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PROMISES AND PERILS: THE POTENTIAL OF AUTOMOBILE TECHNOLOGIES

VIRTUAL HEARING

BEFORE THE

SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

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[1] The letter has been retained in committee files and is available at https://docs.house.gov/meetings/IF/IF17/20210518/112637/HHRG-117-IF17-20210518-SD006.pdf.

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[2] The report has been retained in committee files and is available at https://docs.house.gov/meetings/IF/IF17/20210518/112637/HHRG-117-IF17-20210518-SD013.pdf.

PROMISES AND PERILS: THE POTENTIAL OF AUTOMOBILE TECHNOLOGIES

TUESDAY, MAY 18, 2021

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:34 a.m., via Cisco Webex online video conferencing, Hon. Jan Schakowsky (chair of the subcommittee) presiding.

Members present: Representatives Schakowsky, Rush, Castor, Trahan, McNerney, Cárdenas, Kelly, Soto, Rice, Craig, Fletcher, Pallone (ex officio), Bilirakis (subcommittee ranking member), Upton, Latta, Guthrie, Bucshon, Dunn, Lesko, Pence, Armstrong, and Rodgers (ex officio).

Also present: Representatives Eshoo, Doyle, and Joyce.

Staff present: Jeffrey C. Carroll, Staff Director; Lisa Goldman, Senior Counsel; Waverly Gordon, General Counsel; Jessica Grandberry, Staff Assistant; Daniel Greene, Professional Staff Member; Tiffany Guarascio, Deputy Staff Director; Perry Hamilton, Clerk; Alex Hoehn-Saric, Chief Counsel, Communications and Consumer Protection; James Johnson, Policy Coordinator; Ed Kaczmarski, Policy Analyst; Zach Kahan, Deputy Director, Outreach and Member Service; Mackenzie Kuhl, Digital Assistant; Phil Murphy, Policy Coordinator; Tim Robinson, Chief Counsel; Chloe Rodriguez, Clerk; Andrew Souvall, Director of Communications, Outreach, and Member Services; Sydney Terry, Policy Coordinator; Sarah Burke, Minority Deputy Staff Director; Michael Cameron, Minority Policy Analyst, Consumer Protection and Commerce, Energy, Environment; William Clutterbuck, Minority Staff Assistant/Policy Analyst; Theresa Gambo, Minority Financial and Office Administrator; Nate Hodson, Minority Staff Director; Tim Kurth, Minority Chief Counsel, Consumer Protection and Commerce; and Brannon Rains, Minority Professional Staff Member, Consumer Protection and Commerce.

Ms. SCHAKOWSKY. The Subcommittee on Consumer Protection and Commerce will now come to order. Due to—today we will hold a hearing entitled "Promises and Perils: The Potential of Automobile Technologies."

Due to the COVID–19 health emergency today, the hearing—today's hearing is going to be held remotely. All Members and witnesses will participate via conference.

As part of our hearing, microphones will be set on mute for the purpose of eliminating inadvertent background noise. Members are—and witnesses will need to unmute your own microphone each time that you wish to speak.

Additionally, Members will need to be visible on the screen in order to be recognized.

Documents for the record can be sent to Ed Kaczmarski at the email that we provided to the staff. All documents will be entered into the record at the end of—the conclusion of the hearing.

So the—we will begin with opening statements, and the Chair will now recognize herself for 5 minutes.

OPENING STATEMENT OF HON. JAN SCHAKOWSKY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

So good morning, everyone. Thank you for joining us. Today this subcommittee will hear about the potentials for automobile technologies to improve lives and enhance safety.

Let me state up front: Innovation and revolutionary transportation technologies do not have to come at the expense of our workers or the domestic manufacturing. Hundreds of thousands of Americans are gainfully employed in the automobile manufacturing sector, and more than 4 million Americans work as drivers. As we head into the next era of automobile technology, including autonomous vehicles, we must ensure economic security for the—for this critical workforce and their families.

We also must ensure that these vehicles are safe and accessible to improve mobility.

Twenty-twenty was the worst year in a generation for automobile fatalities and injuries, despite the dramatic decrease in the number of cars that are—actually have been on the road, due to—and I think that that is likely due to the fact that drivers have been more reckless as the roads have been more open.

Crash avoidance systems, lane departure warnings, and other advanced driver assistance systems could save tens of thousands of lives every year. However, the National Highway Traffic Safety Administration has not established safety standards for these technologies. Given the increase in deaths and a—I think, at this point, a deregulatory approach is really unwarranted.

The Federal Government needs to create standards to ensure the safe deployment of technologies that are available now and in the future. Standards will create certainty that is needed to accelerate innovation. I am sure we will hear this morning about the need to compete with China, but we must not do so in—at the expense of the safety of Americans and the American workforce.

So I want to thank all of the witnesses that are here today.

[The prepared statement of Ms. Schakowsky follows:]

PREPARED STATEMENT OF HON. JAN SCHAKOWSKY

Good morning and thank you for joining us.

Today, this subcommittee will hear about the potential for automobile technologies to improve lives and enhance safety.

Let me state up front: Innovation and revolutionary transportation technologies do not have to come at the expense of our workers or domestic manufacturing.

Hundreds of thousands of Americans are gainfully employed in the automobile manufacturing sector. And more than 4 million Americans work as drivers. As we

head into the next era of automobile technologies-including autonomous vehicles-we must ensure economic security for this critical workforce and their families.

We also must ensure that these vehicles are safe and accessible to improve mobility.

2020 was the worst year in a generation for automobile fatalities and injuries despite dramatic decreases in the number of cars on the roads, likely due to more reckless driving on more open roads.

Crash avoidance systems, lane departure warnings, and other advanced driver assistance systems could save tens of thousands of lives per year. However, the National Highway Traffic Safety Administration has not established safety standards for these technologies.

Given the increase in deaths, a deregulatory approach is unwarranted. The Federal Government needs to create standards to ensure the safe deployment of technologies available now and in the future.

Standards will create the certainty needed to accelerate innovation. I am sure we will hear about our need to compete with China, but we mustn't do so at the expense of the safety of Americans or the American workforce.

Thank you to the witnesses for being here today and I yield the balance of my time to my friend and colleague Representative Dingell.

Ms. SCHAKOWSKY. And my intention has been to yield to my colleague and friend, Congresswoman Dingell. Is she there?

Do we have you, Debbie?

[Pause.]

Ms. SCHAKOWSKY. It looks like we don't. So, instead, I am going to yield back, and the Chair now recognizes Mr. Bilirakis, the ranking member of the Subcommittee on Consumer Protection and Commerce, for his 5 minutes for an opening statement.

Mr. Bilirakis, it is yours.

OPENING STATEMENT OF HON. GUS M. BILIRAKIS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Mr. BILIRAKIS. Thank you, Madam Chair, I appreciate it very much. And good morning to everyone. Thank you for holding this important hearing, Madam Chair. And I want to thank today's panel for their testimonies. I am eager to hear their perspectives on this issue.

As you all know, I am from the State of Florida, and many of my colleagues would associate that with the NASA program. The goals set by our space program and its partnership with innovative businesses has had a transformational impact on our economy and our daily lives. It has led to many benefits, from image sensors and mobile phones to hearing aids and improved radial tires. I feel similarly about the topic of the hearing today, automobile technologies, as well as a conversation about the future of autonomous vehicles.

It is important to say "the future of" because there is an assumption among many that these vehicles are already being sold commercially today, when they certainly are not. Driverless vehicles now are still in a very early testing—the very early testing stages, and still have a long way to go. However, by designing our own moonshot framework for AVs, we can set the industry on the path to a fully autonomous vehicle that is currently still many years away.

But the importance of achieving that goal and so many advancements will be borne along the way that will make the current generations of—generation of cars safer and force us to rethink how vehicle designs should evolve. The U.S. must seek that—the high-

est form of autonomy, so we can reap all those benefits. Without that, many of the innovations won't be developed by us, and our economy and society will be at a loss, in my opinion. We will lose the race to other countries around the world.

Additionally, the sad context here is that nearly 40,000 people die each year in traffic accidents, and in almost every case the denominator is the same: human error. The preventable loss of life on our roads is tragic and unacceptable.

The AV ecosystem will also go beyond increasing the safety of our roads. It has the potential to transform the lives of seniors and those living with disabilities in my district in Florida and around the Nation. Every advancement will connect these communities that feel isolated and cut off from everyday routines many take for granted. That means the benefits go beyond safety. It really means opportunity and accessibility.

We have already seen real examples of how our future could be impacted. During the pandemic, AVs transported COVID–19 tests to and from the Mayo Clinic in Jacksonville, Florida. This was occurring at a crucial time and demonstrates the real-world impact we should be embracing.

Again, I do want to be clear: Fully autonomous vehicles are not currently sold on our market today, and they won't be tomorrow. But we must develop a framework path forward so they are safely tested and deployed and, in doing so, educate the public during this transition period of what is occurring in these adaptive technologies.

For that reason, I wanted to specifically call out and thank Professor Rajkumar, from Carnegie Mellon University in Pittsburgh, who is with us today. The professor is a respected authority on the topic and can communicate the facts and myths of this future technology. This objective of informing and educating the public on this issue also led me to introduce—and I will later this week, actually—the Raising Objectivity standards in Advertising Driving Systems, or the ROADS Act. If you could take a look at that bill, I would appreciate it very much, once I introduce. Or, if you have any interest, please contact my office.

This bill will look at ways to most effectively communicate about the capabilities and limitations of advanced driver assistance systems by examining how manufacturers advertise, disclose, label, and name their vehicles—driving systems. It really is common sense. Current vehicle descriptions, such as "autopilot," can mislead consumers into thinking their cars have self-driving capabilities when they do not, much the same—the same way that the public had to understand how antilock brakes work.

They need to understand the benefits and limitations of the current generation of technologies——

Ms. SCHAKOWSKY. Mr. Bilirakis, you are going to need to wind up. You are way over time.

Mr. BILIRAKIS. Let's say 10 more seconds?

Ms. SCHAKOWSKY. Yes, go ahead.

Mr. BILIRAKIS. OK. Again, I am hopeful today serves as a path to move forward with several priorities that this committee has in the automotive space. It will be such a shame if we miss the oppor-

tunity to pass bipartisan legislation that can be included in broader efforts moving us—moving forward.

[The prepared statement of Mr. Bilirakis follows:]

PREPARED STATEMENT OF HON. GUS M. BILIRAKIS

Good morning everyone. Thank you, Madam Chair, for holding this important hearing and thank you to today's panel for your testimony. I am eager to hear your perspectives.

You all know I am from Florida, and many of my colleagues would associate that with the NASA program. The goals set by our space program and the partnership with businesses to serve those needs has had a transformational impact on our economy and our daily lives. It has led to many benefits from image sensors in mobile phones, to hearing aids, and improved radial tires.

I feel much the same way about the topic of the hearing today. When we think about automotive technologies, the conversation is really about the future of autonomous vehicles.

It is important to say "the future of" because there is an assumption that these vehicles are already being sold today. They most certainly are not.

However, by designing our own moonshot framework for AVs, we can set the industry on the path to a fully autonomous vehicle that is still many years away. The importance of that goal though is so many advancements will be borne along the way that will make current generation cars safer and force us to rethink how vehicle designs should evolve.

The U.S. must seek that highest form of autonomy so we can reap all those benefits along the way. Without that, many of the innovations won't be developed by us and our economy and society will be at a loss. Nearly 40,000 people die each year in traffic accidents, and in almost every case, the denominator is the same—human error. The preventable loss of life on our roads is tragic and unacceptable.

The AV ecosystem will also go beyond increasing the safety of our roads. It has the potential to transform the lives of seniors and those living with disabilities. Every advancement will connect these communities that feel cut off from everyday routines many take for granted. That means the benefits go beyond safety, it really means opportunity and accessibility. We have already seen real examples of how our future could be impacted. During the pandemic, AVs transported COVID–19 tests at the Mayo Clinic in Jacksonville, Florida. This was occurring at a crucial time and demonstrates the real-world impact we should be embracing.

Again, I do want to be clear. Fully autonomous vehicles are not in our market today, and they won't be tomorrow. We must develop a framework, so they are safely tested and deployed, and in doing so educate the public during this transition period of what is occurring in these adaptive technologies. For that reason, I wanted to specifically call out Professor Rajkumar (Raj-Koo-Mar) from Carnegie Mellon University who is with us today. The professor is a respected authority on the topic and deals with the facts and myths of this future technology.

I believe so much in being objective with the public on this that it led me to introduce [H.R. XXXX], the "Raising Objectivity standards in Advertising Driving Systems" or the "ROADS Act." H.R. [XXXX] would look at ways to mosteffectively communicate how to educate consumers about the capabilities and limitations of advanced driver-assistance systems by examining how manufacturers advertise, disclose, label, and name their vehicles' driving systems.

Current vehicle descriptions such as "autopilot" can mislead consumers into thinking their cars have self-driving capabilities which they do not. Much to the way the public had to understand how antilock brakes work, they need to understand the benefits and limitations of the current generation of technologies, and that certainly begins with properly describing them.

I am hopeful today serves to move forward with several priorities that this committee has in the automotive space. It will be such a shame if we miss the opportunity to pass bipartisan legislation that can be included in broader efforts moving this Congress.

Thank you again, Madam Chair. I yield back.

Mr. BILIRAKIS. So, anyway, thank you very much, Madam Chair, I appreciate it. Thanks for holding this very important hearing, and I yield back.

Ms. SCHAKOWSKY. The gentleman yields back. And now I call on the chairman of the full committee, Mr. Pallone, for his 5-minute opening statement.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Madam Chair. Last year more than 42,000 people died in the U.S. as a result of auto accidents, and nearly 4.8 million were injured. And these deaths and injuries are preventable, and demand action from Congress and Federal regulators. And we are prepared to meet this challenge with a bold vision for safety innovation that will save lives, boost domestic manufacturing, strengthen our industrial base, protect and create new jobs, and grow wages.

So last—in the last session of the House we passed the Moving Forward Act. That included important auto safety reforms that mandate proven safety technologies that could save 20,000 lives per year. The legislation included the Five Stars for Smart Cars Act, which would have modernized the five-star safety rating and provided consumers with meaningful information about the safety of vehicles. It also included provisions that would have mandated crash avoidance systems and drunk driving prevention technologies. It would have also put an end to children dying in hot cars, prevented carbon monoxide poisoning, and dangerous rollaways of keyless ignition vehicles, and, finally, address glaring limousine safety issues.

And so this is our vision to end the epidemic of automobile crashes and save American lives. And by putting Americans' safety first, we are also putting American workers, the industrial base, and our economy first. An investment in safety is an investment in domestic manufacturing.

Auto manufacturing is still the largest domestic manufacturing sector. But like many manufacturing sectors, our auto industry faces steady headwinds. Domestic auto production has decreased by 11 percent since 1994. And during that same period, nearly a fifth of all vehicle and parts manufacturing jobs were lost, and real wages decreased by 22 percent. And this hollowing out of America's industrial might threatens our economic security and harms our ability to compete internationally. If this century is to be another American century, the United States must harness innovation, strengthen the industrial base, and invest in the American worker.

So that is why I am so pleased that the Biden administration has released a transformative proposal, the American Jobs Plan, to upgrade our Nation's infrastructure, revitalize manufacturing, and shore up supply chains. Cutting-edge technologies like autonomous vehicles hold the promise of improving safety, expanding mobility, and strengthening our economy.

And fortunately, we hold a competitive edge in developing and deploying AVs. According to KPMG, the United States ranks higher in preparedness for AVs than Japan, Germany, and China. We have to preserve and expand this advantage by making sure that the United States, not countries like China, write the rules of the road for this technology. But we must chart a course that balances

deployment with our fundamental American values, and those are safety, workforce protections, and environmental stewardship.

We can't save lives if AVs does not operate safely or adhere to State and local laws. We can't create jobs and grow wages if we don't address how AVs may displace workers. And we can't meet our climate goals if AVs lead to more congestion or undermine our bedrock environmental laws. So Congress can bridge these gaps by creating a national road map for AVs that establishes robust workforce protections for those whose livelihoods may be harmed by the deployment of AVs, ensures that these technologies are developed and manufactured in the U.S., and protects the environment, Americans' rights, and safety.

So I think we have to act thoughtfully to address all these issues. That is why we are having this hearing today.

[The prepared statement of Mr. Pallone follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

Last year, more than 42,000 people died in the United States as a result of automobile accidents and nearly 4.8 million were injured. These deaths and injuries are preventable and demand action from Congress and Federal regulators.

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We must preserve and expand this advantage by making sure that the United States—not countries like China—writes the rules of the road for this technology. But we must chart a course that balances deployment with our fundamental American values: safety, workforce protections, and environmental stewardship.

We cannot save lives if AVs do not operate safely or adhere to State and local laws. We cannot create jobs and grow wages if we don't address how AVs may displace workers. We cannot meet our climate goals if AVs lead to more congestion or undermine our bedrock environmental laws.

Congress can bridge these gaps by creating a national roadmap for AVs that establishes robust workforce protections for those whose livelihoods may be harmed by the deployment of AVs, ensures that these technologies are developed and manufactured in the United States, and protects the environment and Americans' rights and safety.

We have to act thoughtfully to address all these issues, and that's why we're having this hearing today.

Thank you.

Mr. PALLONE. And I wanted to yield a minute and a half now to Representative Doyle.

Mr. DOYLE. Well, thank you, Chairman Pallone, for yielding to me. And thank you, Chair Schakowsky, for holding this important hearing.

I would like to welcome Professor Rajkumar from Carnegie Mellon University in my hometown of Pittsburgh. He directs Mobility 21 and the Metro 21 Smart Cities Institute at CMU. Raj is also a pioneer and leading researcher in the development of AV technologies. His work and that of others at CMU has led Pittsburgh to become a world leader in AV research and development, and it is the reason that I care so deeply about this technology and, as the hearing title alludes to, the promise and perils that it portends.

We, as a government, need to help guide the development and adoption of this technology. Americans need to have faith in the safety and efficacy of AVs. They need to know that someone is accountable when they fail. And we need to have a plan for how this technology is going to increase, and not detract, from equity in our society for workers and for marginalized communities. It is critical that we bring folks to the table and have these important discussions because, if we can't figure out a path forward, someone else will.

Thank you, Mr. Chairman, for this time. Thank you, Chair Schakowsky, for this hearing. I yield back.

Mr. PALLONE. And I yield back, as well, Madam Chair.

Ms. SCHAKOWSKY. The gentleman yields back, and the Chair now recognizes Mrs. Rodgers, ranking member of the full committee, for 5 minutes for her opening statement.

OPENING STATEMENT OF HON. CATHY MCMORRIS RODGERS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mrs. RODGERS. Thank you, Madam Chair. Before I speak on AVs, I would like to appeal to all the members of this committee to support full, in-person hearings. I heard the Chair say at the beginning, "Due to the COVID–19 health emergency, this hearing is being held remotely."

Madam Chair, the CDC guidance allows for in-person hearings. It is time. The Senate is holding in-person hearings. I am a proud member of this committee. We often say we all know that it is the best committee on Capitol Hill. And I speak for many of my colleagues who are eager to do the people's work again together, face to face, not through a computer screen or muted.

Virtual hearings are taking a toll on this committee's important work and further breaking down our effectiveness. Let's come together. Let's reopen E&C to legislate and plow the hard ground

necessary to get things done on behalf of the people that we have the honor to represent in the People's House.

Now, turning back to today's hearing, this is a critical time for us to be discussing the advancement of autonomous technologies that will bring more efficient movement of people and goods, further reduce carbon emissions, save lives—currently, 37,000 people, on average, die on our roadways, most due to human error—and improve mobility for so many.

The surface transportation bill expires this year, and discussions on its reauthorization are currently underway.

At the same time, U.S. leadership in innovation and next-generation technologies is being challenged by adversaries like the China—Chinese Communist Party. To win the future and beat China, the Energy and Commerce Committee must again move bipartisan legislation. We must act now to ensure the U.S. continues to lead in technologies like AVs. If we fail to act as we did last Congress, not only do we risk ceding global leadership to China, but here in Congress we risk ceding this committee's stewardship of these matters. Our fellow committees will not hesitate to legislate on next-generation technologies and creep in on our jurisdiction.

So how should we think about these challenges before us?

Ralph Waldo Emerson once wrote, "Do not follow where the path may lead. Go instead where there is no path, and leave a trail." Now, he was not talking about autonomous vehicles when he wrote that. Yet it is a fitting way to think about the future, and the future of these technologies, and the opportunity that we have on this committee to lead with unique solutions.

As with any new technology, businesses of all sizes and sectors will be disrupted and forced to adjust. The workforce will need to be retrained to prepare and adapt.

At the same time, we are already seeing the benefits associated with AVs. During COVID we have witnessed how AVs can be used to deliver critical food, medical supplies, virus tests, and other needed provisions. During this time many of us have also experienced some degree of restrictions as to where we can go and what we can do.

Sadly, for many of our senior citizens and those with disabilities, these are the kinds of restrictions that they live with every single day. But AV technology has the power to tremendously improve their access and mobility. The idea that someone with a disability could one day be able to get into a car and go wherever they need to go is revolutionary. Many of these adjustments will be challenging, but they will be more challenging if the U.S. is not forging the path and leading the way. If we do not lead, we will empower our adversaries to chart the future for AVs, artificial intelligence, and other critical and emerging technologies this committee has championed.

China is moving forward with ambitious plans to lead the development and deployment of AVs. Their authoritarian regime is already providing a roadmap. We cannot trust the CCP to set the standards for this industry, and we certainly cannot trust them to protect intellectual property and individual rights. The standards and regulatory framework must be led by the United States.

America values the importance of safety of our citizens. China does not. We value our workforce and free market economies. China does not. We value civil society groups and their right to speak freely. China does not. We uphold Western values like liberty, individualism, and human rights. And we culture—and we cultivate innovation, entrepreneurship, and competition from the ground up. China does not.

To win the future, the United States of America must lead on AVs. We must chart the path so that all of these considerations can be part of the road we design and not determined by our adversary that does not respect our ideals and values.

[The prepared statement of Mrs. Rodgers follows:]

PREPARED STATEMENT OF HON. CATHY MCMORRIS RODGERS

Good morning.

Before I speak on AVs, I would like to appeal to all members of this committee to support full in-person hearings. It's time. The CDC guidance allows for it. The Senate is holding in-person hearings. Other committees in the House have been in-person in some capacity. It's time for us to also lead the way.

I speak for many of my colleagues who are eager to do the People's work again—together face to face not through a computer screen or muted. Please, let's come together and reopen E&C to legislate and plow the hard ground to get things done.

Now, turning back to today's hearing. This is a critical time to be discussing the advancement of automotive technologies. The surface transportation bill expires this year, and discussions on its reauthorization are currently underway. At the same time, U.S. leadership in innovation and next generation technologies is being challenged by adversaries like the Chinese Communist Party.

To win the future and beat China, the Energy and Commerce Committee must again move bipartisan legislation—we must act now to ensure the U.S. continues to lead in technologies like AVs.

If we fail to act as we did last Congress, not only do we risk ceding global leadership to China, but here in Congress we risk ceding this committee's stewardship of these matters. Our fellow committees will not hesitate to legislate on next generation technologies and creep in on our jurisdiction. So how should we think about these challenges before us?

Ralph Waldo Emerson once wrote, "Do not follow where the path may lead. Go instead where there is no path and leave a trail." He was not talking about autonomous vehicles when he wrote that, yet it is a fitting way to think about the future of these technologies and the opportunity we have on this committee to lead with unique solutions.

As with any new technology, businesses of all sizes and sectors will be disrupted and forced to adjust. The workforce will need to be re-trained to prepare and adapt for future opportunities. At the same time, we are already seeing the benefits associated with AVs. During the COVID–19 pandemic, we've witnessed how AVs can be used to deliver critical food, medical supplies, virus tests, and other needed provisions.

During this time, many of us have also experienced some degree of restrictions for where we can go and what we can do. Sadly, for many of our senior citizens and those with disabilities, these are the kinds of restrictions they live with every single day but AV technology has the power to tremendously improve their access and mobility. The idea that someone with a disability could one day be able to get into a car and go wherever they need to go is revolutionary. Many of these adjustments will be challenging, but they will be more challenging if the U.S. is not forging the path and leading the way.

If we do not lead, we will empower our adversaries to chart the future for AVs, artificial intelligence, and other critical and emerging technologies this committeehas championed. China is moving ahead with ambitious plans to lead the development and deployment of AVs. Their authoritarian regime is already providing a roadmap to deploy AVs throughout China.

We cannot trust the CCP to set the standards for this industry and we certainly cannot trust them to protect intellectual property. The standards and regulatory framework must be lead by the U.S. America values the importance of the safety of our citizens—China does not. We value our workforce and free market economics—China does not. We value civil society groups, and their right to speak freely—

China does not. We uphold Western values like liberty, individualism, and human rights and we cultivate innovation, entrepreneurship, and competition from the ground up—China does not.

To win the future, the U.S. must lead on AVs. We must chart the path so all of these considerations can be part of a road we design, not determined by an adversary that does not respect our ideals and values. I look forward to the discussion today. With that I yield back, Thank you.

Mrs. RODGERS. I look forward to this discussion today, and with that I yield back. Thank you.

Ms. SCHAKOWSKY. The gentlewoman——

[Audio malfunction.]

Ms. SCHAKOWSKY. I think that is me. No? OK.

The gentlewoman yields back.

The Chair would like to remind Members that, pursuant to committee rules, all Members' written opening statements shall be made part of the record.

And now I would like to introduce our witnesses for today's hearing.

We have—Jason Levine is the director of—is the executive director of the Center for Auto Safety.

Raj—I will get this right—Raj Rajkumin—Raj Rajkumar is the George Westinghouse professor in the Department of Electric and Computer Engineering at Carnegie Mellon University.

And Greg Regan is the president of the Transportation Trade Department of the AFL–CIO.

So we want to thank our witnesses for joining us today. We look forward to your testimony.

Mr. Levine, you are recognized now for 5 minutes.

STATEMENT OF JASON LEVINE, EXECUTIVE DIRECTOR, CENTER FOR AUTO SAFETY; RAGUNATHAN "RAJ" RAJKUMAR, PH.D., DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, CARNEGIE MELLON UNIVERSITY; AND GREG REGAN, PRESIDENT, TRANSPORTATION TRADES DEPARTMENT, AFL–CIO

STATEMENT OF JASON LEVINE

Mr. LEVINE. Thank you, and good morning. Good morning, Chairman Pallone, Chairwoman Schakowsky, Ranking Member McMorris Rodgers, and Ranking Member Bilirakis. And thank you for holding this important hearing today.

My name is Jason Levine, and I am the executive director of the Center for Auto Safety. Since 1970 the center has been the Nation's premier, member-supported, independent, nonprofit consumer advocacy organization dedicated to improving vehicle safety, quality, and fuel economy for all drivers, passengers, and pedestrians.

The topic of today's hearing is "Promises and Perils: the Potential of Automobile Technologies."

For 51 years the Center for Auto Safety has urged using proven vehicle safety technology to protect everyone inside and outside vehicles. The promise of such technology in combination with smarter infrastructure and a dedication to consumer rights is a safer world for all, starting right now.

The perils are our continued acceptance of 115 deaths a day every year, the equivalent of everyone in a sold-out Washington Nationals Park being killed.

A lot has changed in the 2 years since I last had the honor of appearing before this subcommittee. Obviously, the last time we met in person, and today we are connected virtually. Sadly, however, far too much has remained the same. Since May 2019, an estimated 80,000 lives have been lost due to vehicle crashes in the United States. Last year, an estimated 42,060 lives were taken, representing an incredible 8 percent increase from the previous year, and the greatest year-over-year increase since 1924.

There are still an estimated 5,000 deaths involving heavy trucks, annually killing both truck drivers and other road users, such as 6-month-old Leo Wallace of South Bend, Indiana, who was killed last week in a rear-end collision.

The fatality rate in rural communities remains twice as high as in America's urban areas. Pedestrians, bicyclists, and other vulnerable road users now number over 7,000 deaths annually, including the death in November of Larry Willis, the president of TTD.

Greg, our condolences go out to you and everyone in the TTD family.

This ongoing public health crisis is, in large part, due to our vehicle safety policy remaining in pit row, while the rest of the world laps us by focusing on using available safety technology. Taylor Grace Warner died at 17 months old when her parents' seatbacks collapsed in a crash. Sammy Cohen Eckstein was run over at age 12 in the street outside his home by a speeding van. Jewel Brangman died at age 26, as a passenger, when a defective recalled airbag deployed shrapnel in her face.

These victims and many thousands like them derive no benefit from counting the number of state-funded companies exposing Chinese citizens to the risks of automated vehicle technology. Their families took no comfort from discussions about the need to protect AV manufacturers from liability, even after Elaine Herzberg, a pedestrian, was killed by an automated test vehicle in Arizona. Conversations about limiting common-law liability make no one's funeral less awful.

But there is a better way. We recommend a four-pronged approach to seize on the potential of existing and yet-to-come vehicle technologies: Federal Government involvement, data collection, gated certification, and requiring standards for proven advanced driver assistance systems.

However, instead of a debate about solutions to an actual crisis, crash victims and their families must suffer through another round of Chicken Little commentary decrying that, if we do not immediately put all our eggs in the driverless vehicle basket, the U.S. will lose out in the race to be first to transportation and environmental nirvana.

Yet few AV proponents who claim to be motivated by vehicle safety mention that the 29 countries making up the European Union experienced record-low vehicle-related deaths just last year, without a single driverless vehicle on the road. The EU, despite a larger population, and an almost identical number of vehicles and land size, had fewer than 19,000 crash deaths last year, a total

that is less than half of the U.S. death toll. This disparity is unacceptable.

The United States remains home to the greatest vehicle innovators in the world. The time is now to use proven safety innovations in a way that can save lives immediately. We want to thank this committee for your ongoing focus on vehicle safety, an issue that impacts every single American.

On behalf of our members, the Center for Auto Safety stands ready to assist however we can. We have provided more details in our written submission, and I look forward to your questions today.

[The prepared statement of Mr. Levine follows:]

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House Committee on Energy and Commerce

Consumer Protection and Commerce Subcommittee

May 18, 2021

HEARING: PROMISES AND PERILS:
THE POTENTIAL OF AUTOMOBILE TECHNOLOGIES

Good morning. Thank you, Chairman Pallone, Chairwoman Schakowsky, Ranking Member McMorris Rodgers, and Ranking Member Bilirakis for holding this important hearing today. My name is Jason Levine, and I am the Executive Director of the Center for Auto Safety. Since 1970, the Center has been the nation's premier member-supported, independent, non-profit consumer advocacy organization dedicated to improving vehicle safety, quality, and fuel economy for all drivers, passengers, and pedestrians.

The topic of today's hearing is Promises and Perils: The Potential of Automobile Technologies. For fifty-one years, the Center for Auto Safety has urged utilizing proven vehicle safety technology to protect everyone inside and outside vehicles. The promise of such technology, in combination with smarter infrastructure, and a dedication to consumer rights, is a safer world for all starting right now. The perils are our continued acceptance of 115 deaths a day each year – the equivalent of everyone in a sold-out Washington Nationals Park being killed – and trying to explain to our grandchildren why we ignored a public health crisis for which solutions were readily available.

A lot has changed in the two years since I last had the honor of appearing before this Subcommittee. Obviously, last time we met in person – and today we are connected virtually. Sadly however, far too much has remained the same. Since May 2019, an estimated 80,000 lives have been lost due to vehicle crashes in the United States. Last year, an estimated 42,060 lives were taken, representing an incredible eight percent increase from the previous year and the greatest year-over-year increase since 1924.[1] Pedestrian, bicyclist, and other vulnerable road user deaths now number over 7,000 annually, including the death in November of Larry Willis, the President of Transportation Trades Department, one of today's panelists.[2] There are still an estimated 5,000 deaths involving heavy trucks annually, killing both truck drivers and other road users, such as six-month old Leo Wallace of South Bend, Indiana who was killed last week in a rear end collision.[3] The fatality rate in rural communities remains twice as high as in America's urban areas.[4]

This ongoing public health crisis is in large part due to our vehicle safety policy remaining in pit row while the rest of the world laps us by focusing on using available safety technology right now.

Taylor Grace Warner died at seventeen months old when her parents' seatbacks collapsed,[5]

Sammy Cohen Eckstein was runover at age twelve in the street just outside his home by a speeding van,[6]

Jewel Brangman died at age 26, as a driver, when a defective recalled airbag deployed shrapnel in her face.[7]

These victims, and many thousands like them, derived no benefit from counting the number of state funded companies exposing Chinese citizens to the risks of unregulated automated vehicle technology. Their families took no comfort from discussions about the need to protect autonomous vehicle (AV) manufacturers from liability even after Elaine Herzberg – a pedestrian – was killed by an automated test vehicle in Arizona. Conversations about limiting common law liability make no one's funeral less awful.

However, instead of a debate about solutions to an actual crisis, victims must suffer through another round of Chicken Little commentary decrying that if we do not immediately put all our eggs in the driverless vehicle basket the U.S. will lose out in the race to be first to transportation and environmental nirvana. Yet, few AV proponents who claim to be motivated by vehicle safety mention that the twenty-nine foreign countries making up the European Union (EU) experienced record low vehicle related deaths just last year, without a single driverless vehicle on the road. The EU, despite a larger population, and an almost identical number of vehicles and land size, had fewer than 19,000 crash deaths last year, a total less than half of the U.S. death toll.[8] This disparity is unacceptable.

There is a better way. We recommend a four-pronged approach to seize on the potential of existing and yet-to-come vehicle technologies to protect everyone on U.S. roads.

Federal Government Involvement: There must be federal government involvement to create rules and oversight fostering an environment that can iteratively introduce innovative vehicle technology safely to the market thus laying the groundwork for consumer confidence. Creating and enforcing safety standards is one of the most useful tools at the federal government's disposal to assist in achieving the National Highway Traffic Safety Administration's (NHTSA) core mission of saving lives, preventing injuries, and reducing economic costs due to road traffic crashes. By writing minimum performance standards for vehicles and components, NHTSA can provide a baseline on which both manufacturers and consumers know they can rely. Further, automotive history has repeatedly shown that absent regulation requiring the adoption of life-saving technology, safety is typically only available for an additional price – a price frequently paid by everyone on the road.

Data Collection: There must be data collected, and shared, from driverless test vehicles to provide not only the basis for needed rules but also to enable the public to differentiate between manufacturers who innovate for safety from those who do not. The need for such mandated data collection is why the Center petitioned NHTSA in 2018 to begin a rulemaking to require AV manufacturers testing on public roads to submit uniform data.[9]

Moreover, uniform data, shared with the public, is the basis upon which NHTSA's New Car Assessment Program (NCAP) is based. That the world has imitated our NCAP, better known as the 5 Star Crash Ratings, demonstrates that it is inarguably the greatest market-based, nonregulatory safety program in automotive history.[10] Critically, due to a lack of useful comparative data, almost 100% of all new vehicles in the U.S. receive top ratings. NCAP's current state is akin to a youth soccer game where no one keeps score to avoid hurting feelings, but in this case consumers are losing. Updating NCAP would again incentivize safety innovation, as it has in Europe and around the world.[11]

Gated Certification: There must be competent examination and oversight of AVs as they mature to assure that safety claims match the reality of manufacturer developments and objectively

supervised operational experience. Public safety currently demands that every motor vehicle operated on the nation's public roads be controlled by a licensed operator, qualified by examination, with no exceptions. This simple notion underlies all Federal, state, and local road laws; vehicular tort case law; commercial, for-hire, and private licensing; vehicular law enforcement; operator training and certification; and vehicular design.

Just as new human drivers must pass certain criteria, including age, paper exams, driving exams, driving experience, etc., prior to being permitted to legally operate a vehicle in all conditions, the same should be true for computers. Establishing objective operational safety standards which can be verified by an outside third-party prior to unfettered public deployment is a critical step in achieving long term driverless success.[12]

Requiring Performance Standards for Proven Advanced Driver Assistance Systems (ADAS): One of the most easily identifiable differences between the U.S. and the EU is the far greater number of vehicle safety features which are standard overseas. Heavy trucks are required to have automatic emergency braking (AEB), speed assist features, and underride guards. EU vehicles are currently rated on how well they protect pedestrians and other vulnerable road users, a comparison component unavailable in the US NCAP. [13] By 2022, all new passenger vehicle models in the EU will come equipped with a suite of ADAS features that remain optional or non-existent equipment on US vehicles.[14] In 2018, the National Transportation Safety Board (NTSB) issued eight safety recommendations to NHTSA addressing the need to include performance-based standards for vehicle headlight systems, development of performance test criteria for vehicle designs that reduce pedestrian injuries, and incorporation of pedestrian safety systems including pedestrian collision avoidance systems and other more passive safety systems into NCAP.[15] More than 20,000 vulnerable road user deaths later, nothing has changed.

Further, many of today's ADAS features are unquestionably the building blocks of future vehicle automation. Creating performance standards and requiring features such as AEB, Lane Departure Warnings, Forward Collision Warnings, Blind Spot Detection, Cross Traffic Warning, Rear AEB, Smart Headlights, Driver Monitoring Systems, and Advanced Automatic Crash Notification, will not only save lives now but will be part of the slow climb to AVs which work hand in glove with human drivers. Driver Monitoring Systems alone have the potential to combat distracted, drowsy, drunk, drugged, and automation complacent driving, which combined lead to tens of thousands of deaths annually, but are currently not required by NHTSA or rated in NCAP.

The United States remains home to the greatest vehicle innovators in the world. The time is now to use proven safety innovations in a way that can save lives immediately.

We thank this Subcommittee for your ongoing focus on vehicle safety, an issue that impacts every single American. Please see below for more ideas and specifics on how Congress can improve vehicle safety and consumer protection. On behalf of our members, the Center for Auto Safety stands ready to assist however we can in the cause of safety.

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No single mistake should ever cost someone their life - especially when existing technology, available at reasonable price, can mitigate or eliminate potential tragedy and does not interfere with the utility of the vehicle. One of the greatest potentials for automobile technology is the opportunity to use it to prevent crashes before they occur. Conversely, consumers have their lives imperiled every day because instead of employing available technology, proven consumer protections, and targeted government involvement, manufacturers and policymakers find it easier to chase headlines and sound-bite solutions. Below we present a variety of additional immediately achievable policy, technical, and legal solutions to address critical vehicle safety issues and save lives as soon as possible.

Preventing crashes and resulting injuries and fatalities by using safety standards

In addition to the variety of ADAS features listed above, there are other long-standing opportunities for NHTSA to act to improve the safety of consumers in and around motor vehicles. To be able to successfully engage in these tasks, however, NHTSA needs both the will to take on the challenge and the resources to do so. Amongst the most important actions Congress can take to help NHTSA oversee advanced auto safety technologies, and improve vehicle safety overall, is to provide the agency with adequate funding.

Over the last 40 years, while the number of vehicles on the road and the number of drivers have both doubled, America's only federal safety agency with rulemaking and enforcement authority has seen its vehicle safety appropriations (adjusted for inflation) drop as much as forty percent. The Rulemaking, Enforcement, and Research and Analysis departments at NHTSA, which have been directly responsible for vehicle crashworthiness and other safety standards that have saved hundreds of thousands of lives since NHTSA's founding five decades ago, remain significantly underfunded.[16] Such chronic underfunding only encourages the cynical narrative that NHTSA is incapable of overseeing the driverless vehicle industry due to a lack of resources. As discussed above, not only can the federal government play a significant role in the development of AVs, it must.

As also noted above, improving the safety of today's vehicles is a key building block for the vehicles of the distant future. Accordingly, NHTSA should flex its rulemaking muscles to begin the process of updating standards written for now-antique vehicles in order to provide today's road users optimal protection based on current technology. Additionally, the agency should create new standards to ensure the ADAS technology of today works to reduce crashes, which will lay the groundwork for the next generation of safer vehicles. The overdue rulemaking docket at NHTSA, from Congressional mandates, public petitions, and NHTSA's own research is too long to list here in its entirety. One area where the agency could begin to address the backlog would be with the safety of rear seat passengers.

Compel NHTSA to Update the Seatback Standard. Federal Motor Vehicle Safety Standard (FMVSS) 207, which specifies minimum seat and seatback crash performance levels, was written in 1967, published with a slight change in 1968. At the time it was possible to pass the test with the type of chair one might find at a banquet hall, and unlike many aspects of vehicle safety, it has never been modernized. Over the last fifty-four years, there have been thousands of rear end crashes resulting in horrific deaths and life-altering injuries often caused by a parent being thrust backward over their collapsed seat at such a speed and force as to kill or paralyze their own child. For decades, the Center for Auto Safety has urged both the industry and the agency to upgrade

the standard to save lives and stop catastrophic injuries, yet to no avail. Two petitions remain unanswered at NHTSA even now.

In July 2019, NHTSA released a study documenting changes to FMVSS 207 that would reduce seat back dynamic rotation and prevent injury to rear passengers.[17] Included in the data analysis was a figure that shocks the conscience: an estimated cost of less than $4.62 per automatic seat ($1.92 for manual seats) to make the adjustments that could prevent many of these life-altering injuries from taking place.

It is the moral obligation of a society to use available, affordable, science-based solutions to limit risks that can kill or severely injure unsuspecting individuals. On behalf those whose precious lives were cut far too short as a result of seat failures and those whose catastrophic injuries dramatically changed their lives, including Taylor Grace Warner, Jayden-Faith Fraser, Emily Reavis, Owen Reavis, Teddy Schwab, Jaklin Romine, Russell Selkirk, Travis Oldhouser, Thomas Comella, Geneva Massie, Crystal Collins, Mary Portis, Dzemila Heco, Aaliyah George, Heikki Helava, and Clyde M. Sneed and so many thousands of others who should never have had to suffer from decades of auto industry delay and the government's unwillingness to upgrade the seatback design standard for less than the cost of a cup of coffee per seat, we ask that Congress step in and mandate the needed safety upgrade.

Require NHTSA Complete the Rear Seat Belt Reminder Rule: As part of the Moving Ahead for Progress in the 21st Century Act (MAP-21) (Pub. L. No. 112-141) on July 6, 2012, Congress mandated that NHTSA write a rule requiring a reminder for rear seat passengers to put on their seatbelt. According to NHTSA's own data, annually almost 1,000 deaths befall unbelted passengers in the rear seat of vehicles. Studies have suggested unbelted rear seat passengers may be as much as eight times as likely to be injured or killed in crash.

Congress required this rule to be in place by October 1, 2015. Unfortunately, NHTSA refused to act until litigation was brought by the Center for Auto Safety, and KidsandCars.org. However, instead of moving forward to finalize the rule as mandated by law, an Advance Notice of Proposed Rulemaking (ANPRM) was published on September 27, 2019.[18] Nine years have passed without significant action on this rule, a rule based on pre-existing technology and mandated by Congress which could potentially help save a thousand lives a year.

Require NHTSA Establish Side Impact Performance Requirements for Child Restraint Systems: In recognition of the need to protect the most vulnerable passengers in motor vehicles, Congress mandated an update to FMVSS 213 in 2012 as part of MAP-21. These changes were necessary to improve the protection of children seated in child restraint systems (CRS) during side impacts. The agency issued an NPRM seven years ago, on January 28, 2014.[19] While some rules regarding CRS have recently moved forward,[20] there has been no progress on side impact tests. The urgent need for clear federal leadership with CRS was only recently highlighted by recent allegations of false advertising and unsafe products in a Congressional report.[21] We strongly urge that the 2014 NPRM be revived and movement towards a final rule be given priority.

Preventing crashes and resulting injuries and fatalities by using data

We are blessed to live in a moment when the analysis of large amounts of data by machines, programmed by people, has revealed amazing results. The ability of doctors and epidemiologists during the last year of the pandemic to isolate information and locate details related to infectious diseases has been something at which everyone can marvel.[22] Even professional sports have

discovered the tremendous advantages provided by poring over large data sets.[23] Yet, when it comes to vehicle safety, our systems lag far behind.

The Center for Auto Safety has spent decades advocating for collecting, sharing, and analyzing crash data and other vehicle information, because such data has repeatedly proven to be critical in advancing safety for everyone who interacts with the vehicles on the road today. Better data can shed light on inequitable transportation outcomes in marginalized communities and provide new methods to improve the efficiency of America's vehicle network. There are a variety of opportunities for Congress to act to change our outdated data gathering and analytics systems for vehicle safety. Here are a few:

Require an Update to Event Data Recorders: In 2006, NHTSA published a final rule regarding Event Data Recorders (EDRs or "black boxes").[24] The rule set out data element requirements for vehicles in which the manufacturer chose to install an EDR but did not mandate EDRs in all vehicles. Six years later, in 2012, NHTSA published a Notice of Proposed Rulemaking, proposing that EDRs be required in all vehicles, yet did not update any of the data elements collected by the EDRs.[25] Seven years later, in February 2019, NHTSA's proposal to mandate EDR installation was withdrawn based on wide voluntary adoption of EDRs. However, the data elements required to be collected still have not been updated since 2006, long before the implementation of many of today's advanced vehicle technology systems.

Government investigators do not have the necessary tools to accurately reconstruct crashes based on currently available EDR data and often must rely on the least objective party after a crash – the manufacturer. By modernizing required EDR data elements to capture more data (data new vehicles are frequently already capturing unbeknownst to the owner) such information could be made readily portable to existing NHTSA databases, including the Fatality Analysis Reporting System (FARS) and other NHTSA crash data systems. Such a modernization could assist in assuring that new vehicle technologies function as intended to reduce crash death and injury and allow for a reduction in reliance on police crash report narratives that are often incomplete. Such a step could also significantly reduce burdens on states, police departments, and FARS analysts, and potentially speed up FARS data completion and data release, which is necessary in the face of rapidly changing technology.

An immediate expansion of EDR data elements to capture events where driver assistance technologies played a role in the crash is necessary. NHTSA would serve the motoring public, and the automotive and technology industries, well by expanding the role of EDRs to capture a broad range of advanced vehicle operation information to inform future research and rulemaking. It is often said that new vehicles are computers on wheels. Yet, these computers still crash, and determining what happened, and how to avoid it happening again, will require not only additions to traditional data elements, but may well necessitate the incorporation of data from video, LIDAR, RADAR and other sensors as well. Long-term consumer acceptance of advanced vehicle technology is dependent upon confidence in why crashes are happening. The best way to know is to have useful data from vehicles whether they are in person-driving mode, computer-driving mode, or anything in between.

Require Improvements to the Fatality Analysis Reporting System: NHTSA's Fatality Analysis Reporting System (FARS) is a blunt instrument for the vital task of helping to track vehicle crash related fatalities as well as assisting researchers and regulators in determining causality and spotting trends. The FARS system, along with the Model Minimum Uniform Crash Criteria (MMUCC), desperately need data element expansion to provide more useful analytical

information for crashes involving pedestrians, non-motorized vehicles, and ADAS. States must be encouraged to modernize and standardize their crash reporting systems as well.

Unfortunately, when created, FARS was set up to only include fatalities which occur on public roadways, (or "traffic") and to only capture deaths which occur within thirty days of the crash. As a result, thousands of vehicle related deaths every year on private roads, in driveways, parking garages, and workplaces are not captured in the federal government's official vehicle related death toll. The last time a Non-Traffic Surveillance (NTS) report was completed (in 2018) it counted 2,125 vehicle related deaths, including children backed-over in front of their homes, asphyxiated in the back seat by heat stroke, crashes in parking lots, senior citizens killed by Carbon Monoxide poisoning, and employees killed on the job on private property.[26] It is long past time that FARS be updated to include NTS data on a permanent basis.

Moreover, for the purpose of not just counting the dead, but preventing their deaths, FARS should be expanded to include crashes with severe injuries or damage even without deaths. Finally, with vehicle crash related deaths in the United States on the rise, the necessity of more quickly compiling and releasing improved FARS data to the public has never been greater. Currently this information is officially released only annually. The goal should be a quarterly data drop.

Require the Modernizing of the Early Warning Reporting System: In 2000, the Transportation Recall Enhancement, Accountability, and Documentation Act (TREAD Act) was passed in response to hundreds of fatalities involving defective Firestone tires on Ford Explorers, defects that should have been discovered earlier by NHTSA, and deaths that could have been prevented by that discovery. One of the most significant programs mandated by the TREAD Act was an Early Warning Reporting (EWR) system requiring auto manufacturers to submit information to NHTSA on all the vehicle death and injury claims the car makers received. Unfortunately, the system developed by Congress in the TREAD Act when implemented by NHTSA failed to serve its intended purpose. This was demonstrated by the government's inability to detect and act on even the most widespread deadly defects, including GM ignition switches and Takata airbag inflators. EWR can be a vital tool for safety but to be effective it must include more information about each serious injury or fatality from manufacturers and provide more transparency to the public about these incidents, allowing for essential external oversight.

Autonomous Vehicles (AVs)

With full confidence of the ability of an adequately resourced and focused Department of Transportation to tackle the challenge of introducing current technology while overseeing the safe development of new technology, we believe the time for Congressional leadership that gives the best chance for the safe development of AV technology is now. The timing for such action - before the public decides all this talk of driverless cars is just more misleading advertising by the car industry – is critical. If Congress chooses to allow the market to figure it out on its own, today's outlandish "Full Self Driving" and "Autopilot" claims by companies like Tesla may soon seem tame. Worse still, the generational opportunity to change transportation safety for everyone on the road will be inevitably delayed by legitimate public fear.

Hyperbolic claims by some auto manufacturers and their new Silicon Valley partners aside, most drivers do not routinely kill their fellow motorists and pedestrians. The reality is that technological changes to design and safety features, in combination with holding irresponsible manufacturers liable for dangerous products; educational and legal efforts to reduce distracted, drowsy, drunk, and drugged driving; and significant and periodic improvements in required minimum vehicle

performance standards have saved hundreds of thousands of lives and can save even more. The idea that tens of thousands of unproven and unregulated AVs deployed quickly and without oversight, or a significant upgrade in highway and road infrastructure, will automatically be safer than what we have now may make for a good talking point in a quarterly earnings report – but is not good transportation policy.

It is also worth noting, that while competition is a healthy driver of innovation, particularly in the automobile market, contrary to the claims of some the United States is not losing the race for driverless vehicle development to China. The KPMG 2020 Autonomous Vehicles Readiness Index ranks the preparedness of nations for AV development. The United States is ranked sixteen places ahead of China's 20th place finish.[27] According to the Index, over 400 AV companies call the U.S. home. Instead of panic, what is needed is a clear vision for how to safely introduce automated driving in a way that will provide benefits to all involved, not just shareholders. This is where legislators come in.

As Congress undertakes the vital task of writing our nation's first autonomous vehicle law, we urge this Subcommittee to keep in mind the need to protect consumers in order to successfully move the needle forward for AV safety and deployment in the decades ahead. In addition to the criteria mentioned above, such as mandatory standards, data collection, and a gated certification regime, any AV legislation must include cyber security standards, a vision test, updated occupant protection standards, pedestrian and other vulnerable road user protection standards, while maintaining current state, local, and common law rights and authorities.[28] It is vital that an AV law does not preempt protections provided by state and local rules of the road regarding the operation of vehicles on their streets, as the cavalier attitude of some in the auto industry is well documented. Access to courts, for innocent victims killed by an experiment for which they did not volunteer, remain the final consumer protection backstop in an unregulated environment. Further, as it remains likely that AV companies will treat contracts involving automated technology like software or smartphone agreements, binding arbitration must be forbidden in direct-to-consumer contracts.

Finally, some have suggested a preference for voluntary, industry written, standards. Following a voluntary standard model for AVs is a fool's errand. Industry voluntary standards, created for commercial purposes, can be a nice benchmark but can also be easily ignored or subverted at any time by any participant. To act as a bridge between testing and performance standards, we recommend taking a gated certification style approach. Voluntary standards for AVs are not an acceptable substitute for stringent mandatory performance standards which allow for innovation while protecting populations.

Consumer Protection & Corporate Oversight

Today's hearing is focused on the "Potential of Automobile Technologies," a topic which we believe is inextricably linked with consumer protection and corporate oversight. Afterall, the purpose of advanced vehicle technology is to protect consumers, particularly those who may be bystanders to a vehicle possessing the latest unproven features. Further, amongst the essential roles for government is to be a watchdog over the for-profit entities in the vehicle marketplace. A well-functioning automobile ecosystem will include the checks and balances of consumer protection and corporate oversight along with the push and pull of profit and loss reports.

Compel NHTSA to Immediately Implement the Motor Vehicle Safety Whistleblower Act: In recognition of the importance of corporate whistleblowers to transparency and safety, Congress

included incentives and protections for vehicle whistleblowers in the FAST Act in December 2015.[29] The new law required the Transportation Secretary to promulgate regulations related to the Act within 18 months of passage (June 4, 2017). Few industries are historically so in need of such internal oversight mechanisms as is the auto industry. It is worth remembering that the NHTSA whistleblower program is focused on finding misdeeds that can not only cost consumers their money – but take their lives. NHTSA has so far failed to flesh out the details of the process, thus disincentivizing good corporate citizens from coming forward to protect the public.

In recent years alone, whistleblowers have risked their careers to make the public aware of auto industry malfeasance. Takata's defective airbag inflators, which have killed dozens, injured hundreds, and led to the largest recall in automotive history, were exposed by multiple whistleblowers in 2014.[30] In 2017, a Kia whistleblower revealed the manufacturer had an engine defect leading to millions of vehicles being recalled in the United States, and millions more around the world, for potential engine failures and fire risk.[31] The need for such a program has been repeatedly demonstrated by other federal agencies and should have been in place four years ago. The lack of this rule may at this very moment be delaying a potential whistleblower from bringing forth safety information regarding the next mass recall. The time for NHTSA to implement the Motor Vehicle Safety Whistleblower Act is now.

Provide NHTSA with Imminent Hazard Authority: It remains an enduring mystery in auto safety oversight that the NHTSA does not have the authority to declare a particularly dangerous vehicle an imminent hazard and get it off the road, to protect consumers. Congress should authorize the NHTSA Administrator to immediately remove vehicles from the road that pose an unreasonable risk to safety. Currently, the Federal Motor Carrier Safety Administration has the authority to immediately prohibit individuals, vehicles, and fleets of vehicles from operating commercially.[32] NHTSA remains unable to appropriately respond should an imminent hazard threaten vehicles in the US transportation network.

Compel NHTSA to Complete Corporate Responsibility Rules: New rules for corporate reporting to NHTSA were required by MAP-21, in 2012, yet have not been completed. Corporate actors should be responsible for their own defective and dangerous products. Congress enacted exactly such a requirement, requiring auto manufacturers submitting information in response to a NHTSA safety investigation have a senior official certify that the information submitted to the government is accurate and true. Logically speaking, NHTSA should have a self-interest in ensuring the agency does not receive false information in safety investigations, yet the rule remains incomplete. Similarly, Congress should provide NHTSA with criminal penalty authority to further discourage false reporting/delayed reporting.

Recalls

For over fifty years, the Center for Auto Safety has been involved with identifying dangerous vehicles and working to have them recalled from the road to protect everyone's safety. From exploding gas tanks to faulty tires and deadly airbags, defective vehicles need to be recalled to limit injuries and deaths. Making sure manufacturers agree to recalls – and repairs that resolve the safety defect – is no easy task. Yet even when a recall is agreed upon and announced, far too many vehicles remain unrepaired. It is important for consumers to understand that safety recalls are never cosmetic in nature, and are only undertaken by manufacturers because the vehicle has a defect which can impair safe operation, or the vehicle does not comply with a Federal Motor Vehicle Safety Standard. Nevertheless, millions of vehicles remain in use even once they have been recalled. In 2020, there were 55 million such vehicles on U.S. roads, subject to recall but remaining unrepaired.[33]

Below are recommendations to address the recall completion gap:

Cease Federal Government Sale, or Use, of Vehicles with Unrepaired Recalls: The Federal Government, for the benefit of its employees, owns and uses over 600,000 motor vehicles. Stunningly, there is no specific prohibition on the continued use of unrepaired, dangerous, recalled vehicles by federal personnel. An independent investigation found more than 25,000 of these unsafe vehicles being driven every day by federal employees across the government, often without their knowledge.[34] When an agency chooses to upgrade its vehicle fleet, or no longer needs a specific vehicle, it will often sell that vehicle to the public at auction. For example, the General Services Administration (GSA) sells tens of thousands of used vehicles every year. Based on analysis of information made public by GSA, many of these vehicles are sold with open actionable recalls. In fact, over ninety percent of the time when GSA sells vehicles with open recalls the free repairs were available prior to being put on the auction block. Nevertheless, the Federal Government fails to undertake these critical and free safety repairs, thereby forcing the safety burden onto the purchaser and the danger onto all road users.

Recently a dozen consumer groups along with multiple national federal employee unions joined in asking the Biden Administration to direct all departments and agencies to end the unsafe practice of federal employees using unrepaired recalled vehicles and to prohibit the public sale of unrepaired recalled federal vehicles.[35] We urge Congress to act if the administration will not. Federal leadership with respect to its own fleet will set an excellent example for the rest of the marketplace on the importance of recall repairs.

Make selling a recalled real car as illegal as selling recalled toy car: currently there are explicit federal prohibitions on the sale of new cars with unrepaired recalls, the sale of previously rented cars with unrepaired recalls, and the rental of cars with unrepaired recalls, but no such federal prohibition exists for the sale of used cars. Amazingly, it is legal to resell a used vehicle with an unrepaired ignition switch, defective airbag, or faulty set of tires, but it is illegal to sell a recalled French fry cutter, a recalled coffee press, or even a recalled toy car. The same is true for food, medicine, and cosmetics. It is long past time for Congress to recognize the danger posed by defective, recalled, vehicles.

Address the Use of Recalled Cars being used Commercially to Transport Consumers: When a consumer hails a taxi or uses an app to call for a rideshare vehicle, they expect and deserve a minimum level of safety in that vehicle. For example, they presume the vehicle will be in good working order and will be operated by a licensed driver. They also deserve the ability to avoid vehicles that have been recalled for a safety defect but remain unrepaired. While taxi and rideshare vehicles are generally regulated at a state and local level, there is a role for Congress to play. Collecting and providing national level data to help track how many recalled vehicles are carrying unsuspecting consumers, working with companies to notify vehicle drivers of recalls, and urging states to find ways to protect consumers in rideshare vehicles and taxis from unsafe defects, would all be appropriate actions for Congress.

Require NHTSA to Complete the Recall Notification by Electronic Means Rule: One step towards removing recalled vehicles from the road is to ensure that consumers receive the recall notice. In 2015 as part of an effort to reach consumers by modern means, Congress changed the law regarding how recall notifications were required to be distributed to vehicle owners for the first time since 1974. The FAST Act mandated NHTSA write a rule requiring the use of electronic notification for recalls by early 2016, intended to be a supplement to the existing system of using

the U.S. mail. An ANPRM was published January 25, 2016.[36] An NPRM was published September 1, 2016.[37] In an era when almost every consumer always carries a smart phone on their person, and there are over 55 million vehicles with unrepaired recalls[38] on the road, it is long past time to add this tool to close the recall completion gap. Yet six years later NHTSA has failed to act.

Provide NHTSA the Means to Work with States to Notify Consumers Directly About Recalls: As mentioned above, over 55 million dangerous unrepaired recalled vehicles remain on our roads today, posing a danger to all drivers, passengers, and pedestrians. Too often, these vehicles remain unrepaired because owners are unaware of a defective vehicle sitting in their driveway. Congress should work with the Department of Transportation to offer technical assistance to the motor vehicle administration in every state to be sure that owners are notified at registration of the recall status of their vehicle.

Extend the Manufacturer Recall Completion Reporting Period. Congress could also extend the reporting period for manufacturer recall completion data. Currently, car companies only report to NHTSA regarding the status of their recall efforts for six calendar quarters. The average life of span of a car is almost twelve years and it is likely to have multiple owners. Accordingly, the period for reporting recall completions should be extended to at least five years from the recall. Also, NHTSA should publish an annual scorecard of recall completion rates for each manufacturer, to incentivize poor performers and hopefully improve their safety recall performance.

Over-the-Air Updates must be Monitored for Safety-Related Modifications. Unfortunately, the practice of manufacturers attempting to disguise a vehicle problem as a quality issue, when it should likely be classified as a safety defect, remains far too common. As we enter the era of over-the-air (OTA) service updates where manufacturers can interact directly with a vehicle and bypass the vehicle's owner in the process, the Center urges Congress to ensure that NHTSA monitors this area to avoid manufacturer use of OTA updates to hide safety defects. Transparency will remain a key ingredient to providing safety either in person or over the air.

Fuel Economy

We support the Biden Administration paying significant and appropriate attention to addressing the previous administration's rollback of the Corporate Average Fuel Economy (CAFE) standard which resulted in a short-lived final rule.[39] The CAFE standards set in 2012 were arguably the biggest single step our nation had ever taken to cut global warming pollution. Further, the manner in which NHTSA promulgated the SAFE rule raised issues of arbitrary and capricious action under the Administrative Procedure Act, and blatantly ignored the science provided by the career experts at the Environmental Protection Agency. Accordingly, the Center was pleased to see the recent actions withdrawing plans to restrict individual state efforts to act to protect citizens.

This poorly written measure, unsupported by evidence, will lead to neither an improved climate nor an upgrade in vehicle safety, and should never have been introduced. The Center for Auto Safety has been an advocate for improved fuel economy standards on behalf of consumers – and the environment in general – since the conception of the Clean Air Act. The historical record is clear: improving fuel economy without sacrificing safety is achievable and has frequently been accomplished over the last few decades. As the regulatory process continues to develop, we will be monitoring it closely.

Provide Public Confidence in the Safety of Battery Electric Vehicle (BEV) Technology: The successful integration of safer and more efficient vehicles has consistently been a result of recognizing the need to build in safety from the beginning. Accordingly, the Center wants to be sure to bring to this Subcommittee's attention a growing concern that as BEVs proliferate and increase their miles per charge capacity, it will be critical not to trade range anxiety for fire anxiety.

In January, NHTSA's Enforcement division announced an Electric Vehicle Battery Safety Initiative.[40] We applaud this step as it highlights the need for the agency to engage on the safety issues regarding BEVs at this early stage in the technology's mass deployment. We urge a rapid endorsement of this Initiative from the office of the Secretary and throughout the federal government, plus a detailed engagement with industry, along with public and first responder education.

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[1] National Safety Council, *Motor Vehicle Deaths in 2020 Estimated to be Highest in 13 Years, Despite Dramatic Drops in Miles Driven*, March 4, 2021, https://www.nsc.org/newsroom/motor-vehicle-deaths-2020-estimated-to-be-highest

[2] Michael Laris, *Larry Willis, head of federation of transportation workers, dies in bike accident*, Washington Post, November 30, 2020, https://www.washingtonpost.com/local/trafficandcommuting/larry-willis/2020/11/30/0380b182-3346-11eb-b59c-adb7153d10c2_story.html

[3] Ibrahim Samra, *Military medic tried to save baby who died in semi truck crash; vigil held for family,* WNDU-TV, May 10, 2021, https://www.wndu.com/2021/05/11/south-bend-baby-dies-in-car-crash/

[4] *See,* e.g., Insurance Institute for Highway Safety, *Fatality Facts 2019 - Urban/rural comparison*, March 2021, https://www.iihs.org/topics/fatality-statistics/detail/urban-rural-comparison

[5] Megan Towey & Kris Van Cleave, *Bill Could Force Automakers to Confront Safety Hazard Blamed for Dozens of Child Deaths a Year,* CBS News, July 4, 2020, https://www.cbsnews.com/news/car-seat-safety-manufacturers-hazard/

[6] N.R. Kleinfield, *After a Son's Death, Parents Channel Their Grief Into Activism,* N.Y. Times, January 24, 2014, https://www.nytimes.com/2014/01/26/nyregion/after-a-sons-death-parents-turn-their-grief-to-activism.html

[7] Amy Martyn, *When a Broken Car Part Causes a Senseless Death*, Consumer Affairs, January 22, 2018.

[8] European Commission, Directorate-General, Mobility and Transport: *Road safety: 4,000 fewer people lost their lives on EU roads in 2020 as death rate falls to all time low*, April 20, 2021, https://ec.europa.eu/transport/modes/road/news/2021-04-20-road-safety_en and European Automobile Manufacturers Association (ACEA), *Vehicles in Use,* https://www.acea.be/statistics/tag/category/vehicles-in-use

[9] Center for Auto Safety, Petition for Rulemaking, October 19, 2018, https://www.autosafety.org/wp-content/uploads/2018/10/Center-for-Auto-Safety-Petition-for-Rulemaking-to-mandate-Safety-Assessment-Letter.pdf This petition remains unanswered in violation of agency rules.

[10] Aaron Gordon, *The US Invented Life-Saving Car Safety Ratings. Now They're Useless.*, Vice, March 4, 2021, https://www.vice.com/en/article/4ade9p/the-us-invented-life-saving-car-safety-ratings-now-theyre-useless

[11] *See,* e.g.,: Anastasia Tsapi, et al., *How to maximize the road safety benefits of ADAS?,* Fédération Internationale de l'Automobile (FIA), December 14, 2020: discussing sensitivity of manufacturers to Euro NCAP ratings, https://www.fiaregion1.com/wp-content/uploads/2020/10/FIA-Region-I-_ADAS-study_18122020.pdf

[12] *See* Center for Auto Safety response to *ANPRM; Pilot program for collaborative research on motor vehicles with high or full driving automations*, Dec. 10, 2018 for description of a Gated Certification program, https://www.autosafety.org/wp-content/uploads/2018/12/AV-Pilot-Program-Comment-Final.pdf

[13] Euro NCAP, *Vulnerable Road User (VRU) Protection,* Updated 2013, https://www.euroncap.com/en/vehicle-safety/the-ratings-explained/vulnerable-road-user-vru-protection/

[14] European Union, European Parliament, Regulation (EU) 2018/858, October 18, 2019, https://data.consilium.europa.eu/doc/document/PE-82-2019-INIT/en/pdf

[15] NTSB Public Meeting of September 25, 2018, Highway Special Investigation Report Pedestrian Safety NTSB/SIR-18/03, https://www.ntsb.gov/news/events/Documents/2018-DCA15SS005-BMG-abstract.pdf.

[16] NHTSA, Annual Vehicle Recalls Since 1996, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/annualvehiclerecallssince1996.pdf
[17] NTHSA, *Front Seat Modeling in Rear Impact Crashes: Development of a Detailed Finite-Element Model for Seat Back Strength Requirements*, July 1, 2019 at: https://rosap.ntl.bts.gov/view/dot/41839/Email
[18] Advance Notice of Proposed Rulemaking: Occupant Crash Protection, Sept. 27, 2019, 84 FR 51076. https://www.federalregister.gov/documents/2019/09/27/2019-20644/federal-motor-vehicle-safety-standards-occupant-crash-protection
[19] Notice of Proposed Rulemaking: Child Restraint Systems, Child Restraint Systems-Side Impact Protection, Incorporation by Reference, Jan. 28, 2014, 79 FR 4569.
[20] Final Rule: Anthropomorphic Test Devices; Q3s 3-Year-Old Child Side Impact Test Dummy; Incorporation by Reference, Nov. 3, 2020, 85 FR 69898.
[21] House Committee on Oversight and Reform, Subcommittee on Economic and Consumer Policy, Staff Report, *Booster Seat Manufacturers Give Parents Dangerous Advice: Misleading Claims, Meaningless Safety Testing, and Unsafe Recommendations to Parents About When They Can Transition Their Children from Car Seats to Booster Seats*, Dec. 10, 2020, https://oversight.house.gov/sites/democrats.oversight.house.gov/files/2020-12-10%20Subcommittee%20on%20Economic%20and%20Consumer%20Policy%20Staff%20Report%20on%20Booster%20Seat%20Investigation.pdf, *See also:* Daniela Porat & Patricia Callahan, *Evenflo, Maker of the "Big Kid" Booster Seat, Put Profits Over Child Safety*, Propublica, Feb. 6, 2020, at: https://www.propublica.org/article/evenflo-maker-of-the-big-kid-booster-seat-put-profits-over-child-safety
[22] *See*, e.g.: Joseph Menzin & Peter Neumann, *How Real-World Data Can Help Us Better Prepare for the Next Pandemic*, Scientific American, April 22, 2021, https://www.scientificamerican.com/article/how-real-world-data-can-help-us-better-prepare-for-the-next-pandemic/
[23] University of Wisconsin Data Science Team, *The Story of Moneyball Proves Importance of Both Big Data and Big Ideas*, August 24, 2016, https://datasciencedegree.wisconsin.edu/blog/moneyball-proves-importance-big-data-big-ideas/
[24] 49 CFR 563, at 71 Fed. Reg. 50998 (Aug. 28, 2006).
[25] 77 Fed. Reg. 74144
[26] https://crashstats.nhtsa.dot.gov/Api/Public/Publication/812515
[27] KPMG, 2020 Autonomous Vehicles Readiness Index, https://home.kpmg/uk/en/home/insights/2020/07/2020-autonomous-vehicles-readiness-index.html
[28] For more on concepts to help promote the safety of all road users, guarantee accessibility and equity, preserve consumer and workforce rights, ensure local control and sustainable transportation with respect to AV, *see Autonomous Vehicle (AV) Tenets*, November 30, 2020, https://saferoads.org/wp-content/uploads/2020/11/AV-Tenets-11-24-20-1.pdf
[29] 49 U.S.C. Sec. 30172.
[30] https://www.consumerreports.org/car-recalls-defects/takata-airbag-recall-everything-you-need-to-know/
[31] Ben Foldy, *Whistleblower Program for Auto Safety Has Yet to Launch, Years After Congress Mandated It*, Wall Street Journal, April 4, 2021, https://www.wsj.com/articles/whistleblower-program-for-auto-safety-has-yet-to-launch-years-after-congress-mandated-it-11617541200
[32] See 49 USC 13905(f)
[33] *New Recall Numbers From CARFAX Demonstrate Growing Safety Risk On Roads*, September 25, 2020. https://www.carfax.com/press/new-recall-numbers-from-carfax-demonstrate-growing-safety-risk-on-roads
[34]https://wjla.com/news/spotlight-on-america/investigation-25000-government-cars-have-open-safety-recalls-that-could-endanger-drivers
[35] Center for Auto Safety, *Consumer Safety Groups and Three Federal Employee Unions Call for the end of Government Use and Sale of Unsafe Recalled Cars*, April 15, 2021, https://www.autosafety.org/consumer-safety-groups-and-three-federal-employee-unions-call-for-the-end-of-government-use-and-sale-of-unsafe-recalled-cars/
[36] Advance Notice of Proposed Rulemaking: Update Means of Providing Notification; Improving Efficacy of Recalls, January 25, 2016, 81 FR 4007. https://www.federalregister.gov/documents/2016/01/25/2016-01291/update-means-of-providing-notification-improving-efficacy-of-recalls
[37] Notice of Proposed Rulemaking: Update Means of Providing Recall Notification, September 1, 2016, 81 FR 60332. https://www.federalregister.gov/documents/2016/09/01/2016-20926/update-means-of-providing-recall-notification
[38] *Id.* at FN 33.

[39] https://www.federalregister.gov/documents/2020/04/30/2020-06967/the-safer-affordable-fuel-efficient-safe-vehicles-rule-for-model-years-2021-2026-passenger-cars-and
[40] https://www.nhtsa.gov/electric-vehicles-battery-safety-initiative

Ms. SCHAKOWSKY. Thank you for your testimony. And now, Professor Rajkumar—I am sorry, say it for me. "Raj-coo-mar," is that correct?

OK, you are recognized for 5 minutes.

STATEMENT OF RAGUNATHAN "RAJ" RAJKUMAR, PH.D.

Dr. RAJKUMAR. Thank you, Congressman Doyle, for your kind introduction. I am grateful to Chairman Schakowsky, Ranking Member Bilirakis, Chairman Pallone, Ranking Member Rodgers, and members of this committee for the opportunity to testify on a topic vital to American competitiveness and our standard of living: by ensuring the safe and responsible development of self-driving vehicle technology.

I am Raj Rajkumar, an academic researcher and educator of autonomous vehicle AV technology. AV innovations will be accompanied by large-scale economic opportunities, immense social benefits, and significant perils. Those perils include not advancing innovation that will ensure the safety of the technology, and falling behind in the global technology race that will define competitiveness in the massive transportation industry and beyond.

Beginning in the 1980s, investments across eight Federal agencies advanced various aspects of AV technology. Scientists like me, working on AVs, share a passion for the mission to save 42,000 lives lost in the U.S. alone per year and to reduce the vast human and economic toll of automotive crashes.

When vehicles can drive themselves, transportation deserts can be eliminated. The elderly and differently abled individuals will gain personal mobility and independence.

The historical milestone that demonstrated the practical feasibility of AV technology was triggered by the 2007 DARPA Urban Challenge. Subsequent investments of more than $10 billion globally have accelerated innovation and applications. Underlying this history of innovation are the best American traditions of partnership among government, industry, academia, and the communities that worked together to incubate this technology. As we plan ahead to address the challenges, opportunities, and deployment of AVs, the full might of the unique American innovation ecosystem must be brought to bear.

The AV market size is estimated at about $7 trillion per year. This market is not monolithic and comprises multiple distinct segments. With the same market in mind, Chinese companies are catching up with us and are now surging ahead, aided in part by their relatively lax regulations. China can also apply its global leadership in 5G technologies to leverage the large volumes of information for use in AVs. Unless we take quick and corrective action to outinnovate them, China can secure a dominant position in both these important economic sectors.

How do we navigate the perils and realize the promise of AVs?

One, advance a new generation of collaborative research. Focused investments in basic research are needed to, A, verify, validate, and demonstrate the safety of AV technologies; B, enable connectivity; and C, designing smart infrastructure.

Two, accelerate investment and deployment in the infrastructure of the future. We must deploy smart physical infrastructure, 5G

networks, edge computing, and vehicle-to-everything communications.

Number three, actively engage on workforce issues. An all-of-nation commitment must include an up-front, holistic approach to meet job and workforce needs. Workforce organizations should be engaging directly in university AV research. If the technology is not developed or deployed here, it will happen elsewhere anyway.

Four, actively manage the transition from driver-assist features to automated driving systems. Robust driver monitoring mechanisms will help prevent deaths from impaired driving. NHTSA must also educate the public about the deep chasm between advanced driver assistance systems and full autonomy and take action against misleading claims.

Five, the regulatory framework must advance safety and accelerated innovation. Create a clear and uniform national approach to on-road testing. Recognize the distinctions between AV market segments. Keep regulations adaptive and agile. Encourage collaboration among jurisdictions and create a national roundtable of stakeholders.

In conclusion, the emergence of AV technology is an exemplary American innovation success story. However, significant but addressable technical and policy challenges remain. We must commit to an all-of-nation initiative to ensure AV technology does not join the list of innovations which are invented here in the U.S. but end up generating jobs and wealth only far beyond our shores.

Thank you. I yield back.

[The prepared statement of Dr. Rajkumar follows:]

Testimony of Dr. Raj Rajkumar

Carnegie Mellon University

Before the

US House of Representatives

Committee on Energy and Commerce

Subcommittee on Consumer Protection and Commerce

"Promises and Perils: The Potential of Automobile Technologies"

Tuesday, May 18, 2021

Introduction

Thank you Chairwoman Schakowsky, Ranking Member Bilirakis and Members of the Committee for this opportunity to testify before you on a topic vital to American competitiveness and our quality of life—ensuring the safe and responsible development of self-driving vehicle technology. My name is Raj Rajkumar. I speak to you as an academic researcher and educator who has devoted nearly two decades to advancing the frontiers of autonomous vehicle (AV) technology. I have worked closely with industry partners like General Motors and government at the federal, state and local levels. I am also an entrepreneur who founded a successful AV software company and experienced firsthand the potential of this technology to contribute to economic development.

The title of this hearing is on target[1]. As with most transformative inventions, AV innovations will be accompanied by large-scale economic opportunities, immense social benefits and notable perils. As my testimony will highlight, these perils include

(a) not advancing innovation that will ensure the safety of this technology, and

(b) falling behind in a global technology race that will define competitiveness in the massive transportation industry and beyond.

My remarks will focus on three areas.

- First, I will briefly review the growth of this quintessentially American invention.

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[1] In 2019, I had given a talk titled "Self-Driving Vehicles: The Promise, Peril and Challenges" at a workshop on AVs (http://www.ipam.ucla.edu/programs/workshops/autonomous-vehicles/.)

- Secondly, I will review the emerging technology and AV market trends, and how these developments offer insights on the policy considerations the Committee is seeking to explore and address.
- Finally, I will highlight some broad principles that may contribute to ensuring that America and American communities, citizens and workers realize the full potential of the safe deployment of self-driving technology.

A Brief History of the Technology and Passion Shaping the Development of AV Technology

The vision for autonomous vehicles has its roots in a 1939 World's Fair GM Futurama[2] where engineers had envisioned vehicles that could drive themselves even before digital computers as we know them today were born. Early-stage research efforts soon followed, including a presentation by the Pittsburgh-based Westinghouse[3] company in 1959 of a radar system on car bumpers that would utilize dots and dashes built into the interstate highway system to enable self-driving. Focused research efforts began with National Science Foundation and Department of Transportation programs in the 1980's. Carnegie Mellon's first-generation autonomous vehicle, Terregator, emerged from these efforts in 1983. A small mobile robot, the Terregator could only travel at a speed of less than one mile an hour but could sense its surroundings and drive around obstacles.

Over the next few decades, investments across eight federal agencies advanced various components of the technology. New programs in the Department of Defense, National Aeronautics and Space Administration, and the Department of Energy, along with the National Science Foundation and The Department of Transportation were key to developing foundational vision, sensing, computing, planning and control technology innovations. These programs, along with critical concurrent advances in computing and recently in machine learning, advanced the frontier.

Scientists like me who were drawn to the pursuit of this technology share a passion for the mission to save lives and reduce the vast human and economic toll of automotive crashes. When vehicles can drive themselves, transportation deserts can be eliminated and personal independence will be bestowed to elderly and differently-abled individuals currently facing barriers to full participation in the economy and society.

Like prior revolutionary advances, AV technology has had to overcome the peaks and valleys of hype and disillusionment. The critical inflection point that demonstrated practical feasibility of the technology was triggered by DARPA about 15 years ago. The DARPA Grand Challenges held in 2004, 2005 and 2007 enabled self-driving technology to move from university labs to early-stage commercial development. In the years following the historic 2007 DARPA Urban Grand Challenge, industry and venture investments of more than 10 billion dollars globally have

[2] https://www.thetruthaboutcars.com/2014/05/autonomy-and-the-1939-worlds-fair/
[3] https://slate.com/culture/2009/06/1959-when-america-first-met-the-microchip.html

accelerated both innovation and the potential for commercial applications. The pace of innovation has been dramatic but slower than had been anticipated by some.

Our Carnegie Mellon vehicle that won the 2007 DARPA Urban Grand Challenge utilized the entire rear portion of the vehicle for its computing system and had an entire grid of sensing and vision equipment on its rooftop. Today's self-driving test vehicles resemble traditional passenger vehicles. The computing capability of current AVs is over a million times greater than that of our 2007 vehicle.

Underlying this history of innovation are the best American traditions of collaboration and partnership among government, industry, academia and the communities across America that joined in incubating this technology. It has been a partnership focused on transformative technology innovations targeting important societal challenges. As we plan ahead to address the challenges and opportunities of the next phase of AV development and to chart the path to deployment, the full might of the American innovation ecosystem must be brought to bear.

A Brief Review of the Technology, Industry Growth and the Global Race

AV technology involves a complex "stack" of technologies. Its hardware components include a variety of computing, sensing and communications equipment. Multiple software layers that generate the seemingly incredible driving capabilities utilize both algorithmic and AI approaches, which make thousands of decisions per second.

The continued development of AV technology is dependent upon both separate and integrated advances in each of these layers of the stack. Self-driving applications also depend upon and contribute to advances in computing, software, communications and AI in fields ranging from health care to manufacturing. Hence, it is important to regard self-driving technology not simply as a revolution only in transportation, but as a vital component of a web of breakthroughs that will span and shape much of the U.S. economy in the future.

Self-driving vehicles are also part of a convergence of technologies that involves the synergy between breakthroughs in AV technology, electrification and connectivity. My research has demonstrated that Connected and Autonomous Vehicle (CAV) technologies will support the scaling of electric vehicles as well as greener applications in passenger rail, freight rail and shipping.

Similarly, the safety of AVs will be greatly enhanced by the deployment of 5G and future generations of wireless technology, while also extending the reach of this technology to realize the potential for significant energy and efficiency improvements. The opportunity to integrate AV technologies with smart infrastructure and smart building applications will be transformative in meeting the climate challenge while enabling a range of new services and industries. We must therefore continue to invest in and support pilot deployments of edge computing (which

provides compute power right at the devices rather than in the cloud or other centralized location), and Vehicle to Everything (V2X) connectivity technologies that enable self-driving vehicles to communicate with virtually all travelers and elements of the infrastructure around them. We must keep a broader vision of this technology convergence in mind as we shape the policies for the safe deployment of self-driving vehicles. The estimates of the vast market impact of the technology reflect this potential.

The long-term market size for autonomous transportation is estimated to be $7 trillion per year[4]. This massive market comprises a diverse set of market segments and companies. There are over 250 US companies in the industry including automakers, and providers of critical component technologies and services. The industry ranges from household names to tech start-ups providing hardware components, software tools for testing, as well as mapping and vision technologies. During the pandemic, core AV route-planning software was put to work in Pittsburgh to facilitate the delivery of meals to home-bound students. The reach of the AV industry has also shattered the bi-coastal concentration that dominates most major emerging technology sectors. Nodes of AV innovation span the heartland from over 2,000 jobs in Pittsburgh to centers in Ohio, Michigan, the Southwest and the South. Currently, more than 1,400 vehicles are being tested by 86 companies in 36 states.

The large AV market is composed of the following distinct segments:

- Robotaxis: a fleet of vehicles without any human operator, possibly without a steering wheel, gas and brake pedals and used to provide dedicated or shared rides;
- Passenger vehicles: individually-owned consumer vehicles that drive themselves in well-tested domains which become larger over time;
- Road-worthy delivery robots: vehicles that drive on public roads but carry only goods and no passengers for delivery;
- Personal delivery devices: vehicles that move at pedestrian speeds on sidewalks to deliver food and medicine within a community (such as a neighborhood or campus);
- Long-haul trucks: Semi-trailers that are a backbone of the nation's economy and;
- Public transit: vehicles that can be used selectively to supplement existing mass transportation.

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[4]The Verge, "Intel predicts a $7 Trillion self-driving future", June 2017, https://www.theverge.com/2017/6/1/15725516/intel-7-trillion-dollar-self-driving-autonomous-cars.

The diversity of the above market segments also highlights how central the technology will be in shaping the future of a comprehensive transportation system that can better meet the needs of individuals, communities, industry and government. Self-driving ground vehicles can coordinate with autonomous system breakthroughs in drones to revolutionize agriculture as well as personal transportation, the shipment of goods and even health-care services.

The enormous market potential for AVs has understandably sparked a global technology race. After the ground-breaking 2007 DARPA Urban Challenge, China in particular initiated a sequence of similar annual competitions. Chinese teams learned to literally crawl first, walk next and now are surging ahead in the ongoing technology marathon. China is also deftly seeking to apply its significant leadership in 5G technologies to self-driving vehicles. Unless we undertake quick and corrective actions, China can secure a dominant position in both of these important economic sectors.

China's ability to catch-up with our advances has been aided in part by their relatively lax regulatory environment. While we should not aim to mirror their regulatory model, we must recognize what is at stake in the overall race and seek to out-innovate them in the core technologies that will ultimately enable the safe deployment of AV technology. In short, unless we act, leadership in a technology that we created and nurtured could slip to China, which is very aggressive in terms of investments and deployment-friendly policies.

The Road Ahead – Recommendations for Navigating the Perils and Ensuring the Ability to Realize the Promise

It is imperative that we commit soon to an all-of-nation initiative to ensure AV technology does not join the list of innovations which are invented in the US but end up generating jobs and wealth only far beyond our shores. The following five major pillars would form the foundation of this national commitment.

1. Advance a New Generation of Collaborative Research

The rapid growth of commercial investment over the last decade may lead one to a presumption that federal research investment is no longer needed to advance the technology and the industry. That is unfortunately not the case. Driving safely under a wide spectrum of weather, lighting, road and traffic conditions is the most complex activity that most adults engage in on a regular basis. Consequently, AVs are not yet a part of our daily lives. Critical investments in basic research to (a) verify, validate and demonstrate the safety of complex cyber-physical systems and AV technologies,, (b) enable connectivity, and (c) design smart infrastructure are vital to the ability to win this global race. Moreover, as has been demonstrated in sectors such as communications and health care—continued progress on the technological frontier is also essential to support progress on sound regulations. Security violations can also potentially lead to major loss of life, property and trust as hackers can cause physical damage. While industry

participants deeply recognize the need to keep vehicles safe, targeted research programs to enhance cyber-security and cyber-physical security are sorely needed.

A recent and ongoing USDOT program to launch the Automated Driving Systems Demonstration grants is a positive first step. We should reinvigorate the coordinated multi-agency research framework that made the U.S. the early leader in AV technology and focus on opportunities for synergistic developments in AVs, EVs and connectivity breakthroughs to advance overall U.S. competitiveness. It will also be critical to continue support for research in cybersecurity and data management techniques.

2. Accelerate Investment and Deployment in the Advanced Infrastructure of the Future

A core basic research agenda also requires a complementary commitment to investments in smart physical infrastructure, 5G, edge computing and V2X communications technologies. As Congress and the Administration move forward to place broadband connectivity at the heart of the nation's infrastructure agenda, initiatives to support V2X testbeds across the nation would make a vital contribution to accelerating innovation and improving safety. These testbeds will enable safe driving under different weather conditions, lighting conditions, geographical terrains and construction zones. The testbeds can also advance self-driving applications to other innovations in infrastructure and building technologies. Specific testbeds can be developed to bridge between urban, suburban and rural needs.

3. Actively Engage on Workforce Issues

An all-of-nation commitment must certainly include a central focus on job and workforce needs. As witnessed in other industries, the introduction of AV technology is likely to transform the nature of jobs and improve safety. Drivers of transit vehicles and semi-trucks do much more than driving alone, and it is likely that their roles and responsibilities will expand, as partial automation is eased into operations over time.

Importantly, these are not issues that can be "thrown over the transom" to be resolved after technology deployment. Breakthroughs this transformative necessitate social innovation along with technological advances.

Labor organizations should be engaged directly in university research advancing the technology frontier. Carnegie Mellon University is in the early stages of a potential model for such collaboration with a project bringing together the perspectives of transit unions to the development of autonomous transit technology. Such collaborations will help inform training and safety requirements, and enable new job creation opportunities while bringing the perspective of the worker---whose domain expertise on safety and operations is incredibly valuable—to the research enterprise.

In addition, we need to accelerate collaborations among research institutions, industry, community colleges and community STEM education programs to shape a more inclusive

research and industry workforce. The USDOT-funded National University Transportation Center based at Carnegie Mellon has launched Women and Diversity in Transportation Fellowship Programs, partnered with the Pennsylvania Rural Robotics Initiative to expand K-12 STEM engagement, and has been training Community College of Allegheny County students in AI and AV technology. Its new executive education and certificate program called "Managing AI in Transportation" also builds new career pathways at the forefront of emerging job opportunities.

Based on past experiences in other industries, all intentional actions to bring workforce development and workers to the table must also recognize the following: Given the global race to develop AV technology and broaden the reach of the technology from transportation to manufacturing, agriculture and the overall national logistics infrastructure, well-meaning efforts that might seem to preserve some jobs in the near term can cost our nation many more over time. If the technology cannot be developed here, it will happen elsewhere. If the technology cannot be deployed here, it will be deployed elsewhere.

4. Diligently Manage the Transition from Driver Assist Features to Automated Driving Systems

Recent model-year automobiles have a wealth of driver assist features including lane departure warning, lane keeping/following, blind zone alert, automated emergency braking and cross-traffic alert. Such driver assist features however require the vehicle operator to be paying attention at all times. Since human attention tends to fade when active driving engagement is absent, robust driver monitoring mechanisms are highly desirable. These driver monitoring and assist functions can also be enhanced to detect whether a driver is drowsy and/or impaired. Unnecessary fatalities and injuries can be therefore minimized. NHTSA and other enforcement agencies must both educate the public about the deep chasm between advanced driver assistance systems and full autonomy, while ensuring that vendors do not oversell functions and/or use misleading labels.

5. Recognize the Need for a Regulatory Policy Framework that Advances Safety and Accelerated Innovation

In the early days of automobiles, some states required individuals to walk ahead of cars to warn pedestrians. Breakthrough technologies always create a need to align our goals for safety and innovation. Recognizing that continued research can help mitigate regulatory challenges, the following recommendations are offered as general principles for the next phase of regulatory policy for AVs:

- Safety is paramount: safety will be enhanced by creating a clear and uniform national approach to on-road testing. This national framework must incentivize and enhance industry investment in advances that address critical safety needs by harnessing market forces that align deployment with safety;

- Recognize the distinctions between AV market segments: The regulatory framework should not seek to create a single approach for all the various self-driving market segments. The regulatory approach should explicitly take into account the distinct elements and nature of different application segments[5];

- Be adaptive and agile: Given the rapid technological advances, the regulatory framework should not be set in stone - a well-defined path is needed to continually adapt to the evolving needs for real-world testing and deployment, and the conditions for fully autonomous vehicle testing;

- Encourage collaboration: The federal government should continue to support testing and deployment collaborations—such as that being implemented by government authorities, industry and academic partners in the Smart Belt Coalition comprising the states of Michigan, Ohio and Pennsylvania to facilitate advancing specific applications and foster the engagement of transportation officials with rapid technological advances; and

- Create a national roundtable: While enabling testing and collaboration, the federal government should regularly bring together industry, state and local transportation officials, the academic research community and labor organizations together to foster greater dialogue and information sharing.

Conclusion

The emergence of AV technology is an exemplary American innovation success story. Support for basic research by Congress and multiple administrations across several decades combined with close collaboration among academia, startups and major companies and supportive communities has brought a technology within reach that was once science fiction. However, significant, but addressable technical and policy challenges remain. Continued collaboration and innovation will be vital.

Autonomous vehicles are poised to create large-scale economic opportunities and yield an array of social benefits. We must avoid the potential peril of not encouraging innovation that will achieve safer roads. Most critically, unless we take rapid and concerted action, we can end up ceding global leadership in a technology we invented here to other countries with an established edge in complementary technologies like 5G. AV regulations must be clear, uniform, and adaptive. And the federal government must encourage private-public-academic collaboration, and convene regular national roundtables of all stakeholders.

[5] As an example, exemption caps need not be a hammer to use across all AV market segments. Vehicles with a licensed operator inside can be regulated differently.

Ms. SCHAKOWSKY. Thank you, Professor Rajkumar.

And now I welcome Mr. Regan for your 5 minutes of testimony.

STATEMENT OF GREG REGAN

Mr. REGAN. Thank you. On behalf of the Transportation Trades Department, our 33 affiliated unions, and millions of frontline workers, I want to thank Chair Schakowsky and Ranking Member Bilirakis for inviting me to testify today.

Although they are not an affiliate of TTD, we have worked closely with the Teamsters on automated vehicle policy, and I share a document, and—I have shared a document with the committee that outlines our shared principles and request that it be submitted for the record along with my written testimony.

While the concept of fully automated vehicles may be new, innovation and change have always been hallmarks of the transportation industry. Transportation workers have lived through generations of new breakthroughs. Time and again, the skills frontline workers bring to their jobs, their adaptability in the face of accelerated innovation, and the benefits they receive from union representation have proven invaluable in implementing new technologies and serving the American public.

While the projections on how automation will impact jobs are not uniform, we know that—with certainty, that millions will see their jobs altered or eliminated. In commercial driving alone, reports suggest that as many as 3 million workers may be displaced or have their jobs fundamentally changed by automation. As we enter a new era of technology-enabled change in our system of mobility, policymakers must not allow the lure of that new, shiny object to obscure the facts and substitute sound policy with hastily developed legislation.

We must also not let fears of being outclassed in AV technology by other countries drive us towards rash public policies that grow wealth only for a handful of tech companies and their investors. Instead, we must balance a legitimate desire to lead the world in transportation innovation with safety and the needs of American workers to care for their families and to live and retire with economic security and dignity, something that is not possible if we do not reject the hands-off, deregulatory approach to AVs we have seen in recent years.

Frontline transportation employees are already seeing a growing number of automated vehicle pilot projects on our roads and in our public transportation systems. They know that, without good training opportunities, they will be left without the skills they need to manage these new technologies. And that is the best-case scenario. At worst, they risk having their jobs eliminated altogether.

Proponents of automation suggest that the labor market is "well equipped to reabsorb displaced workers," and they tout creation of new jobs in the AV and tech industry. Yet those proponents gloss over two key questions.

First, will mid-career workers who are displaced by automation be reabsorbed into jobs with similar incomes and workplace protections? Negative shocks to the economy can cause significant, long-term damage to the earning potential of working families. One

study suggests that workers' earnings may be depressed by 10 percent or more, even more than a decade after workers are displaced.

Second, how confident are any of you that the new jobs created by automation will be realized back home in your districts and not just in a handful of communities where the tech sector is concentrated?

We believe the antidote for significant economic harm and job impacts caused by the automation is a holistic approach by Congress that attacks the issues from multiple fronts, including mandating workforce impact statements when these new technologies are procured with Federal dollars; creating career ladder and apprenticeship programs; mitigating job losses and wage degradation via the employee protections, job retention, just transition, vehicle taxation regimes, and wage supplements; and boosting the right to form and join unions and bargain collectively as a strategy to ensure workers have a voice in decisions around widespread deployment of AVs.

We also urge Congress to continue the carve-out for vehicles over 10,000 pounds. Heavy commercial motor vehicles come with unique operational challenges that will complicate the introduction of AVs into that space. Frontline commercial vehicle operators do not just drive, they have specific training to react to an array of challenges that an AV is ill-equipped to handle without a human on board.

At the same time, vehicles under 10,000 pounds being used for commercial or passenger service should have strict safeguards in place based on explicit, enforceable Federal regulations. The presence of a trained human driver to quickly assume control of the vehicle, for example, must be mandated for any such service.

Lawmakers must also make—take clear steps to ensure that jobs created in AV manufacturing are good jobs, here in the U.S. Government assistance for the development and procurement of AV technologies must come with strong Buy America policies and procurement standards. These requirements will help ensure that the development and use of AVs also produce broad community benefits and leads to good, middle-class, domestic manufacturing and supply chain jobs.

While ensuring a safe framework for the deployment of automated vehicles is a critical task before this committee, I would remind you that your work must be part of a larger package that takes full stock of the disruptive nature of this tech. We have seen the impacts of automation in other sectors, as well as the consequences for workers and consumers when public policy fails to protect the public interest. I urge you to give our safety and workforce proposals the full weight they deserve and to work closely with your colleagues across other committees in the development of comprehensive policy that protects our transportation system and country from the premature and irresponsible deployment of AV technology.

Please reject the AV lobby's poorly veiled attempts to sidestep all of the tough questions surrounding AV deployment. The broad-based set of principles and proposals developed by transportation labor that I have shared with you today takes on the toughest questions and offers a responsible path forward.

Thank you again for the opportunity to testify, and I look forward to your questions.

[The prepared statement of Mr. Regan follows:]

A bold voice for transportation workers

WRITTEN STATEMENT OF
GREG REGAN, PRESIDENT
TRANSPORTATION TRADES DEPARTMENT, AFL-CIO

BEFORE THE SUBCOMMITTEE ON CONSUMER PROTECTION AND COMMERCE

"PROMISES AND PERILS: THE POTENTIAL OF AUTOMOBILE TECHNOLOGIES"

May 18, 2021

On behalf of the Transportation Trades Department, AFL-CIO (TTD), and our 33 affiliated unions, I want to thank Chair Schakowsky and Ranking Member Bilirakis for inviting me to participate in today's hearing. I also want to acknowledge that, while not an affiliate of TTD's, we have worked closely with the International Brotherhood of Teamsters on automated vehicle (AV) policy, and my testimony fairly characterizes our shared positions on this topic. Hundreds of thousands of union members face a future of technology-enabled change and their voices must be a part of any debate over the deployment of AV and other transportation technologies.

At the outset, I would ask the Committee to allow me to submit joint labor principles that we believe must form the basis for any AV legislation put forth by Congress. My testimony today will be an expansion of the principles laid forth in that document.

The broad impacts of automated vehicles on America's workers

Technological change in transportation is not new to transportation workers. They have lived through generations of new breakthroughs and have demonstrated their skill and adaptability as innovations accelerated and placed new demands on them while redefining our system of mobility. Meanwhile, their jobs and skills requirements have constantly evolved and Americans have benefited from their resiliency, precision, and know-how.

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Since the introduction of the SELF DRIVE Act in this committee and the AV Start Act in the Senate four years ago, we have seen a rapid expansion of AV technology operating on American streets, from automated driving systems like Tesla's Autopilot feature to Waymo's driverless ride-hail operation to pilot projects in transit and commercial transportation. These AV experiments are just that—experiments. But unlike a standard experiment, these AV tests occur not in a laboratory but in real time on public roads shared with other vehicles, bicycles, scooters, and pedestrians including people with disabilities. These experiments have proven at least one thing: that AV vehicles crash frequently and remain an unproven technology with unsolved engineering challenges. In other words, this technology is not safe enough to operate without federal oversight. But thanks to the Trump administration's refusal to lead, our government lacks a responsible regulatory regime on the books that ensures safety before AVs are allowed on our streets. The approach to regulation is shortsighted and irresponsible at best, and potentially catastrophic at worst. This simply cannot be the federal government's approach to AVs moving forward.

Policy makers must balance the interests of a growing industry with transportation safety and American workers' needs to care for their families and retire with dignity. This is not an all or nothing choice. But transportation labor steadfastly rejects the hands off, deregulatory approach to the radical disruptions that AV will bring to roadway safety and good American jobs. I urge you to tread carefully and consider both the opportunities *and risks* posed by this new technology. This is not the first time we have faced technological change and we should learn the lessons that history can teach us about the risks and opportunities AVs pose to workers, safety, American industry, and our economy at large.

We know that AVs threaten to drastically alter the provision of service and the nature of work, while placing millions of jobs at risk. Most authoritative research agrees that automation will threaten to eliminate and drastically alter millions of jobs. A recent study estimates that over the next 30 years, between 39 and 73 million American jobs stand to be automated.[1] In the commercial driving sector alone, reports suggest that between 700,000 and 1.7 million workers may be displaced or have their jobs fundamentally changed by automation—with other estimates closer to 3 million.[2] And with automated shuttle pilot projects already on the ground in a growing number of American cities, the transit workforce of 400,000 workers may find their jobs slowly phased out in favor of autonomous transit systems.

Proponents of automation suggest that the labor market is "well equipped to reabsorb displaced workers," while touting the benefits of new jobs in the AV and technology industry. Yet those proponents gloss over a critical question: will displaced labor be "reabsorbed" into jobs with

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[1] Manyika, James, et al. "Jobs Lost, Jobs Gained: What the Future of Work Will Mean for Jobs, Skills, and Wages." McKinsey & Company, www.mckinsey.com/featured-insights/future-of-organizations-and-work/Jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages; "Artificial Intelligence, Automation, And The Economy". Whitehouse.Gov, 2018, https://obamawhitehouse.archives.gov/blog/2016/12/20/artificial-intelligence-automation-and-economy.

[2] "America's Workforce and the Self-Driving Future." Securing America's Future Energy, June 2018, avworkforce.secureenergy.org/.

similar income and workplace protections? Negative shocks to the economy—like the one many would experience as a result of disruptive AI—can cause significant long-term damage to workers' earning potential. One study suggests that workers' earnings may be depressed by 10 percent or more, even more than 10 years after they are displaced.[3]

While this committee's jurisdiction may not extend to crafting policies to mitigate these workforce impacts, I would suggest that you nonetheless have a responsibility to the American people to work with your colleagues across other committees to ensure any AV legislation takes full stock of its potential negative impacts and of policy solutions that may help the labor market better absorb the shock of automation and the workforce prepare for the transition.

Automated vehicles' record of safety

News stories over the past four years clearly reveal the need for a **strong** federal framework for AV testing and deployment. Rather than providing exemptions and waivers, Congress should be focusing on empowering the US Department of Transportation (DOT), NHTSA, and other federal regulators to treat this technology with the seriousness it deserves. Consider the following, which represents a mere snapshot of incidents involving AVs:

1) In a well-publicized 2018 incident, an Uber automated vehicle pilot test resulted in the death of a pedestrian. It was reported at the time that test vehicles were involved in 37 crashes over the prior 18 months leading up to the fatal crash.
2) In 2019, a self-driving shuttle in Las Vegas crashed into a truck. While there was an operator on board, they did not have direct access to the manual override controls.
3) In 2020, a self-driving shuttle in Ohio came to an abrupt stop, requiring a passenger who was thrown from their seat to receive medical attention for their injuries. This pilot project was a component of the 2015 Smart Cities challenge.
4) In 2020, a self-driving shuttle in Utah sent a 76-year old man to the hospital after it came to an abrupt stop.
5) NHTSA has opened investigations into 27 crashes involving Tesla vehicles. There have been at least 11 deaths in Tesla vehicles that involved their autopilot feature in the US alone.
6) A 2020 report showed that Waymo's driverless cars were involved in 18 accidents and 29 near-miss collisions over a 20-month period.

[3] Steven J. Davis and Till Von Wachter, "Recessions and the Costs of Job Loss," Brookings Papers on Economic Activity, Economic Studies Program, The Brookings Institution, 43(2): 1-72, 2011, https://www.brookings.edu/wp-content/uploads/2011/09/2011b_bpea_davis.pdf

For too long, proponents of the AV lobby have pushed a rosy narrative that brushes aside safety, workforce, and equity issues to convince our government to prematurely get vehicles to market as quickly as possible. And they've managed to gain support from some of our elected officials, most notably in the Trump administration, which played the role of AV cheerleader instead of safety regulator. To ensure AVs meet the promise their proponents have touted for all Americans, the following principles must form the basis of any comprehensive automated vehicle legislation.

Labor principles for automated vehicle legislation

1) **Workers must have a voice in the adoption of new technology**

For more than 80 years, employees affected by technological changes in the transportation sector have benefited from comprehensive employee protections providing for job guarantees, training and retraining programs to learn and apply the new skills, and the continuation of their collective bargaining rights and terms and conditions of employment.

These protections have enabled the commercial driving and transit industries and their employees to successfully adopt and adapt to new technologies, including those requiring advanced computer and engineering skills. Federal legislation anticipating such changes must ensure that these protections apply and cover the workforce affected by the introduction of autonomous vehicles and other innovations.

Unfortunately, this standard was not met in any previous AV bill, in the DOT's Smart City Challenge, in any current draft AV legislation I have seen from this committee, or in Senator Thune's recent AV proposal in the Senate. And it certainly was not included in any of the Trump administration's ill-advised AV policy proposals. Specifically, while AV bills considered by Congress have largely omitted commercial vehicles over 10,000 lbs.—a decision we strongly support for reasons detailed below—they failed to address how the federal government should more broadly respond to workforce issues caused by automation.

As detailed in our joint principles document, Congress should attack this issue from multiple fronts. With regard to public transportation, legislation should direct comprehensive regulations through the DOT and its Federal Transit Administration (FTA) that would require workforce impact assessments be conducted jointly by representatives of the frontline workforce and management at any agency utilizing AVs, and the application of transit-related AV labor standards. Moreover, legislation that allows the commercial application of AVs, which may negatively impact public transportation ridership, must also include provisions that create career ladder and apprenticeship programs for transit workers, ensure the manufacture and development of new technologies is done within the U.S., and that new jobs created come with union protections.

For private transportation, Congress should examine the impact smaller AVs will have in high-risk industries such as taxicab and rideshare operations, private shuttles, and food/package delivery operations. These reviews should be combined with aggressive policies aimed at mitigating both

job losses and wage degradation via job retention, just transition, vehicle taxation regimes, allocation of retraining funds for displaced workers, wage supplements, and the restriction on the use of independent contractors throughout the industry. They should also be combined with robust manufacturing standards to ensure that vehicles, components, and engineering work is done in the United States. These rules should be put into place before any widespread deployment or approvals for AVs are granted.

2) Safety must be paramount

TTD urges this committee to incorporate the safety framework developed in the Joint AV Tenets introduced by Advocates for Highway and Auto Safety and endorsed by our organization. Bus operators, truck drivers, and thousands of other transportation workers will be sharing the road with AVs for years to come if widespread use is authorized. The performance of AVs will be of paramount importance to safety throughout our entire transportation network for both system users and our members, whether they operate on the roads and transit systems or work in other roles with AVs such as performing maintenance or loading the vehicles.

The Joint AV Tenets were developed by safety advocates and equity partners, as well as our unions. All workers deserve to know that an autonomous car or bot driving next to them is safe enough to be on the same road or in the worksite. Any legislation written by Congress or regulations promulgated by the DOT must strengthen the development of future Federal Motor Vehicle Safety Standards (FMVSS) for AVs and mandate tests of key components (i.e., a vision test) on any system whose performance is inseparable from the safe deployment of that vehicle. Congress and the federal government must focus on strong safety regulation and enforcement rather than the hands-off policies sought out by the AV industry—those based on waivers and exemptions that clear the way for widespread piloting and deployment of unproven AVs. Too much is at risk for millions of motorists and transit system riders for AVs to be "left to the market" to sort out the solutions to myriad hazards and challenges.

3) Define the scope appropriately

We urge Congress to continue the carve-out for vehicles over 10,000 pounds. Heavy commercial motor vehicles offer a laundry list of unique operational challenges which will greatly complicate the introduction of AVs into that space. Frontline commercial vehicle operators do not just drive—they have unique training to react to adverse situations and an array of challenges that an AV is ill equipped to handle without a human on board. Professional drivers are trained to account for shifting loads, the higher center of gravity a fully loaded trailer may have, and the need to identify and engage in defensive driving when surrounded by distracted drivers in the lanes next to them. Small vehicles bear little resemblance to the design or operational realities of buses, trucks, or heavy-duty construction vehicles and should not be considered under the same regulatory framework as personal cars or fleets of small vehicles delivering individual packages. Small cars aren't capable of killing dozens of people if the automated driving system malfunctions, but a fully loaded 80,000-pound tractor-trailer is. The enormous workforce concerns surrounding the use of

these larger vehicles also necessitates their separate consideration. We applaud Congress for recognizing these challenges and excluding vehicles over 10,000 pounds in every AV bill that has been introduced to date.

Automated vehicles weighing less than 10,000 pounds that are providing passenger service must have a human driver. The operators of passenger service vehicles are critical to the safe and accessible delivery of transportation services, both for the passengers and for all other road users. Any legislation or regulations designed to facilitate the deployment of AV technologies must mandate an operator on board who is there to perform an array of critical tasks and is available to take over automated operations that we know from experience will fail or falter. The presence of an operator ensures that someone is there to respond to emergencies and summon first responders, facilitate and comply with ADA needs, prevent vehicles from becoming magnets for crime, and critically, to provide a backup in the case of technological failure. We do not allow passenger airplanes to operate without pilots or passenger rail to run without engineers, and we should use a similar approach with AVs that operate on our often-congested roadways and in complex transit networks.

Finally, Congress must consider alternative design vehicles such as delivery bots. Any vehicle that is under the 10,000-pound threshold that will travel on public roads must be properly regulated and not made exempt from the safety mandates embodied in any AV legislation. We have already seen these smaller AV vehicles receive special treatment (including waivers from safety requirements) from regulators simply because they are lighter and travel at lower speeds. TTD expressed strong criticism of the previous administration's approach in granting such exemptions. These vehicles should also be subjected to proper federal scrutiny and safety requirements. This includes the creation of a new federal operating authority for bots and delivery vehicles. Any vehicle that is being used solely for commercial purposes must be required to carry a minimum level of insurance in the case of a crash and demonstrate a comprehensive maintenance plan that accounts for the heavy wear and tear it will undergo as a part of continuous commercial operations.

4) Federal policies must ensure that jobs in AV manufacturing are good jobs

Promoters of AV technology repeatedly make the claim that we are falling behind China and other countries in the development and deployment of automated driving system technologies. Without clear federal leadership, history tells us that American manufacturing workers will be guaranteed to fall behind and be the last to benefit from the economic gains that might be inspired by these technologies. Lawmakers must take clear steps to ensure broadly shared prosperity and that jobs created in AV manufacturing are good jobs here in America. U.S. government assistance for the development of AV technologies, federal procurements of AVs, or procurements by transit agencies or state and local governments through federal assistance must come with strong Buy American policies and a U.S. Employment Plan or similar procurement standards. These requirements will help to ensure that the development and use of AVs also produces broad community benefits and leads to good middle-class domestic manufacturing and supply chain jobs.

5) Ensure consumer rights, equity, and accessibility are key components of any framework

The AV industry claims broad deployment of this technology stands to help improve access to transportation for disadvantaged populations. But if wrongly implemented, they also risk exacerbating long-standing inequities which have existed across racial, gender, and socioeconomic lines for generations. Professional driving has long been a solid path to the middle class, including for women and people of color. Nearly 40 percent of professional drivers are non-white, and men and women both work as bus operators across the country at about the same rate. Transportation jobs have higher unionization rates than many other professions, and as a result, they pay significantly better than most jobs the same individuals would be likely to find in non-driving occupations.[4] Congress must keep these ladders to the middle class intact before and during the eventual introduction of AVs onto our roads or in our transit systems. Without specific safeguards, AVs are likely to undermine equity and worker rights while cementing longstanding social injustices.

Our unions also represent many workers who currently provide paratransit for older adults and individuals with disabilities. We know how much of a lifeline these services can be to many individuals and their families. If deployed, AVs must not degrade universal access to these services. Isolated and marginalized communities must share in the benefits of these mobility options. This will require adequate staffing levels to ensure the presence of well-credentialed safety monitors aboard AV-enabled paratransit operations, and assurance these types of services will remain accessible for all.

Conclusion

While ensuring a safe framework for the deployment of automated vehicles is a critical task before this committee, I would remind you that your work must be a part of a larger package that takes full stock of the disruptive nature of this technology. We have seen the impacts of automation on other sectors—manufacturing, health care, and retail, to name a few—and the consequences when public policy fails to protect the workers and users it impacts. I urge you to give our safety and workforce concerns the full weight they deserve, and to work closely with your colleagues across other committees in the development of comprehensive policy that protects our transportation system and country from the premature and irresponsible deployment of AV technology. Please reject the AV lobby's poorly veiled attempt to sidestep all the tough questions surrounding AV deployment. Our broadly based set of principles and proposals take on the toughest questions and offer a responsible path forward.

[4] http://globalpolicysolutions.org/report/stick-shift-autonomous-vehicles-driving-jobs-and-the-future-of-work/

Ms. SCHAKOWSKY. Thank you, Mr. Regan. So we have concluded witness opening statements. At this time we will move to Member questions. Each Member will have 5 minutes to ask a question, including getting the answer, of our witnesses. And I will start by recognizing myself for 5 minutes.

Before I do, I just wanted to say to Mrs. Rodgers that I look forward—hopefully, when we come back after 3 weeks—that we will be able to have in-person meetings, and I too look forward to that time.

So let me begin my questions with Mr. Regan. OK, so as I mentioned in my short opening statement, 4 four million people in the United States of America make their living by driving. We are talking about 2.7 million truck drivers, nearly 600,000 school bus drivers, taxi drivers, and chauffeurs, over 150,000 bus and transit drivers.

So what I wanted to ask you, Mr. Regan, can the United States reap the economic benefit of AVs without considering the workforce protections for those who may lose their jobs?

And the question is, how can we do that?

Mr. REGAN. I don't believe we can realize the benefits unless we look at it—address workforce conditions up front.

Frankly, the proposals we have adopted here are not ones that are designed to stand in the way of technology being developed. They are designed to make sure that policy that is being developed right now will benefit the most people moving forward, will make sure that careers and jobs are able to grow along with the tech as we adapt it into our mobility systems. So I think that is the key to success.

And the key to truly leading when it comes to AV technology is making sure we are developing the right policy, and policy that, frankly, can be the leader in the world that will bring the workforce along with the tech.

Ms. SCHAKOWSKY. Well, I certainly think that the people that you represent need to be part of the solution and certainly can't be left on the sidelines.

There is no question that driving—the driving profession, if you will—is a dangerous job. What existing technologies could make our roads safer and better for the workers, and for the passengers?

And how do you ensure that we deploy those technologies as soon as possible?

Mr. REGAN. Sure, and I would defer to Jason on some of these, as well.

But if you look at automated braking technology, the sensors that are in a lot of vehicles that are being deployed right now, all of these are a form of automation or a form of technology that could be beneficial if widely deployed and actually provide a great number of safety benefits and ones that enhance the ability of an operator—of a human operator—to do their job safely and effectively, or just drive their vehicle safely and effectively. So all of these can actually enhance safety and should be adopted widely.

Ms. SCHAKOWSKY. Well, let me turn to Mr. Levine.

If an AV hits—oh, let me see, hang on.

If an AV were to hit and kill a pedestrian or runs a red light, who is responsible? Is it the manufacturer, or the AV—of the AV,

one of the vehicle suppliers, the passenger? Who is to be charged for that?

Mr. LEVINE. Sure, thank you so much for the question. And, you know, I think, as others have already noted, there are currently no truly driverless vehicles on our roads. And so right now, the responsibility for those actions go to the driver of the vehicle. And so I think what is important to think about is, when we talk about AVs, that should be the same. Except now the question is, who is the driver?

Ms. SCHAKOWSKY. Well——

Mr. LEVINE. And the AV—you know, when we are talking about a driverless vehicle, that means it was created by a manufacturer who wrote computer code and totally and completely controls that vehicle. Now, right now, that is regulated at a State level. Right? State and localities determine exactly how that liability and how that responsibility will be apportioned, which is why it is really important that we maintain that ability at the local level, to make sure we have oversight over the responsibility, if a vehicle operator—a computer, in this case—runs a red light and kills someone or injures someone, that entity who created that code is who needs to be held responsible.

Ms. SCHAKOWSKY. Well, so let me follow up on that. How has—on there—how have Americans' access to the courts actually helped improve safety?

And do AVs pose a different challenge to consumers?

Mr. LEVINE. Sure, I see there is only a little time left. Can I answer that question?

Ms. SCHAKOWSKY. Yes.

Mr. LEVINE. OK. So, quickly, Americans' access to courts have, literally, saved thousands, if not tens of thousands, of lives. And we say that because defects that were found—one perfect example is the General Motors ignition switch defect, which killed over 174 people and injured many more, was only brought to light because of a civil action that someone brought after there was a death. And that is what uncovered it. That is what led to the recall. That is what led to the fix. So that is really an important history that goes backwards.

Going forwards, that same—those same issues remain vitally important. And so, if we have a circumstance where Americans are interacting with autonomous vehicles from a legal standpoint, where they lose their right to bring an action should something go wrong, that not only injures that person financially, but their injury may not be able to open up what might be a problem and help everyone else if they are denied access to the courts. And so that is something we are going to——

Ms. SCHAKOWSKY. Thank you, Mr. Levine. I appreciate that. And now the Chair will recognize Mr. Bilirakis, subcommittee ranking member, for his 5 minutes to ask questions.

Mr. BILIRAKIS. Thank you, Madam Chair. I appreciate it very much. The first question is for Professor Rajkumar.

As I mentioned in my opening statement, I am alarmed by some manufacturers that potentially mislead consumers by advertising automated capabilities not currently on the market. My draft legislation was circulated with stakeholders on this topic. And while I

am pleased that NHTSA took note of it and announced a campaign yesterday to educate drivers, I still believe it is important we legislate on this topic, since we have seen that, every time there is a related accident, it sets back our progress and the efforts to actually test and develop AVs.

So the question. We hear about the Society of Automotive Engineers, SAE, level of autonomy. Can you tell us what SAE-level vehicles are on the road today, and how many years away are we from level 5 autonomy that many opponents of AVs are most concerned about?

Dr. RAJKUMAR. Thank you, Ranking Member Bilirakis.

Number one, the Society for Automotive Engineers has defined multiple levels of automation. It has become sort of an industry standard, going from level 0, with no automation at all, to level 5, which is complete automation, where the passengers do not do anything at all. All the technologies out there today on the market correspond to level 2, which basically means that the vehicle can drive itself under some well-defined conditions like highways with well-defined lane markers. But the operator of the driver must be paying attention at all times so, if the self-driving software misbehaves, it is the responsibility of the driver to intervene and take over.

So pretty much all technologies out there today are level 2. And then, going up to level 3, level 4, level 5, they begin incrementally much—more and more complex. And in my estimate, level 5 autonomy is many years away—at least 5 years, if not much longer.

Mr. BILIRAKIS. OK, thank you. How does misrepresenting the autonomous capabilities of vehicles damage consumer confidence in the safety and mobility benefits these currently present?

And how do you suggest we ensure that manufacturers accurately reflect actual capabilities and limitations of their vehicles' automated driver assistance systems?

I think this is very important. If you could answer that, sir, I would appreciate it.

Dr. RAJKUMAR. Sure. There is at least one car company out there which seems to have mislabeled—it is really not marketing correctly, truthfully, its vehicle capabilities. And such misrepresentations cause two sorts of problems.

One is that there are customers who actually believe that misleading information and possibly could end up either dying or causing problems to other people on the road.

A second category of people who are allowed to benefit from this technology do not believe these misleading statements and, therefore, their trust in these systems is actually going to go down, so that is a disservice to the rest of the industry.

In terms of making sure that information is not misleading, enforcement agencies, including NHTSA—false advertising laws that the Federal Trade Commission can enforce, that they just basically make—must take concrete action to prevent such misinformation being used, either in the selling of the product or through their base marketing.

Mr. BILIRAKIS. Thank you, sir. I am turning on another issue again, Professor Rajkumar, on the related issue of updating the new car assessment program. I am interested in your familiarity

with crash testing of anthropomorphic test vehicles—actually, devices, so these dummies that we are talking about, commonly known as test dummies, and have—how those can factor in. I have seen recent reports where gender is not reflected during these crash safety tests. I believe that the physiological differences between a man and a woman must be considered to rectify gaps that may exist within the safety standards.

So can you tell me if you conducted research on this matter, and, if so, what has that research shown?

And then I have a short question for Mr. Levine, if I have time. Well, let me go ahead and give it, and if I don't have time, Madam Chair, that is fine.

Can you briefly answer what you believe is a sensible balance with regard to these crash dummies? Because, again, we have been hearing these reports. It is very dangerous for female drivers, and it is just not fair.

So, Mr. Rajkumar, can you briefly answer that question?

And then also, Mr. Levine, if possible, if I am permitted, Madam Chair. I know I am already over, I apologize.

Dr. RAJKUMAR. I am not an active researcher in crash test dummies. But that being said, I do know that the industry, both NHTSA and the Insurance Institute for Highway Safety, they use male version of these dummies, which are 5 foot and 9 inches tall, the median height of the American male. So that allows them to basically standardize across all tests across different cars and such.

But it turns out that American women, for example, are—the average height is 5 feet, 4 inches. So testing on a 5-foot, 9-inch dummy is not the same as the effect on a 5-foot, 4-inches person. It turns out that I am 5 foot 5 inches, so this really does not reflect on me as well. So, really, the study has to be conducted to understand the effects of shorter people and females as well.

Mr. BILIRAKIS. Thank you. I guess, Madam Chair, I probably need to yield back. I appreciate it very much.

Ms. SCHAKOWSKY. Yes. And you can submit a question to—for the record.

Mr. BILIRAKIS. Yes, thank you, Madam Chair.

Ms. SCHAKOWSKY. Is Chairman Pallone here?

It is your 5 minutes to ask your questions. Thank you.

Mr. PALLONE. Thank you, Madam Chair.

The auto industry claims that AVs have the potential to eliminate virtually all human-caused crashes, but then they oppose efforts to establish safety standards that would ensure that AVs perform safely. Instead, they want a hands-off approach to self-driving cars, quick deployment with no new safety standards. And so I wanted to ask in that regard, if I could start with Mr. Levine.

Do you believe that the auto industry can be trusted to police itself and ensure AVs perform safely?

Mr. LEVINE. No.

Mr. PALLONE. OK.

Mr. LEVINE. I do not. That——

Mr. PALLONE. How will—OK, go ahead, I am sorry.

Mr. LEVINE. Oh, no, I was just going to say, I mean, there is a—unfortunately, a many-decades-long history of the industry failing to do exactly that. And, you know, you can go back to before our

founding in 1970 to find evidence of that. In fact, that is why we were founded.

Mr. PALLONE. All right, thanks. Now, how will implementation and safety standards applicable to self-driving cars help us reach the potential benefits of AVs, if you would?

Mr. LEVINE. Sure. There is—in two ways, actually. You know, in—to accelerate the success of automated technology will require an entire new set of layers of standards. And whether we are calling them voluntary or calling them mandatory, the reality is eventually they are going to need to be mandatory, and they are going to need to be part and parcel of our new vehicles. And they are going to need to be built for trust. They are going to need to be built so everyone knows how they work, whether they are working, when they are not working.

But I would also say, on the road to autonomy, we are going to need—and we can achieve far more safety gains than we are currently getting out of existing technologies that will eventually become part of autonomous technology.

So safety standards can help us get to AVs but can also help us protect lives now.

Mr. PALLONE. All right. So I want to go to Mr. Regan and talk about workforce and safety, if you will. So, Mr. Regan, what policies can Congress include in an AV bill to strengthen American jobs, enhance U.S. competitiveness—we keep talking about China—and also boost domestic manufacturing?

Mr. REGAN. Sure, I—thank you for the question. I know that, frankly, one of the talking points we hear is we are going to lose to China. Well, if we don't have, you know, strong Buy American policies attached to this if we are using Federal dollars, then we are going to lose all of that manufacturing to China, regardless of how we deploy it here.

We do need to make sure that we have built-in workplace protections at the front end of all this so that we are growing the workforce along with the technology as it is deployed. We have laid out all of these in the document that we have submitted for the record today. And frankly, if you do it based on maintaining collective bargaining agreements using transit worker protections, there is a lot of ways that we can ensure that working people benefit as much as those who are using the systems.

Mr. PALLONE. All right. And I want to go to back to Mr. Levine again about advanced driver assistance.

The wide-scale deployment of advanced driver assistance systems like automatic emergency brakes, lane departure warnings, and blind-spot detection are building blocks of AV and could save 20,000 lives a year. But as we work on a framework for deployment of AVs, should we also consider policies to expand the deployment of advanced driver assistance systems?

Mr. LEVINE. Thank you so much for the question. And the answer is categorically, 100 percent yes.

I mean, if you look at the main significant difference between our death rates and the European death rates I mentioned earlier, there are about 20,000 deaths. That is the number you just mentioned. Now, is it one for one? No, that is not exactly how it works. But one thing that Europe has done is—really consistently have

implemented a lot of these ADAS systems that we haven't. By next year they are going to be required on all new vehicles in Europe, and they have been rapidly adopting them, whereas here they remain luxury items, they remain completely unregulated. We are not even sure whether they work, how they work, and manufacturers can call them whatever they want.

So we need to accelerate not only getting them into cars but making sure that we have got standards around them, that they succeed in protecting people on our roads.

Mr. PALLONE. All right. Thank you so much.

Oh, did anyone else want to say anything?

No, all right. Thank you.

And thank you, Madam Chair. I yield back.

Ms. SCHAKOWSKY. I did just want to mention that we heard from Debbie Dingell. There was no way to overcome the technology problems that she faced, so she will be presenting her questions and her comments for—and opening statement for the record.

And now I welcome our ranking number, Mrs. Rodgers, for 5 minutes of questions.

Mrs. RODGERS. Thank you, Madam Chair. Before I begin my questions, I would like to offer for the record a letter from the National Federation for the Blind to Senators Cantwell and Wicker in support of the autonomous vehicles legislation, in this case attaching a version to the Senate's Endless Frontiers Act, which is supposed to focus on U.S. leadership versus China.

Sadly, the amendment was withdrawn, as Senator Thune cited, "due to intense lobbying pressure from the trial lawyers and the Teamsters."

Ms. SCHAKOWSKY. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mrs. RODGERS. Thank you.

Professor Rajkumar, I believe lost in this tug of war on auto issues among companies and safety advocates and labor unions and trial lawyers is the greater opportunity that will be available years down the road for seniors and those with disabilities. Can you tell me about the mobility benefits autonomous vehicle technology will provide for the more vulnerable in our society?

Dr. RAJKUMAR. Oh, sure. There are more than 6 million legally blind people in the country, more than a million physically disabled people in the country, none of whom can actually drive like you or me. So these are people, millions who actually are literally stuck at home. And to go from any point A to point B, they need to depend on somebody else. With autonomy these people will gain mobility and independence and a much better quality of living.

And the same concept applies to elderly people. Since women tend to outlive men, it applies more to women than to men. When an elderly person's faculties begin to decline, they may end up losing their driver's license. And even though they have been an independent spirit their entire life, now they do not have a license. It is an empty nest. They basically get stuck at home all by themselves, and records indicate that both mental and physical health begin to decline very rapidly. So we can—with autonomy we can actually give them a better quality of life.

Mrs. RODGERS. Thank you.

Mr. Regan, while we do not have jurisdiction over labor or trucking issues, we do appreciate you being here today to speak to workforce issues. I just wanted to know, given other topics are covered in your testimony relative to autonomous vehicles, specifically in regard to the Tesla accident, do you mind just stating for the record that the AFL–CIO agrees with us that Tesla does not currently sell an autonomous vehicle?

Mr. REGAN. Well, sure. It depends on how you define "autonomous vehicle." It is not a fully autonomous vehicle, no.

Mrs. RODGERS. Right, right. There's five levels. Theirs is a level 2, so we have a long ways to go.

Since public transportation options and assistance can be limited depending upon where you live, do you agree that these technologies can fill a gap in areas where organized labor is not serving those in need?

Mr. REGAN. We have always looked for opportunities to expand mobility options for people in all communities. We think that there are other ways to do that, frankly: more investing in public transit, for instance.

And frankly, what public transit offers right now for—whether it be paratransit for people that are in need of special assistance—a lot of that, as we start developing technology and moving forward, needs to be replicated in the right way to make sure that that—those people are not left behind, that we have the same access to transit that everybody else has, and——

Mrs. RODGERS. OK.

Mr. REGAN [continuing]. The pathway to the middle class there, as well.

Mrs. RODGERS. Thank you. To all the witnesses, I mentioned in my opening statement America still leads the world in the innovation of advanced technologies. However, just like the lessons we learned from ceding leadership on telecommunications networking equipment, we risk our auto and tech companies being marginalized or acquired by Chinese competitors if we fail to enact our own roadmap to develop and test AVs, getting to that place where we have full autonomous vehicles. We are not there yet.

While we will always have outliers in this discussion for their own several interests, I hope our auto and tech companies, our workforce, and our safety advocates can see the benefit of the U.S. developing this technology, setting up supply chains, and designing the rules and standards creating new jobs.

Do you all agree that China will seize our inability to lead on this technology, yes or no?

Professor Rajkumar, would you answer?

Dr. RAJKUMAR. Yes.

Mrs. RODGERS. Mr. Regan, would you answer?

Mr. REGAN. No, not necessarily. I think it depends on how you define "lead."

Mrs. RODGERS. OK. And I am looking for the third here.

Oh, Mr. Levine. Yes, please.

Mr. LEVINE. No, because I don't think that they are leading. We are leading, and I believe we will continue to lead if we choose to do so.

Mrs. RODGERS. OK. Well, I will just underscore we need a national framework. We need to take action to make sure that we do this right.

With that, I yield back. Thank you.

Ms. SCHAKOWSKY. The gentlewoman yields back, and now I recognize Mr. Rush.

Are you here from——

Mr. RUSH. I am here, Madam Chair.

Ms. SCHAKOWSKY. Go ahead.

Mr. RUSH. Madam Chair, I thank you so much for this hearing. My first question is directed to Mr. Levine.

As you know, Mr. Levine, I, along with my good friend from Indiana, Dr. Bucshon, recently introduced a bill that will require the National Highway Traffic Safety Administration to "evaluate the performance of crash avoidance systems, and detecting and classifying pedestrians, bicyclists, and other vulnerable road users, including those with different skin tones."

The genesis of this bill came out of a recent Georgia Tech study that found that crash avoidance systems currently on the market have trouble recognizing individuals with darker skin tones. And I am grateful to you and the Center for Auto Safety for your support of our bill.

Can you please discuss why this legislation and the performance evaluation it mandates are so important?

Mr. LEVINE. Thank you so much for the question, Congressman. And thank you for introducing the bill.

The value of making sure that crash avoidance systems work is really inarguable. The idea, both for vehicles today—you know, when we talk about automatic emergency braking and forward collision warning and all these different acronyms that people throw around, the value in them is only if they work, only if they detect other vehicles and, of course, other vulnerable road users, pedestrians, bicyclists, particularly, making sure they detect every one of every—you know, of every possible skin color, and whether they are—again, they are a bicyclist or a pedestrian.

And most importantly this is something that will help save lives now and help build AVs in the future, because these AVs are going to be dependent upon crash avoidance technology. So this is really an important step in making sure we get the right technology on the road for everyone's safety.

Mr. RUSH. Mr. Levine, I have a second question, and I thank you for your answer to my first question.

Does the Georgia Tech study have any more information as to the safety of AVs? And if so, give us some ideas about what those implications are.

Mr. LEVINE. Well, you know, I mean, AVs, if I understand the question correctly, I mean, AVs can prevent, in the long run, if they work properly, a lot of the current crash circumstances. But we have a long way to go to make sure that they are working correctly. As was discussed previously, there is some technology out there right now, particularly from Tesla, that claims it is autonomous but is not. There is an unregulated sort of moment that we are living in, with respect to how this technology is described and deployed.

So in the long run, for us to get from where we are now to where we want to go and eliminate, or at least mitigate, the vast majority of these 42,000 deaths a year, we are going to need careful, iterative steps to make sure the technology works——

Mr. RUSH. Mr. Levine, I have another question. As you know, even pedestrians may lose their right to seek justice and, of course, if there is a continued proliferation of forced arbitration clauses. These clauses often emerge in terms-of-service agreements that waive a consumer's right to sue in court, participate in a class action, or appeal the arbitrator's decision.

Does forced arbitration clauses relating to AVs pose a danger to pedestrians? And if so, why?

Mr. LEVINE. They pose a real threat, and the threat is this. As we discussed earlier, the ability to make sure you are holding any manufacturer—AV or otherwise—responsible for something defective, for a defective vehicle, is critical to safety. It is a backstop to our entire system.

And so, if you are a pedestrian who has entered into an agreement unknowingly when you downloaded an app to order a pizza, maybe, and you get hit by a pizza delivery vehicle, and you said, "Well, I am going to do everything, from a legal standpoint, through binding arbitration," you have now lost your ability to go to court. That sounds outlandish, but it is not actually that far from where we are, in terms of binding arbitration, removing our ability to hold manufacturers accountable.

And so that is something that we don't want to see in an AV context.

Mr. RUSH. Thank you very much.

Madam Chair, I yield back.

Ms. SCHAKOWSKY. Thank you. And now, Mr. Upton, it is your turn for 5 minutes of questioning.

Mr. UPTON. Well, thank you, Madam Chair. And I think we all agree—I know we all agree that, if we don't lead, if America doesn't lead in AV technology, we run a lot of risks. And we saw this last week with Colonial Pipeline. We also run the risk of cybersecurity threats from abroad.

So I would just note to my colleagues that I introduced the GUARD Act last week that is going to require the Secretary of Transportation, in consultation with other appropriate Federal agencies, to conduct a study, report to us on the state of cybersecurity regarding motor vehicles.

And I wonder, Professor Rajkumar, if you could talk a little bit about what is Carnegie Mellon doing to address cyber, and what do you think the Secretary should focus on in the report, as authorized, if my legislation moves forward?

[Pause.]

Mr. UPTON. You have to unmute yourself.

Dr. RAJKUMAR. Thank you, Congressman. Cybersecurity is a critical issue for AVs, in particular, and vehicles in general. If my bank account gets hacked, I may end up losing some money. But if my vehicle gets hacked, and the vehicle runs into something, I can lose my life. So it is actually a big imbalance out there. So I really think that cybersecurity, as applied to physical destruction of life and property, should really be cyber physical security.

At Carnegie Mellon we have an institute called CyLab that I am part of as well. "Cy" stands for cybersecurity and privacy, in this case. We are looking at so many different functions—detecting security intrusions, how to design systems from scratch to be secure, how to take an existing system, make it more robust, from a security perspective—and when we map that to vehicles, we go across multiple hardware subsystems when computers talk to each other within the vehicle and with the environment as well. So we are looking at that whole spectrum of technology. So it is imperative that we make this vehicle secure.

Mr. UPTON. So there has been pretty big investments made by—you know, I am from Michigan, the auto State. The President is there, actually today, looking at the new Ford 150 electric vehicle. But GM just announced more than $2 billion investment in a company called Factory ZERO in Hamtramck, Michigan. It is going to create a couple of thousand jobs, all on the AV industry.

You know, one of the things that we are all concerned about is DoD—DOT, rather, Department of Transportation—needs to modernize the Federal Motor Vehicle Safety Standards, FMVSS, to account for AVs. What can we do in the interim to help with funding and development to make sure that those—that technology, in fact, is born here in the U.S.?

Dr. RAJKUMAR. I see multiple components forming a holistic picture, Congressman.

Number one, we still have a need for basic research, so targeted research programs at the Federal level would go a long way.

Number two, the U.S. DOT, it has a program called Automated Driving System Demonstration Grants. We need more of that to, basically, deploy these technologies in the real world, and get—collect data, and then obtain feedback.

Number three, we need to engage workforce and understand their concerns so that retraining programs can be put in place so that their skills can be upgraded.

So all of that needs to happen.

With respect to FMVSS, Vehicle Safety Standards, we have some very outdated regulations on the books. You cannot remove your side mirrors, for example, and replace them with small cameras with displays inside on the doors. If you remove those side mirrors, the aerodynamics of the vehicle will go up, mileage will go up, and costs will actually come down, cost of ownership will come down. But meanwhile, nobody has ownership of that particular regulation and, therefore, it is on the books. Even though the technology is there, it cannot be deployed today.

So we should be revisiting these regulations on a complete scale.

Mr. UPTON. So it would make some sense, then, to have some commonsense regulations that would be able to account for some of those things that weren't done when those regulations were promulgated through OMB.

Dr. RAJKUMAR. Absolutely, yes. Many of them are outdated, and it is hard to change that. So going forward, when we put in regulations for AVs, it is important that the regulations are not set in stone. They need to be revisited every so often, at least once a year.

Mr. UPTON. Thank you. I yield back.

Ms. SCHAKOWSKY. And next up, Congresswoman Castor, you are recognized for 5 minutes for questions.

Ms. CASTOR. Well, thank you, Chair Schakowsky, and thank you to our witnesses for being here today.

You know, together with the Biden administration, as we bounce back from COVID, we are pressing ahead on jobs in clean energy and cost-saving energy efficiency in ways that we reduce pollution, as well, to create these win-wins. In fact, when it comes to autos, the House Select Committee on the Climate Crisis, our big Climate Crisis Action Plan, we recommended providing incentives for the purchase of electric vehicles and incentives for EV charging infrastructure, with very significant Buy American, Build It in America complementary policies.

And what followed on? President Biden's American Jobs Plan. He does propose to invest $174 billion in vehicle electrification, and there is an exciting announcement coming today out of Dearborn, Michigan, with Ford and the United Auto Workers that we are all going to be watching.

Mr. Regan, how will such investments boost domestic manufacturing, help us expand domestic jobs, and ensure all workers in the industry earn fair wages and high-quality benefits while we boost American competitiveness?

Mr. REGAN. Thank you, Congresswoman. Really, the way—if you look at the American Jobs Plan, the reason why it will create so many jobs and be such an economic benefit is because of the labor standards that are attached to all of those investments. Buy America, 13C, Davis-Bacon, all of these labor protections that have been proven to provide middle-class jobs are embedded in that proposal. And we expect Congress will make sure it is written in the right way to do it, to create those jobs.

Ms. CASTOR. Yes, we have got to make sure that the United States outpaces our international competitors in the global race for electric vehicles.

And the race is on. In 2018 Chinese production accounted for more than half of all lithium battery cell manufacturing capacity and nearly half of global EV sales. So this—I mean, the race is on, and we better get our act together here with very substantive policies.

Mr. Regan, can we win the global race to EVs without a comprehensive Federal approach that supports electric vehicles and high-quality jobs, manufacturing, and deployment? What do you think?

Mr. REGAN. No, we can't. We need those policies. We need the investments.

And also, I would add, we need the investment in the workforce as well. We need training requirements. We need to make sure that the people are growing, their careers are growing at the same time that the technology is growing. That is true for EVs, it is true for AVs. And we have an opportunity here to really become a leader not only in the manufacture of these vehicles and the deployment of vehicles but also in the policies that will redefine how we interact, how these policies and how these vehicles are being built out, and expanding workforce opportunities.

Ms. CASTOR. Exactly. And so would you recommend that any Member of Congress who wants the United States to outcompete China support the American Jobs Plan?

Dr. RAJKUMAR. A hundred percent, yes.

Ms. CASTOR. We have to do it. As the economy heals and interest rates remain low, this is the perfect time to invest in our workforce, electric vehicles. We have got to outcompete our global competitors.

And by the way, these cars are really fun to drive. So this is going to be an exciting time and an exciting announcement today.

Also, fuel economy and tailpipe emissions standards have played a critical role in reducing pollution, but these standards are only effective if they are enforced. Thankfully, when two major German automakers installed the so-called defeat devices to cheat emissions tests, consumers who had purchased those cars under false pretenses had the right to hold the manufacturers accountable by participating in a class action lawsuit that awarded billions of dollars in compensation.

Mr. Levine, automated vehicles, as they are deployed—a number of Members have raised this today—how do we ensure that consumers are still able to seek legal recourse if they violate the fuel economy and tailpipe pollution standards? What do you recommend?

Mr. LEVINE. Sure. Thank you so much for the question. I mean, a core way of achieving the accountability is not changing the system in a way that all of a sudden changes how we hold manufacturers accountable. Right now, if a manufacturer of a vehicle is doing something that is cheating intentionally or putting a defect on the marketplace, they can be taken to court. They can be held accountable by both regulators and by individual citizens, either banding together or one on one. Let's not change that. Let's not remove that backstop that helps protect all of us, whether it be from an emissions cheating scandal or a defective ignition switch.

Ms. CASTOR. Thank you very much.

Thank you, Madam Chair. I yield back.

[Pause.]

Ms. SCHAKOWSKY. Oh, I am so sorry, Mr. Latta, I just introduced you as someone who has a little bit of interest in this topic, but I was on mute. So now you have 5 minutes.

Mr. LATTA. Well, thank you. I thank my friend and—for holding today's hearing. I really appreciate it. Thanks to our witnesses for being with us today.

It is hard to believe it has been two Congresses ago that this committee and subcommittee passed out the AV legislation unanimously, and it passed the House on a voice vote. And I think that we are falling behind the rest of the world, and I am glad we are having this hearing. We need to spotlight this.

And, you know, if I could just go back to the legislation that we had, I think we had over 300 staff meetings, and meeting with everyone on the issue to make sure that we came up with a good piece of legislation, from preemption to safety. And I remember saying it over and over and over, we wanted safety first, safety last, safety always, cybersecurity, and we wanted privacy. We

wanted to make sure, of course, that the vehicles that were coming out would be as safe or safer than anything that was on the road.

And then, you know, talking about our senior citizens, give them more mobility, making sure that those with disabilities had more mobility. And so we wanted to make sure that happened.

We also looked at, you know, saving energy, and working with smart cities like Columbus, Ohio. So it is getting out there and testing.

And then, you know, it has been brought up, unfortunately, you know, we have had 42,000 deaths in the last year on the road, 94 percent being human error. And, you know, then it was increased. It was 37,000 when we were talking about this legislation two Congresses ago.

So, Mr.—or Dr. Rajkumar, if I could start with you, first question: Are we falling behind China right now in AV technology?

Dr. RAJKUMAR. Congressman, I believe yes. Yes, we are. After the 2007 DARPA Urban Challenge, China launched a sequence of annual competitions. Initially, basically, they had vehicles that were really veering this way, that way, and then next year they improved. Now, basically, they are pretty much catching up with us.

Baidu, the big company in China, has announced—has reported in Bloomberg that they will have more than 2,000 autonomous vehicles across multiple Chinese cities in the next couple of years. And meanwhile, the longest video on YouTube that showcases a completely driverless vehicle without anybody inside them is for 2 hours, driving across a Chinese city in light traffic, Sunday morning traffic. But it is the longest driverless trip I have seen anywhere, including U.S. companies and such. And that is from a company that is operating in China.

And meanwhile, they have these advantages of a relatively lax regulatory environment, where they don't—they can stifle—muffle disagreements. And they tap into the resources available in China in terms of talent and money. They also operate offices in the U.S., so they tap into American talent, as well.

So I think we should be very concerned. They already have 80 percent of electric vehicle manufacturing capability, I believe, more than the U.S. and Europe combined. And if we end up losing the manufacturing capability and we end up losing the IP, the intellectual innovation part with autonomous vehicle software and sensing—they have sensor manufacturing companies there as well—we could end up losing the whole enchilada.

Mr. LATTA. Well, and, you know, we already know that—as you mentioned is not only what they are doing in China, but they are testing in the United States right now.

Let me ask you. You talk about safety being paramount. Would you want to talk about—a little bit about that?

And I would like to—if you could, make it a shorter answer, because I got about a minute and 12 seconds left.

Dr. RAJKUMAR. Sure. Without safe technologies, customers will not trust or buy these vehicles. So the companies are incentivized to basically make sure that this technology is reliable and safe.

Mr. LATTA. Well, and also, you also mentioned that, you know, that this should be adaptive and agile. Could you touch on that?

Dr. RAJKUMAR. Yes, the technology is maturing rapidly, evolving across multiple different segments and multiple different geographic regions. Whatever regulations that we put in place today will end up being outdated a few months from now, a year from now. So it is important that any framework that we put in place is revisited every so often, once a year.

Mr. LATTA. And you also talk about encouraging collaboration, and that is something I—we worked on in the last—you know, two Congresses ago, making sure we had everybody involved. Do you want to just quickly talk on collaboration?

Dr. RAJKUMAR. Yes, I find that—the American innovation ecosystem to be very unique. It comes about because of Federal investments in basic research, industry participation, and groundbreaking creative ideas from universities working with communities and organizations. So that, I think, is the magic sauce that we have in the U.S., where we became the innovation capital of the world, and we need to push that advantage that we have.

Mr. LATTA. Well, thank you very much.

And Madam Chair, my time has expired, and thank you for today's hearing. I yield back.

Ms. SCHAKOWSKY. Thank you. Next up is Congresswoman Trahan.

And you are recognized for 5 minutes for questions.

Mrs. TRAHAN. Thank you, Chairwoman Schakowsky, Ranking Member Bilirakis.

I am the daughter of a union ironworker, and like several of my colleagues I am concerned that market forces will likely lead to an uptake in self-driving cars for ride hailing, transit, and delivery. And this means that not only are the livelihoods of displaced workers at stake, but their physical health and safety as well, as they look to be the first major subset of the population to work in and around level 3, 4, and 5 vehicles.

This workforce will be at the front lines when these vehicles make mistakes. And AVs will make mistakes. They already have. Mistakes are part of the process for developing innovative technologies. Mr. Levine, if a worker is killed or injured by a defective AV car or truck, what recourse will they have against the manufacturer?

Can they bring an effective case if they are forced to proceed in a private arbitration with little access to discovery or to information from similar incidents that might have occurred?

Mr. LEVINE. Well, as a general—thank you so much for the question. As a general matter, no. I mean, to the extent that an employee or a contract worker or, really, any individual has been bound from—prevented from using all of the access to all the different tools that the American court system provides, then no, they are unlikely to be able to seek justice. They are unlikely to be able to hold the manufacturer accountable. And, perhaps most importantly, whatever they do determine will be done in secret, so the rest of the public won't learn what happened and if there is a real widespread problem.

Mrs. TRAHAN. Understood. And I am wondering if you could just expound a little bit on how these forced nonpublic arbitrations would affect public safety.

Mr. LEVINE. Well, again, as a general matter, there is only one party that seeks binding arbitration in a consumer-manufacturer context. That is going to be the manufacturer. Consumers are never out there looking for binding arbitration agreements that they want to be able to sign. They are generally forced upon them.

And when we enter into them on our phone for an app, we don't think very much about it often. But when we are talking about a vehicle, whether you are in the vehicle or you are hit by the vehicle or you have to use it for work, it dramatically changes your opportunity, again, if something goes wrong, to hold that manufacturer responsible, and perhaps, again, even more importantly—remember, binding arbitration disputes are almost always settled in private, in secret, and do not get made public. And this is a major problem, historically, that has little to do with AVs, but there is no reason to expand this problem to the autonomous vehicle environment, which we all want to get to.

Mrs. TRAHAN. Yes, no. Thank you.

Similarly, this same frontline workforce will be highly surveilled. Working alongside AVs means being constantly surrounded by cameras and having your every move tracked. Mr. Regan, heavy-duty truck driving is already a highly surveilled occupation. Can you speak to the impact this has on workers, and ways Congress can create policies that balance a worker's right to privacy with the fact that AV technology needs large quantities of image data to work effectively?

[Pause.]

Mrs. TRAHAN. Did we lose Mr. Regan?

Mr. REGAN. I am sorry, my Webex just suddenly froze out on me. But can you repeat the question?

Mrs. TRAHAN. You bet. You bet. I am—given just the high level of surveillance, I am wondering—you know, heavy-duty trucking is already highly surveilled, and I am wondering if you could just tell us a little bit about the impact this has on workers, and ways that, you know, Congress can create policies that balance a worker's right to privacy with the fact that, you know, AV technology needs large quantities of image data to work effectively.

Mr. REGAN. Sure. I think you can look to, frankly, look to the aviation sector for guidance on how to balance worker privacy with the necessary safety constraints that are inherent in some of the monitoring equipment in an aircraft. We have struck that balance before. We can certainly do it here.

Mrs. TRAHAN. Great. Well, certainly I join so many of my colleagues in my excitement about the potential of a world with self-driving cars, and I believe in the ingenuity of our engineers and our computer scientists. I believe our brightest minds can develop world-changing technology while remaining committed to the safety of those working on our front lines of this grand experiment.

Thank you, Madam Chair. I yield back.

Ms. SCHAKOWSKY. Thank you.

Mr. Guthrie, you are now recognized for 5 minutes for questions.

Mr. GUTHRIE. Thank you, Madam Chair. And first I need to point out that Mr. Levine appears to have Willie the Wildcat behind him, which is a really good move, since Willie is a constituent of our chair. So that was a good move this morning.

I have questions for Dr. Raj Rajkumar.

In your testimony you discuss the regulatory challenges that are preventing us from deploying autonomous vehicles. While these deserve our attention, I would like to shift focus to some of the technical challenges that remain ahead. As you know, we are also in a global race to 5G. How important of a role do you see 5G playing in the deployment of autonomous vehicles?

Dr. RAJKUMAR. Thank you, Congressman. Autonomous vehicles collect a massive amount of information from different sensors, multiple cameras, radars, and lidars. We are talking a massive amount of information.

With the 5G connectivity, a good portion of that information can be transmitted to the cloud, to a central computer somewhere, which can collect all this information from multiple AVs and then extract very useful information—what the weather conditions are, different roads, what the road conditions are like, wet, icy, slippery, and so on. It can get the traffic snags like accidents, debris on the road, the presence of potholes and such, and it can feed back that information back to the AVs. And now the AVs can basically react to that information that cannot be sensed by their sensors. Now they basically navigate those obstacles by taking detours and such, and therefore they are more safe—they are safer and more reliable.

Mr. GUTHRIE. OK, thank you, and——

Dr. RAJKUMAR. So——

Mr. GUTHRIE. Now, next, during today's hearing we have heard a lot about potential safety benefits that autonomous vehicles can bring to our Nation's highways. And Dr. Rajkumar, what are the safety implications of allowing a country like China to beat the U.S. to automotive innovation and AV deployment?

And how can we assure Americans that this technology will provide improved mobility and quality of life, ultimately ensuring more widespread adoption?

Dr. RAJKUMAR. Sure. In terms of deaths, the World Health Organization reported that there may be about 250,000 automotive deaths in China. So they are motivated to save lives, number one.

In my testimony I say that the market size is estimated about $7 trillion a year—with a T. They understand that as well. So while they are investing intensely into the space, they are encouraging their companies to forge ahead. And when they get the manufacturing base in-house and they basically get the intellectual meat, the cream of the crop in terms of the core innovations, so that can become an unbeatable combination, particularly when combined with 5G.

So it is important that we invest—we outinnovate them. That is the only way that we can actually get ahead. And therefore we maintain our national security as well as economic competitiveness, retain our jobs in terms of maintaining control of domestic supply chain and such.

Mr. GUTHRIE. OK, thanks. And how can we ensure that rural America is going to benefit from AV technology?

Dr. RAJKUMAR. If there is a crash, an automotive crash in the rural areas, it is likely that emergency vehicles will not reach you necessarily on time. So the fatality rate in rural accidents is much higher than in urban areas. And if you are disabled or legally blind

or living alone by yourself and you are old, you get stuck at home. So autonomous vehicles can give you both mobility, independence, a better quality of life, access to opportunities and employment. So all of that will be enabled in rural areas.

Luckily, rural areas also have open skies and such, and therefore, autonomous vehicles likely will drive better also.

Mr. GUTHRIE. All right, thanks. And then to also Dr. Rajkumar, during the 115th Congress I introduced the SHARES Act, which eventually became part of the SELF DRIVE Act. The SHARES Act set up an advisory council to bring industry experts together to develop an information-sharing framework to advance the safety of AV. How important is it for us to be sure we are bringing experts and relevant stakeholders together to tackle emerging issues?

Dr. RAJKUMAR. I believe there should be advisory boards that advise the U.S. DOT, in particular, that brings together participants from industry, participants from academia, from stakeholder organizations, bike organizations, pedestrian organizations, people with disabilities and such. So it is important that all of us together communicate with each other our concerns and come up with a solution that works for everybody, including the regulatory framework.

Mr. GUTHRIE. Thank you very much, and my time has expired, and I yield back. Thank you.

Ms. SCHAKOWSKY. I thank the gentleman. And now, Mr. McNerney, you are recognized for 5 minutes.

Mr. MCNERNEY. Well, I thank the chair, and I thank the witnesses. Your testimony has been very informative.

The ransomware attacks at the Colonial Pipeline and the massive hack detected by SolarWinds are wake-up calls about the increasing cyber threats we now face. AVs are, effectively, computers on wheels and can be hacked.

Mr. Levine, in your testimony you noted that AV legislation must include cybersecurity standards. Following up on Mr. Upton's question, why is it necessary that this legislation include such standards?

Mr. LEVINE. Thank you so much for the question. And as Congressman Upton noted, you know, I mean, the Colonial Pipeline is a perfect example of how important cybersecurity is in our transportation sector. But we don't have to go outside of vehicles themselves. I mean, there have been reports, since we have made computers part and parcel of our vehicles, of vehicles being hacked. There was a news report last week of a Tesla being hacked via a drone.

Now, we are not yet at the point where they are always able to take over operational control, but we are probably not that far away. So the immediate importance of setting up cybersecurity standards that allow for us to know what is happening and allow for a sharing of information that shares threats amongst both government and the manufacturers will allow us to be more protected in these vehicles, going forward. It is a critical part of the conversation. Thank you for raising it.

Mr. MCNERNEY. Thank you. Well, AVs are likely to communicate with smart infrastructure like tolls and traffic lights. Are you concerned that the potential cyber vulnerabilities of AVs could pose cybersecurity risks to a city's smart infrastructure?

Mr. LEVINE. It is certainly a concern. I mean, any time anything is online, there is a risk associated with it, from a cybersecurity perspective. That said, this is the way we are going to achieve the tremendous benefits that AV proponents are discussing.

And so it is probably not a question of if there is going to be a connection between infrastructure and vehicles. It is a question of how can we be sure to protect it as well as possible and make sure that, if there is a hack, if there is a vulnerability, it can be closed as quickly as possible and mitigated.

Mr. MCNERNEY. Thank you. It is my understanding that NHTSA can currently use recall authority to remove vehicles with cybersecurity vulnerabilities. Is NHTSA's recall authority sufficient?

Mr. LEVINE. Well, the authority is probably sufficient, but remember, a recall is only happening after the problem has been discovered. The reason standards are useful is they try and prevent the problem from happening in the first place and create a more effective mechanism, ideally, for limiting the scope of the problem.

But yes, I mean, NHTSA can certainly recall something that has an issue, but there is a larger question of can we prevent or limit that issue before it gets a recall.

Mr. MCNERNEY. Well, thank you. Well, in your written testimony you noted the importance that an AV law does not preempt protections provided by State and local rules of the road regarding operations of vehicles on the street. Why is that something you believe is important?

Mr. LEVINE. Well, right now, remember, the way we think about who is in charge of our local roads, our local communities. They determine the rules of the road, who gets on the road, who gets driver's licenses, speed limits, that sort of idea. And that is not just important for local control; that is important for oversight and accountability.

And so, if we decide that that should all be preempted at a Federal level, we are removing not only the opportunity for local communities to have oversight into what is going on on their roads, but we are also taking away a legal oversight mechanism that holds manufacturers—and anyone, quite frankly, any operator of a vehicle, a person or a computer—responsible.

And so, again, that—the importance of the oversight can't be overstated.

Mr. MCNERNEY. Thank you. That makes that clear.

Mr. Regan, I serve as the cochair of the Artificial Intelligence Caucus. One of the issues that I am most concerned about is the impact of AI and automation on the workforce. And thank you for the set of recommendations you gave in your oral testimony for how to avoid large-scale job displacements due to AI and automation.

What challenges are workers whose jobs are displaced as a result of AI likely to face in finding—transitioning to new jobs?

Mr. REGAN. Thank you for the question. I mean, especially if you have people that are in the—you know, midcareer, and all of a sudden have their jobs—they lose their jobs, I mean, the challenges of finding something and adapting to a new economy is going to be very difficult, especially if they don't have the built-in workforce training opportunities that we are calling for here to make sure

that they can smoothly transition, along with the technology, to adapt to a—to the new economy.

Mr. MCNERNEY. So this is going to require investment from the Government and from the beneficiaries of the technology, is what I would guess.

Mr. REGAN. Absolutely. I think this needs to be a comprehensive effort to make sure that the workforce is brought along as well—along with the technology.

Mr. MCNERNEY. Thank you. I yield back.

[Pause.]

Mr. DUNN. Madam Chair?

Ms. SCHAKOWSKY. Yes, I got it.

So, Mr. Dunn, you have a very sparkly State behind you, and you are welcome now to take your 5 minutes for questioning.

Mr. DUNN. Thank you, Madam Chair. I will try to address this background in between meetings.

Some critics of autonomous vehicles legislation claim that exempted vehicles are not as safe as others currently on the road. And that is why I recently introduced the H.R. 1334, Safe Alternative Vehicle Endorsement, or SAVE, Act. This legislation would reclassify a vehicle's exemption—note the word "exemption"—as an alternate safety endorsement. My intent is simply to better reflect that any endorsement granted by NHTSA meets or exceeds Federal vehicle safety standards.

So my first question is to the entire panel, and a simple yes or no will suffice, I think you would agree. Under current law, would you agree that, in order for a vehicle to receive such an exemption, the vehicle must have an overall safety level equal to that of the overall safety level of nonexempt vehicles?

Let's start—Mr. Regan?

Mr. REGAN. Yes.

Mr. DUNN. Great. Mr. Levine?

Mr. LEVINE. That is the current standard. But remember, the Ford Pinto met all the Federal standards.

[Laughter.]

Mr. DUNN. Yes, I was around for the Ford Pinto.

Dr. Rajkumar?

Dr. RAJKUMAR. Yes.

Mr. DUNN. Yes, OK, great.

So, Professor Rajkumar, can you briefly explain why the exemption process is critical for the development of autonomous vehicles now, right now?

And what exemptions are necessary to allow manufacturers the flexibility to develop safer vehicles?

Dr. RAJKUMAR. AV technology is very complex and needs to be tested extensively to demonstrate safety. I can take a couple of approaches. You can simulate, but simulation only goes so far. You can test for certain conditions, but the real world is much more complex than what simulations can produce. So these vehicles have to be tested in the real world. So having a mechanism that enables testing under well-defined conditions so that it does not hurt the public but enables the technology to mature is hypercritical.

Mr. DUNN. Well, thank you very much for that. Would you say, Professor, that an auto manufacturer must meet the same level of safety in order to receive what would today be called an exemption?

Dr. RAJKUMAR. Well, absolutely. They could go through a very detailed process to, basically, get their exemption application granted.

Mr. DUNN. So in that—because you said that, now is it not more appropriate to describe and title what we are now calling an exemption what it truly is, which is an alternate type of safety endorsement?

Dr. RAJKUMAR. Very much so, because the car maker, in this case, has to demonstrate to an enforcement agency like NHTSA that their technology is safe because of the following reasons, and they should identify where they are going to be testing the vehicles, they need to be identifying who is involved, who is in the vehicle, who can be around, who is not, and such. They define their entire process.

And meanwhile, NHTSA will very likely require them to share a lot more information. They will retain the right to maintain tight oversight of that vehicle and then impose an expiry duration, after which—car makers to come back and say, "This is what happened, and therefore please continue my exemption."

Mr. DUNN. Very good. Thank you.

Mr. Levine, would you be in favor of changing the title "exemption" to "alternate safety endorsement"?

Mr. LEVINE. Well, thank you for the question. I am not sure that what we title it is as important as what the outcome is. And——

Mr. DUNN. So I think you are right, the outcome, but we are talking—the outcome is the same. So—but the title is intended to get away from the term "exemption," which causes fear. That was my intention right there.

Mr. LEVINE. So—and I think that that is fair. I mean, the concern would, of course, be, you know, there is this current process, which we call the "exemption process," but the current process exists. There has been, I believe, two or three manufacturers who have submitted applications, one of which was approved, one of which was withdrawn. And so there is an existing process that is supposed to look at this information.

I think the most important piece is, is enough data being acquired and submitted to allow NHTSA to make a reasonable determination as to the safety of the vehicle that may not meet the traditional standards? And that is the most important question before us. And that is the one I think we are all hoping to find a way to solve.

Mr. DUNN. And I would—I think we would all agree with you on that. I mean, it is a new and evolving area. Thank you very much for your answers and your time, gentlemen.

I yield back, Madam Chair.

Ms. SCHAKOWSKY. OK, next we have my colleague and friend from Illinois, Congresswoman Kelly, for 5 minutes.

Ms. KELLY. Thank you, Chair Schakowsky and the witnesses, for testifying today.

One thing we can all agree on is the desire to protect and create good-paying jobs that provide families with financial security. For

decades, automobile manufacturing has supplied just that kind of employment. While that sector has faced its fair share of challenges due to automation and globalization, I am hopeful that the design, engineering, and manufacturing of autonomous vehicles will occur in the United States.

Mr. Regan, over 32,000 of my constituents are employed in the manufacturing industry, many in the automobile manufacturing sector. How can we ensure that Federal support for AVs also supports American workers and domestic manufacturing?

Mr. REGAN. Thank you for the question. You know, this—it is not going to happen by accident. It is not just going to magically develop here. We are going to need strong Buy America procurements. We are going to need community benefits agreements, U.S. employment plan restrictions, all these things that we have outlined here that are really important.

And I would add—earlier the Ranking Member Rodgers made a point about the Thune amendment being withdrawn because of Teamsters and trial lawyers. I would say it was withdrawn because it did absolutely nothing to address manufacturing domestically. It laid out findings that we need to be able to produce these here in the United States but had zero policy that would actually accomplish that goal.

Ms. KELLY. Is there a danger, Mr. Regan, if we permit the widescale development of AVs without any insurances that the vehicles are designed, engineered, and manufactured in the United States?

Mr. REGAN. Yes, I think the danger of falling behind China, as I know that—has been raised many times here, would exactly be realized at that point. If we aren't making sure that it is going to be developed and built here, it is going to go overseas and we are not going to realize the benefits, economically, of these in the United States.

Ms. KELLY. And how do you suggest we prevent a regulatory environment in which companies designing, engineering, and manufacturing AVs overseas reap the economic benefits? How do we prevent?

Mr. REGAN. Well, I think what we have laid out here—it is the responsibility right now of policymakers to build a framework that is going to ensure that we reap the benefits. I think a failure to address the manufacturing, safety, workforce issues that are very complicated and, frankly, are all going to be impacted by AVs, any policy that doesn't address all of those is, frankly, a failure of legislating, and any regulation that is adopted because of it would be a failure of regulation if it doesn't address all these issues.

Ms. KELLY. Thank you.

Professor, in your testimony you mention that there is more research needed into cybersecurity and cyber physical security around AVs. What role can the Federal Government play, and how mature are the current industry standards actually—how mature are they in auto cybersecurity?

Dr. RAJKUMAR. Thank you, Congresswoman. We still need some fundamental breakthroughs, because cyber physical security spans all layers of the system, all the way from you playing your music on your Bluetooth device all the way down to the wire that basically carries information back and forth between computers.

The industry is very sensitive to potential attacks, which will make them extremely liable for things that go wrong. But they do have the need, the necessity to make money now. So they are taking, basically, near-term solutions to address this problem.

But really, to come up with a fundamental framework that addresses the issue or the longer term, that calls for investments in basic research at the Federal level, and it really needs to be coordinated across multiple agencies, including the DOT, as well as basic research agencies like the National Science Foundation.

Ms. KELLY. Thank you.

Mr. Levine, are industry standards sufficient to protect vehicles from cybersecurity threats?

Mr. LEVINE. That is highly unlikely. Thank you so much for the question. It is highly unlikely that industry standards, all by themselves, are going to be sufficient. And we know that because they are not sufficient in almost any other category either.

There is certainly a role to be played by industry standards. There is certainly a role to be played by public-private partnerships when we talk about cybersecurity, whether you are talking about ISACs or other collaborations, but there needs to be a significant involvement from the Federal Government, and DOT should look to how it deals with cyber in the aviation space as a model.

Ms. KELLY. Thank you so much.

And lastly, Mr. Regan, what safety lessons can we learn from the aviation and transit sectors, which have long adopted automation to improve safety?

Mr. REGAN. Thank you. Aviation is a really good example because the FAA has often been referred to as the tombstone agency, where regulations are written in blood. Every time there is a major accident, you know, most of the good safety policy that has come out, good safety regulations, are because of a catastrophic crash. We have an opportunity right now to prevent that from happening when it comes to AVs if we are addressing this at the early part instead of waiting until there is a catastrophe.

Ms. KELLY. Thank you so much, and I yield back.

Thank you, Madam Chair.

Ms. SCHAKOWSKY. Thank you. And now 5 minutes go to Congresswoman Lesko.

Mrs. LESKO. Thank you, Madam Chairman, and thank you to the witnesses today.

I really do believe that the future of vehicle safety and autonomous vehicles is something we can work together on, as Republicans and Democrats. I am happy to cosponsor a bill with Congressman McNerney on—Impaired Driving Safety Act. And I think autonomous vehicles may be part of the solution.

In the past 5 years, the State of Arizona has become the world leader in autonomous vehicle technology. Arizona welcomed testing and pilot programs in our State. In fact, I rode in an autonomous shuttle launched in my hometown of Peoria, Arizona, just last spring, and it drove us around a shopping area in Peoria called P83.

Autonomous, long-haul trucking companies have also found a welcome home in Arizona. And in March, Arizona Governor Doug Ducey signed into law legislation that updates our State's safety

framework for autonomous vehicles. We know that approximately 94 percent of vehicle accidents are caused by human error, including impaired driving. My district is home to thousands of senior citizens who can no longer drive and need to get to their doctors and stores. I think autonomous vehicles can be part of the future to solve that problem for senior citizens, those that are disabled, and, of course, will definitely cut down on impaired driving accidents.

Mr. Rajkumar, my first question is for you. In your opinion, what are the hurdles remaining for the automobile vehicle industry to overcome, to continue the development of this technology as we shift from driver assist functions to fully autonomous systems?

Dr. RAJKUMAR. Congresswoman, thank you for the question. The basic technology for doing that is available or can be made available fairly quickly. There are so-called driver monitoring systems, where a camera can be mounted above the steering wheel, say, looking at the driver's face, and then monitor whether the driver's eyes are closed or not, that the head is drooping or not.

And therefore the technology is there to detect whether the driver is opiated, drowsy, or drunk. And whether the vehicle is driving itself or not, even with the level 2 systems and beyond as well, you can monitor. And if things are not looking good, the vehicle can take action, generate alerts, and if they are not being responded to, slow down, turn the flashers on, pull over, and stop.

Mrs. LESKO. Yes, that is very interesting that—you know, of course, with the introduction—there is drunk driving and then, of course, with the introduction of more legalization of marijuana, that is causing a problem as well. So I could see how that would be very beneficial.

I have another question for you, sir. You mentioned in your written testimony that China's ability to catch up with our advances in autonomous vehicles has been aided in part by their regulatory environment. What actions should Congress take to both address consumer safety and maintain American leadership and innovation in autonomous vehicles?

Dr. RAJKUMAR. Oh, sure. China, being an aristocratic regime, they can turn many different knobs different ways or just completely shut them down at will. We, being a democratic republic nation, we cannot do that. We will not do that. Our value systems are fundamentally different.

So the way we basically beat them, I believe, is by outinnovating with the most talented, innovative workforce in the entire world. So that is how we need to make it happen. We have done that through public-private partnerships with the gems of the Nation in higher education contributing with their creativity—and startups. So that is the way to make it happen.

Mrs. LESKO. Thank you, and Members and Madam Chair, I do think this is part of our future. Of course, we need to proceed cautiously and make sure that the vehicles are safe. But as I am growing older, I look forward to the use of autonomous vehicles so that I don't have to rely on other ways to get to the doctor or, you know, to the shopping center, because I know this is a huge problem in my district. I have been working for years on how we transport around senior citizens that don't have access to vehicles.

And so, with that, I yield back.

Ms. SCHAKOWSKY. I thank the gentlewoman, and I look forward to working with you on this.

And now, Mr. Soto, the floor is yours for questions for 5 minutes.

Mr. SOTO. Thank you, Madam Chair, and I appreciate this great hearing today on autonomous vehicles. We can boost innovation, protect safety, and retrain American workers for our 21st century transportation system.

You know, autonomous vehicles have an incredible effect across the Nation, but we are doing research already in what would otherwise seem like an unlikely place. In Auburndale, Florida, right next to the new Florida Polytechnic University, we have a 475-acre facility built amid both pasturelands and orange groves. The project, SunTrax, in conjunction with the Florida Department of Transportation and Florida Turnpike, has already completed phase one, a two-and-a-quarter-mile oval testing track.

We are also developing phase two, in-field testing elements to create obstacles and barriers for testing autonomous vehicles. And soon phase three, to be able to simulate rain, smoke, fog, and other environmental challenges. Plans call for several testing environments.

We are seeing, right in central Florida, testing for the vehicles of the future. But we know those can be 5 to 10 to 20 years off. We also know that, if we aren't careful, we could see a disruption of many jobs in our current economy, which is why our Artificial Intelligence Jobs Act, our AI Jobs Act, is a blueprint to make sure that we are retraining those for the future.

But advanced driver assistance systems are already here: autonomous emergency brakes, blind spot detection, and lane delay. These technologies can save more lives at a time when we desperately need them. Unfortunately, in central Florida we still have the highest pedestrian death rate in the Nation: 740 pedestrian deaths from 2010 to 2019.

Florida also, sadly, still tops the list of dangerous—most dangerous places for pedestrians, according to the 2021 Dangerous by Design, by Smart Growth America and National Complete Streets Coalition.

These new autonomous systems are available now. What is the solution? The National Highway Traffic Safety Administration must develop performance and safety standards for both—for the advanced driver assistance systems in the near term, and autonomous vehicles in the long term, as well as protecting drivers with access to the courts for legal remedies arising from product liability, negligence, or other liability.

Then we need to pass the American Jobs Act, upgrade our crumbling highways, roads, and bridges, add new sidewalks, pedestrian bridges, and trails at commuter rail, high-speed rail, and add electric vehicles and charging stations to combat climate change.

In fact, today President Biden is in Dearborn, Michigan, visiting the Ford Rouge Electric Vehicle Center, where they are working on an F–150 with zero emissions and built by union workers.

Mr. Regan, we know that, as we prepare for these 21st century jobs, advanced electric, semiautonomous, and eventually autonomous vehicles are key for competitive manufacturing. What work-

force training should we invest in to help these workers who may face economic disruption?

Mr. REGAN. Thank you. Yes, workforce training, I think, is a key part of this. It is going to have to come so they can transition to the new jobs that are created in agencies, transit agencies, that are deploying this technology, making sure that people have a career or a ladder of opportunity to advance their careers.

And I think it is going to have to take—frankly, be flexible about how people are able to take advantage of it and pursue the career opportunities that they desire.

Mr. SOTO. And, Mr. Regan, how will the American Jobs Plan help with workers displaced by new technology like autonomous vehicles and a decline in oil jobs due to electric vehicles?

Mr. REGAN. The American Jobs Plan is—has built into it labor protections that are key to making sure that workers are brought along and that the investments we make as a country are going to build our economy from the bottom up and make sure that working people have their fair share in all of this.

So whether it be Buy America policies, 13C, Davis-Bacon, any number of labor protections to make sure that the investments are done in a way that advance middle-class jobs and encourage the ability of people to form and join unions.

Mr. SOTO. Well, thank you so much. We know in this committee we need to be forward looking, and having a Federal regulatory regime for both advanced driver assistance systems, which are coming online and helping save lives now, as well as autonomous vehicles.

And my time is expired.

Ms. SCHAKOWSKY. Yes, I thank the gentleman. And now I recognize for 5 minutes Mr. Pence.

Mr. PENCE. Thank you, Chairwoman Schakowsky and Ranking Member Bilirakis, for holding this hearing. And thank you to the witnesses for appearing before us today.

As the crossroads of America, Indiana is uniquely positioned to play a central role in the development, deployment, and manufacturing of autonomous vehicles. Congressional action, or its inaction, will set the stage for our position globally and opportunities locally for advanced transportation technologies.

Just last summer the Indiana Department of Transportation announced a test bed initiative for partially autonomous trucks along Interstate 70, which runs through Greenfield across to Richmond in my district. Real-world opportunities like this are crucial to inform the continuing policy discussion for AV standards across the country. Whether it is the workers at the Honda manufacturing plant in Greensburg, or researchers and engineers at Cummins Technical Center in Columbus, autonomous vehicles have the potential to expand opportunities for Hoosiers [audio malfunction].

Ms. SCHAKOWSKY. Oops, we seem to have lost Mr. Pence. Shall we proceed? Let's wait a second and see if he can get back.

We will come back to him if he gets back, and right now I will recognize Congresswoman Fletcher for 5 minutes.

Mrs. FLETCHER. Thank you so much, Chairwoman Schakowsky, and thanks to you and Ranking Member Bilirakis for convening to-

day's hearing on this important topic. These issues matter to the people I represent in the Houston area.

From 2001 to 2016, our region had more than 3,000 fatal crashes from drunk and drugged driving alone. Automobile technologies like advanced driver assistance systems and autonomous vehicles have great power to make our roads safer, and I appreciate the time our witnesses have taken today in detailing how we can best do that.

But, as we also know, this technology brings with it new concerns and new complications. Just last month we saw a fiery crash of a vehicle that killed two people that investigators believe no person was driving. And there is a major and ongoing investigation and a lot of questions about exactly what happened. And that is a huge concern, going forward.

So I have heard a few negative comments in this hearing from some of my colleagues about trial lawyers. And, as a former practicing courtroom lawyer, I really think that these comments are misplaced. There simply isn't time now to go into all of the reasons and ways that our legal system and our courtroom system protects consumers and all Americans through the courts. But access to the courtroom is important, and even a cursory review of the history of consumer and worker protection in this country will show that.

Now, that said, some of my colleagues have already raised the potential for mandatory arbitration of disputes relating to autonomous vehicles. And that is—I think that is really an important thing to circle back to. While I certainly believe there are certain circumstances where arbitration of disputes can be useful for the parties, where they agree to do so once a dispute has arisen in this context, as with, generally, you know, most consumer matters, arbitration moves disputes out of the public view. It is often confidential. It provides no meaningful opportunity to appeal the result, all of which are hugely problematic in contexts like these and especially with these emerging technologies.

So my first question is directed to you, Mr. Levine. Are you concerned that there will be less information available publicly about safety issues if AV companies are allowed to force claims to arbitration?

What kind of impact will that have on safety and creating a legal record for these new technologies?

Mr. LEVINE. Sure. Thank you so much for the question. And the idea that we are going to have this transformational new technology, which is going to replace the 280 million currently human-driven vehicles on our roads, and—but it is all going to be done behind closed doors, should really scare everyone.

And we see that already, in AV manufacturers disclosing very little information to the Federal Government right now, as they are currently testing on our roads. Very little useful information is being disclosed now, and that is before there is widespread deployment and, hopefully, long before we get to widespread problems and defects that may result in injuries, in crashes, or deaths.

So if there is a circumstance where the people who are using vehicles or who are injured by them or just financially injured by them cannot make that made public, cannot hold people accountable—manufacturers accountable, I should say—that is going to

really blunt the opportunity to fix those problems, not just for the injured party but for everyone else. We have got to get this stuff out into the light.

Mrs. FLETCHER. Thank you. And as a followup to that, you know, in 2017 the Texas legislature passed a bill in our Senate that places the liability of vehicle operation on the owner of the vehicle, not the manufacturer, even when the owner has no control over how the system operates, no insight into where and when it might fail, and no ability to update the system or keep up with the latest rules of the road.

So, you know, in thinking about this and looking into the future, do you think it is fair to hold owners of cars liable for a crash that may be caused by the company that built the vehicle and the technology that drives it?

I mean, how do we address that concern?

Mr. LEVINE. You know, it just—it is fundamentally unfair to posit a circumstance where you have no control over the vehicle, what it does, how it operates, whether it operates safely, but you are responsible for it. This is not a circumstance where you chose to loan the vehicle to an irresponsible driver. You purchased it on the—in this theoretical context, on the idea that it is a perfect driver, it is a perfect robot that will never cause a problem and that, if it does have a problem, you are responsible for it.

Manufacturers need to be held responsible, not just for their claims but for what they actually put on the road.

Mrs. FLETCHER. Well, thanks so much. And I have a few more questions, but I am running out of time, so I will submit them for the record. And thank you so much for your testimony today.

And Madam Chairwoman, I yield back.

Ms. SCHAKOWSKY. Is—did I see Mr. Pence back?

Mr. PENCE. I am back, Madam Chair. Do you hear me?

Ms. SCHAKOWSKY. OK, yes, I can hear you. You just disappeared on us.

Mr. PENCE. Yes.

Ms. SCHAKOWSKY. So——

Mr. PENCE. Thank you very much for your patience here. I am just going to go straight to my question to Professor Rajkumar.

Let me ask you this, Professor. Your testimony highlights the many benefits that would come from continued U.S. leadership in autonomous vehicle industry. Workers in my district representing different parts of the autonomous vehicles value chain stand to benefit from American leadership.

I introduced a bipartisan H.R. 2907, the Global Investment in American Jobs Act, which would ensure the United States remains the premiere global destination for investment, innovation, jobs, and manufacturing in emerging technologies like self-driving vehicles, which, in this world of driver shortages, is very important.

My question is, can you expand on what long-term job creation would look like across the "stack" of technologies, particularly how it would affect my manufacturing district?

[Pause.]

Ms. SCHAKOWSKY. Professor, you are muted. We are not hearing you.

Dr. RAJKUMAR. Oh, sorry about that. Thanks, Congressman.

I see the AV market being comprised of multiple segments: robo-taxis, individually owned consumer vehicles, delivery vehicles. You have semi trucks and transit buses.

In terms of human involvement, I think transit vehicle drivers and semi truck drivers, basically, do a lot more than driving. So I think it will be a long time before they can be completely replaced. It would be a very long time. And meanwhile, I think robo-taxis, to make money to sustain the business, they will have to become completely autonomous, level 4-plus, and that may take some time to happen. So it is not clear what the business viability looks in the near term. It is not clear.

Meanwhile, for individually owned personal vehicles, technologies like ADAS level 3 and beyond can start taking off the burden of driving very long distances, being stuck in traffic jams and the like. So I think that sector ends up being the biggest winner in the near term. And over the long term, as the technology matures and becomes more reliable and safe, basically, that can disseminate across the other market segments.

For—I guess we sell about 17 million cars in the U.S. every year. Imagine more and more technology going in—sensors, computers, communications equipment into these cars. So all of that ought to be—really be manufactured and assembled in the U.S. in your district and beyond.

Mr. PENCE. All right, thank you.

Thank you, Madam Chair, I yield back.

Ms. SCHAKOWSKY. Yes, thank you. So we are going to go to Congresswoman Rice, and then come back to Mr. Armstrong. OK?

Miss RICE. Thank you, Madam Chair——

Ms. SCHAKOWSKY. You are recognized——

Miss RICE. Thank you, Madam Chair. I would like to—I haven't spoken to Representative Dingell, but I would like to think that I would, in my remarks, be echoing what Debbie Dingell, Representative Debbie Dingell from Michigan, would be speaking about in terms of her bill, the HALT Drunk Driving Act. I am proud to be a colead on this bipartisan bill with her and Representative McKinley, and I hope to see it signed into law, because drunk driving accidents continue to plague our Nation.

It is estimated that drunk driving accidents cause over 10,000 deaths a year, 29 fatalities a day, and societal losses exceeding $44 billion every year. Most importantly, you know, before coming to Congress I spent my whole life as a prosecutor, and I have seen the havoc that is wreaked in communities and among broken families. And it is just a terrible, preventable crime.

We do have—the technologies that can passively detect whether a driver is intoxicated and trigger the vehicle to automatically mitigate the risks are on the horizon. And the HALT Act would require all passenger vehicles to be equipped with this technology.

Mr. Levine, are you optimistic about the promises of drunk driving prevention technology?

Mr. LEVINE. Yes. Thank you so much for the question, and thank you so much for pushing this issue forward. There is tremendous potential right now, not 10, 20, 30 years from now, right now to help prevent not only drunk driving, but drunk, drugged, distracted, and drowsy driving with technology that exists right now.

And we need to get it into vehicles as quickly as possible to limit, mitigate, and eventually, eliminate these tragedies.

Miss RICE. So I am—thank you for saying that, because we are hearing a lot today about the promise of autonomous vehicles and how AVs on the road could lower drunk driving crashes, obviously. But you know, still, that is still a ways away. And I don't want us to kind of be thinking, OK, that is where we have to focus on, is what—how the deployment of AVs can lessen the occurrence of drunk driving fatalities and crashes, when we have that technology now.

But now also, Mr. Levine, with you, you know, I am concerned, you know, with the proliferation of marijuana legalization. It is a lot more tricky to detect an impaired driver from drugs versus an intoxicated driver from alcohol. So what are your thoughts about that, in terms of what is the latest technology, and what—with the AV—deployment of AV, how would that affect the impaired drugged driver?

Mr. LEVINE. Sure, and there is—obviously, there are different chemical characteristics of a—of someone with alcohol in their system or someone with other substances in their system. That is the idea of technology like driver monitoring systems, is to try and get after the behavior that leads to crashes and injuries and deaths. And so maybe that is a drowsy driver. Maybe it is a driver who has had too much—you know, who has had too much to drink or who is on drugs. There's a lot of different possibilities that lead to behavior that is dangerous. It could be a completely sober driver who is texting while driving. Many of these behaviors, in terms of how we actually operate behind the wheel, are similar.

And so the idea of driver monitoring systems is to try and attack the behavior that leads to the crash. And eventually, hopefully, we get to a place where we can detect what we need to detect. But until we get there, attacking the behavior that can stop the crash is our best opportunity, and we can, again, do it with technology that exists right now. We don't need to wait.

Miss RICE. Thank you.

Very quickly, Mr. Regan, many of your members have fallen victim to drunk drivers. How do you feel about the deployment of the, you know, drunk driving prevention technology to protect our Nation's—not only our Nation's truck drivers, but our transit workers, as well.

Mr. REGAN. Well, thank you. I think that it is important. I think it would be—provide great benefit. Anything to increase safety is, in my view, a benefit. And I think that is an example of new technology that can assist human operators and that can be deployed throughout our system to make sure that we are augmenting the safety of the human-operated crafts and making sure that we are not just jumping headlong into an automated future without any real safeguards.

Miss RICE. I want to thank all the witnesses for coming today, and I yield back the balance of my time, Madam Chair. Thank you.

Ms. SCHAKOWSKY. And the gentlelady yields back. And Mr. Armstrong, you are recognized for 5 minutes.

Mr. ARMSTRONG. Thank you, Madam Chair. And I want to just say I am going to go off of what Congressman Fletcher had said earlier about trial lawyers and all of that.

I think the one thing that we forget in this dichotomy, whether it is autonomous or not, is every State in the country requires liability insurance. And how we deal with these things moving forward, and how insurance companies deal with these things moving forward as we deploy whatever vehicles, including the last testimony, I—is going to be very, very important, which will be, I think, a little different than some of the other forced arbitration and different conversations we have. Because I have a very distinct idea that both insurance companies and insurance defense lawyers are going to have something to say about how this moves forward.

And as somebody who has spent my practicing legal career dealing with the DOT and spending a lot of time with NHTSA, I think one of our conversations we have to have on our end is Congress has never been really good at adapting to quick responses in technology. The Music Modernization Act, right before I got to Congress, comes to mind. We still haven't figured out how to deal with privacy in the digital age. The Federal regulatory agencies aren't a lot better. We have no—we still aren't anywhere on AI, facial recognition, geofence warrants, and those things.

So, Dr. Rajkumar, your testimony suggests an AV regulatory environment that continually adapts to real-world testing and deployment, which I think sounds fantastic. I am skeptical that we are capable of that at the Federal level. So what policies would you suggest that would allow our Government to adapt to these rapid advancements in the field?

Dr. RAJKUMAR. Thank you, Congressman. I believe we are going back about 5 years. The Secretary of the U.S. DOT did propose to have an annual revisit of AV-related guidance on a regulatory perspective. So I do agree that it is an aggressive schedule for a Federal agency, but it has been talked about before. I believe it is feasible. I think it is necessary to not just ensure the safety of the public, which is why the regulations are in place, but to adapt to the changing—the maturation of the technology, so—which is why that agility is required.

I would also add two more elements in here, which Mr. Levine states in his written testimony too. The NHTSA budget needs to be reinforced, increased, because our responsibilities are becoming larger with the same amount of resources, number one.

Number two, the technology in the AV space is complicated. We need to figure out ways and means to get appropriate expertise into agencies like NHTSA and the U.S. DOT.

Mr. ARMSTRONG. Yes, and I guess my concern is we are really good at regulating what is—what already exists. We are very bad at crafting regulation for what might exist in 6 months, 8 months, 15 months. So which—and part of your testimony called for tailored regulatory framework in AV markets. Like, you state that a vehicle with a license operator would be regulated differently. Can you define the market segments, and how you would approach regulations like that and in the segments?

Dr. RAJKUMAR. Sure. For example, if you take robo-taxis from a strictly business financial perspective, if there is a human operator

on board, you would very likely be better off just buying a normal vehicle, hiring a human driver to operate the vehicle, and you are done, right?

If—instead, if you basically have to put an assistant on board, the vehicle drives itself most of the time, but the equipment is very expensive sensing and computers, you only added to your overhead, and the revenue still remains the same.

But if you take an individually owned consumer vehicle, that is a person in the car who is going from point A to point B. The vehicle belongs to that person. And if the vehicle has enough capabilities, it drives itself most of the time, and when it requires assistance, it calls upon the licensed operator in the car to basically help out the vehicle, take it out of its current fix, and then move to the destination, so that basically—it really does not cost anybody anything but adds convenience and, hopefully, safety to the vehicle owner.

So I think there are distinct segments. The same regulatory parameters should not apply.

Mr. ARMSTRONG. Thank you.

And with that I would just add that one—as we start going down this road, we also have to recognize that how we deal with local and State DOTs and enforcements—there was just talk about marijuana versus impaired versus alcohol-related. Those are all really interesting conversations. I am just telling you being an impaired driver and being a tired driver are treated very differently in every court system across the State. And there is probably nothing litigated both in the civil and criminal matter more than driving crime. So, with that, I yield back.

Ms. SCHAKOWSKY. The gentleman yields back. And I believe—Mr. Cárdenas, are you here?—is next.

No? So we have—yes. I am going to call now on Mr. Bucshon. Then that would be the last of the members of the subcommittee, and we can go to the people who have waived on.

Mr. Cárdenas, you have 5 minutes.

No, I am sorry, I meant to say Mr. Bucshon, sorry.

Mr. BUCSHON. Thank you, Madam——

Ms. SCHAKOWSKY. You have five, sorry.

Mr. BUCSHON. Thank you, Madam Chairwoman, I appreciate that. No, you are fine. Thank you.

Professor Rajkumar, I am a cosponsor of H.R. 2997, the Crash Avoidance System Evaluation Act, a bill that I am proud to work with, with my friend Bobby Rush. The bill would require the Department of Transportation to conduct a study on the performance of crash avoidance systems to detect and classify vulnerable road users, pedestrians, and the like, including those with darker skin tones. This has apparently been an issue.

In your testimony you state that stacking safety systems is paramount in achieving good outcomes for road users. Are there any emerging technologies that you have encountered in your research that you would think would be useful in addressing the concern of crash avoidance systems not detecting individuals of various skin tones, in addition to the things we know: cameras, radar, and lidar?

[Pause.]

Mr. BUCSHON. I think you might be muted.

Dr. RAJKUMAR. Yes, sorry about that.

Ms. SCHAKOWSKY. Oh, yes, OK, go ahead.

Dr. RAJKUMAR. It depends upon the sensing mode within the vehicle. If only cameras are used to look at pedestrians and the AI data being used to train that pedestrian detection system has only people of a certain skin color and does not represent the entire distribution of people in the population, you run into these biases. When you feed in biased input data, bias outcomes result. The algorithm itself is completely agnostic to this, it is really about getting the data sets right, if you will. So that is a key point that many companies in the domain are being very sensitive to these days.

Number two, when you use lidars or radar, they really do not care about skin color, or the detectors—there is an obstacle there. And this could be a human, so they would be completely independent of the skin color, if you will. So the safety, therefore, depends upon the combination of sensors being used.

Mr. BUCSHON. OK, great. So what you are saying, the sensors that are being used are probably acceptable, but that it is very important to make sure that the data that is—that they are—that is downloaded to them, or that they are adjusted for, is the critical piece here.

Dr. RAJKUMAR. Absolutely, yes.

Mr. BUCSHON. Great. And how can Congress ensure that these concerns are properly investigated, while not stifling innovation of this emerging technology?

I mean, how can we avoid stepping in the way? Is there anything that we are doing that could prevent this type of development?

Dr. RAJKUMAR. Sure. Many States across the country have a permit process through which AV testing companies can get a permit to test AVs in those respective States.

Imagine a driver's test that all of us went through. So that test could actually involve injecting appropriate inputs of this kind and seeing how the vehicle reacts.

Mr. BUCSHON. OK, great. And that is why Congressman Rush and myself are proposing this legislation, to make sure that the DOT, you know, investigates this performance to detect and classify vulnerable road users and making sure that people are testing and are putting this information properly in their systems.

Also to you, the Chinese Communist Party has now developed a pathway for the development of autonomous vehicles. And according to a recent Bloomberg article, the China tech giant Baidu is—has set a goal to deploy 3,000 robo-taxis in 30 Chinese cities by the end of 2023. If Congress continues to delay in passing AV legislation and we cede our leadership in this space, how perilous do you think these consequences could be for the U.S.?

Dr. RAJKUMAR. I think this is the biggest peril that we currently face in the domain. We need to absolutely make sure that what AVs are on American streets are safe. At the same time, if China ends up taking the leadership in this massive market, they could locally transform their transportation industry, locally. They would also start exporting. They have incredible manufacturing power,

lots of factories and such, so they could end up taking a big slice of that $7 trillion market here.

It would be a huge loss, would be an unfortunate outcome for the U.S., where—the technology was, literally, invented here, the mission was carried out to fruition here, but the wealth and the jobs go to a country like China.

Mr. BUCSHON. Yes, I think the—I mean, the moral to that story is the United States Congress and the United States Government needs to get past our differences and get this process moving along.

With that, Madam Chairwoman, I yield back. Thank you.

Ms. SCHAKOWSKY. The gentleman yields back. And now I note that Mr. Cárdenas, from the subcommittee, has returned.

And I recognize you for 5 minutes.

Mr. CÁRDENAS. Thank you, Madam Chairwoman. And thank you to you and the ranking member for having this important hearing in full view of the public. And I appreciate all of the witnesses bringing your perspectives and expertise on this matter.

The first thing I want to point out is that we, obviously, are looking at a shift in what kind of jobs will be out there, especially with autonomous vehicles. If we get to the point where we can actually have 100 percent autonomous, where we don't necessarily need a human being at the wheel, so to speak, that means that jobs shift and what the future jobs look like is going to be incredibly different than what it looks today.

Mr. Regan, when and if that takes place, especially when it hits momentum and moves en masse, would we see a shifting of skill sets in the people—for example, bus drivers and truck drivers and delivery truck drivers, et cetera—would we see a shift in the need within our societies for those kinds of jobs shifting away to other kinds of jobs?

Mr. REGAN. That is certainly possible, yes. And, you know, whether they are able to shift their skill set is depending on the policies that are going to be written by Congress, making sure that they have the resources to transition along with the technology in our systems.

Mr. CÁRDENAS. Is there any place on the planet where we have seen shifts like this, where the government and the private sector got together, for example, when it comes to training programs to retool, so to speak, so that people can continue to have that ability to put in an honest day's work and yet get compensated when they are trying to shift from maybe a job that they had for 2 or 20 years and now they need to shift and have a different skill set? Is there examples on the planet where government and private industry have come together to do that?

Mr. REGAN. We have seen—well, here in the U.S., TAA, Trade Adjustment Assistance, is an example of that. And frankly, there are some flaws in that program. I know a lot of people rely on it, but that was an example of us trying to address a problem after the fact.

And what I am trying to impose during our—during this hearing today is that we have an opportunity now, you all have an opportunity to address this problem on the front end and make sure that we are building up the capacity to advance our workforce early

rather than trying to deal with the problem down the line when it is a crisis right in our face.

Mr. CÁRDENAS. So, Mr. Regan, the Federal Government could and perhaps should have a role in that. And not that the Federal Government should be, for example, practicing those kinds of on-the-ground efforts, but maybe with local governments, with private industry to look into the future, to see what private industry says, the kinds of jobs that they need and are ready to pay people to do, yet at the same time, for example, community colleges or trade associations, et cetera, could—is that the kind of effort that maybe we should get in front of?

Mr. REGAN. Yes, of course. And, you know, apprenticeship programs, you know, ladders of opportunity within agencies, whether it be public or private companies, all of those should be addressed, and we need to make sure that we are encouraging that from a Federal perspective.

Mr. CÁRDENAS. Well, I had an issue getting on this—I almost called it a Zoom—this Cisco Webex event earlier today, and I had a tech staff who was very capable, much more capable than me, even though I am an electrical engineer. Go figure. It took me close to, you know, 12, 15 minutes to finally get back on track.

When somebody is driving a vehicle, especially if you have vehicles coming in the opposite direction at 60 and 70 miles an hour, you don't get 12 minutes. You don't even get 1.2 seconds if that goes off the rails. So are we there yet, in having autonomous vehicles on the streets of America, where we can actually trust that mistakes are not going to be made and lives will not be lost based on a technical glitch?

[Pause.]

Mr. CÁRDENAS. Who would like to answer that?

Mr. REGAN. I would say no, but I refer to Jason——

Mr. LEVINE. Yes, I would agree with Greg. No, we are not currently there. And in fact, when we have got manufacturers suggesting that we are, we have seen what has happened with a number of crashes involving vehicles that are, you know, supposedly autonomous, and they are not.

So we want to get there, certainly, but we are a long way from there. And let's get a lot of this better technology in sooner.

Mr. CÁRDENAS. Yes. And the fact of the matter is we are in the United States of America, where, thank God, people have incredible rights, civil rights, et cetera, where in other countries, perhaps, they don't have the checks and balances to make sure that, oops, we kind of let the cat out of the bag and a few people got killed, and so what, let's just, in the name of progress, let's just continue to allow those kinds of catastrophes to happen.

So I believe that we can do it carefully in the United States. I believe in our institutions and our research to be able to do it right, respecting the individuals on the streets of America. So I look forward to the United States continuing to put a lot of energy and effort into making sure that we do not fall behind, but we do it responsibly.

And with that, my time has expired. Thank you, Madam Chairwoman, I yield back.

Ms. SCHAKOWSKY. Thank you.

And now it is such an honor for me to recognize Congresswoman Eshoo, the chairman of the wonderful Health Subcommittee that I regularly waive onto, and to welcome you to waive on here today. So you have 5 minutes for questions.

Ms. ESHOO. Well, thank you, Madam Chairwoman, for your warm welcome. I certainly appreciate the—you extending your legislative courtesy to me for me to participate at your subcommittee today. And thank you to the witnesses.

My congressional district covers most of Silicon Valley, and I have seen the rapid growth of the AV industry firsthand. In fact, I rode in a self-driving car in my district before this subcommittee ever had its first hearing on AV legislation, nearly 4 years ago. This technology is likely to disrupt industries such as ride-sharing, delivery, long-haul trucking, and public transit. Because the vast majority of crashes are caused by humans, by human error, it may also save lives. And I think that we are all focused on that as well.

Of course, there are risks as well. Federal standards are necessary to establish minimum safety baselines to ensure consumer confidence. And testing data will be needed to evaluate whether AVs live up to their promise of reducing crashes. This is going to require legislation, and I look forward to working with my colleagues to develop that legislation.

To Professor Rajkumar, in your testimony you note that the AV market has six distinct segments and that regulation should recognize these distinctions. Aside from exemption caps, what distinctions should the regulatory framework make between different kinds of AVs?

And then I have a question for Mr. Levine.

Dr. RAJKUMAR. Thank you for the question, Congresswoman.

In terms of the segments, for example, for individually owned—the consumer vehicles, since that is a licensed driver in the car, the contours of operation can be broader than a ride-sharing taxi where there is no human operator on board. So that would be one distinction.

And meanwhile, if you go to the trucking industry—of course, lots of Silicon Valley companies working in that space—you could mandate that autonomous operations for semi trucks could only happen on highways, where there are no pedestrians, and only on good weather days, where the lighting conditions, road conditions, weather conditions are good. So it is really not about the exemption count, it is about the operating design domain, if you will.

Ms. ESHOO. I see. Thank you very much.

To Mr. Levine—I hope I am pronouncing that correctly. Is it "Levine" or "Le-veen"?

Mr. LEVINE. It is "Le-veen," but it's OK, Congresswoman.

Ms. ESHOO. OK. We certainly agree that safety has to be at the forefront of AV policy. But no vehicle, whether it is traditional or self-driving, can prevent every crash. We go into this understanding it.

As the technology develops, the question will not be whether AVs are safe but how safe they are. At least in my view, that will be the case. How safe do AVs need to be before they are safe enough to allow on public roads?

Mr. LEVINE. Wow, that is a great question. And it, I think, is one that the entire community, when we talk about vehicles, struggles with. But if we make it just a little bit broader, I think the larger question is, how do we think about our entire auto vehicle infrastructure? How do we reduce the risk of the crashes, of the millions of crashes and injuries and 42,000 deaths every year?

And so, when we are going to measure autonomous vehicle safety, obviously, we are going to want them to be safer than our current drivers, which are—the average driver, you know, only has—experiences a death just over 1 time for every 100 million vehicle miles traveled. That means most drivers don't ever experience a crash death. So we are going to need to see, I think, for public to trust AVs, far significantly safer vehicle travel, with all of our infrastructure combined——

Ms. ESHOO. How close would you estimate we are to making that determination right now?

Mr. LEVINE. Well, you know, I mean, based on what we see, the statements coming from the companies themselves, we are pretty far away from a circumstance where you could be comfortable putting your 6-year-old in the back of a vehicle and sending them on their way to school. We are really far away from that.

Ms. ESHOO. OK, thank you very much, Madam Chairwoman. Pleasure to join your wonderful subcommittee, and I yield back.

Ms. SCHAKOWSKY. Well, thank you for coming. Now I want to yield to Mr. Joyce, who has waived on as well.

And you have been very patient, and the floor is yours for 5 minutes.

Mr. JOYCE. Thank you, Madam Chair and Ranking Member. Thank you for allowing me to waive on to this important hearing today.

Dr. Rajkumar, while there are clear safety benefits from highly automated passenger cars, we also expect to see safety benefits in a variety of other applications. Many of these solutions are years down the road and will require a stable regulatory framework.

Dr. Rajkumar, how important is it that the Federal Government creates such a framework?

Dr. RAJKUMAR. I think it is extremely important, if 50 States in the U.S.—basically, each has its own regulatory framework. Now the developers of the technology, be it a big company or a startup company, cannot deal with that heterogeneity.

What should happen instead is that there is a national framework that is enforced by NHTSA/the U.S. DOT, and therefore the technology developers need to develop towards that one single standard and then test against that standard. I think that is at the core of what needs to be done.

The U.S. DOT had taken a similar position earlier, where the individual States had jurisdiction over licensing, insurance, and the like. But in this particular case, the driver is really not a human but computer software, and therefore the right to regulate that particular aspect of vehicles lies at the Federal level.

That being said, the U.S. DOT has been taking the following position, where it lets individual States experiment with different processes to help incubate and make sure local companies and technologies try out different processes. But the Federal Govern-

ment has retained the right to preempt all those regulations at a future point in time, when the processes are well understood, the technology has been proven itself to be safe.

So that, I think, is the right framework to go forward with, a single national framework.

Mr. JOYCE. If the Federal AV framework currently lacks clear testing requirements and guidelines, do you think drafting these for autonomous vehicle framework—that the principles needed to be included should be outlined in advance?

Dr. RAJKUMAR. The——

Mr. JOYCE. This is, again, for Dr. Rajkumar.

Dr. RAJKUMAR. Yes, the guidelines need to be stated, but I think they need to be drafted with input from the vehicle makers, with the researchers who understand that the pitfalls of the technology, with community organizations, with the workforce, and such.

And the more—and then the other important aspect is that any regulations that we put in place today, if they are set in concrete, they will become outdated a year from now, 18 months from now. So it is important that the regulatory framework gets revisited every so often, like, every once a year.

Mr. JOYCE. We hear about concerns with driverless cars on the roadways, that some manufacturers have made claims about the current existence already of self-driving cars. To me, this sounds like level 5 automated technology, which, according to NHTSA, is an automated driving system.

On these vehicles, can they do all of the driving in all of the circumstances on the road?

Dr. RAJKUMAR. Currently, there are no fully autonomous vehicles on the entire planet, period. The only vehicles that consumers can buy today corresponds to level 2, which is far below level 5. In level 2 features, the operator in the vehicle must be paying attention to the vehicle at all times. You all know, if the vehicle is driving itself, it could do something really crazy, something dangerous at any point in time, and it becomes the responsibility of the operator to step in when the vehicle does something bad.

So there is a huge chasm between level 2 functionality and level 5. We are many years away from level 5.

Mr. JOYCE. Earlier in this hearing, Ranking Member Bilirakis mentioned that it is important, worth repeating this.

Dr. Rajkumar, should the NHTSA hold automakers responsible for misleading claims that create fear among the public about this technology?

Clearly, you have stated to us there is a significant difference between level 5 and level 2. Should there be accountability for misleading claims?

Dr. RAJKUMAR. I think that NHTSA must take on two roles.

Number one, educate the public about what—the capabilities and the limitations of driving technology, self-driving technology, today.

Number two, it needs to take a very strong and compelling action against any company out there which misrepresents the capabilities of their level 2 functions.

And meanwhile, I think, arguing on the side of NHTSA, we need to give them the appropriate resources and human expertise, so they can actually manage this process as well.

Mr. JOYCE. Thank you for your answer. My time has expired.

Again, thank you, Madam Chair, for allowing me to participate.

Ms. SCHAKOWSKY. Well, I am happy to have you. Thank you very much.

And now, last but not least, I am going to call on a man who I know just loves to wait for things, because he is such a patient individual.

And so, Mr. Doyle, you are recognized for 5 minutes.

Mr. DOYLE. Thank you very much, Madam Chair. I appreciate your courtesy.

You know, it is critical that, as we work to advance development and adoption of technologies that can change the way we live and work, like autonomous vehicles, that we bring folks to the table to discuss the impact that these new technologies will have so that we can affirmatively guide the development of this technology in a way that enhances our values, our communities, our workers, and our economy.

Professor Rajkumar, a few years ago we heard from luminaries—or charlatans—in Silicon Valley talking about innovations in AVs and how we were right around the corner from a revolution that would make drivers obsolete. Well, that doesn't seem to have happened. Instead, it seems that we have seen a range of new safety technologies be deployed that can increase road safety. And I think those folks back then scared a lot of people.

So tell me, how do you see this technology evolving?

And do you see it as a sudden shift to driverless cars or a more gradual transition, one that we have the opportunity to help guide, to ensure that these innovations enhance our values of inclusion and equity, as opposed to detracting from them?

Dr. RAJKUMAR. Thank you, Congressman Doyle. Autonomous—driving, as an activity, is the most complex activity that we adults engage in on a regular basis. But if you close your eyes for a couple of seconds on the highway, one could actually end up getting killed. And meanwhile, autonomous vehicles are deemed to be one of the grandest engineering challenges of this century. So when you, basically, juxtapose those two things together, it is very natural that it is going to take quite some time for the technology to evolve and mature that we can trust our lives with it at any time.

But meanwhile, as you pointed out, there are multiple intermediate milestones, like level 2 and level 3, which will actually help mitigate, compensate for human error and therefore reduce the number of fatalities and injuries. But the process is long. We have gone through this cycle of hype, as you pointed out, and then we went through this trough of disillusionment about a year or so back.

So we need to go past that disillusionment, understand that China is investing significantly in the space, enabling and facilitating their companies to grow more, take a bigger—a big share of this huge market space, and therefore, we need to wear the reality goggles, invest in basic research, enable private-public partnerships, and then help out deployments and testing from a regulatory perspective. And that is how we continue to sustain and extend the edge that we created in this space.

Mr. DOYLE. Thank you. Professor, do you believe that strong Federal safety standards are critical for the development and adoption of autonomous vehicles, that—you know, for Americans to adopt this technology, they need to feel confident that the technology works?

Dr. RAJKUMAR. Absolutely. So, if anything, any accident, crash, or fatality related to autonomous features get covered significantly, the media—it becomes top-page news, if you will. So we hold computers and software to a very high standard. So therefore they need to be significantly better than human performance in driving. We humans cause fatalities once every 80 million miles or so. So computers need to be better.

So importing a high bar is necessary to earn the trust of the consumers, safeguard the reputation of the technology, and that is an incremental, evolving process that the Federal Government needs to support on ongoing basis.

Mr. DOYLE. And finally, let me ask you, do you believe the companies that deploy autonomous vehicles need to be accountable for the systems they create, if they fail and result in harm?

It seems like, all too often, folks describe machine learning systems as black boxes that aren't accountable and that aren't sort of verifiable in what they do and how they do it. Do you think that we need to hold AV systems to a higher standard?

Dr. RAJKUMAR. Yes, of course. Three words of caution to consumers: number one, understand the limitations of the system that they are buying, they are not fully autonomous; number two, be careful about what you agree to—the agreement that the car maker presents to you—it very likely says that you are responsible, even if their software does something wrong, right; number three, delve deeper, watch videos, look at the literature, read testimonies from my colleagues like Greg and Mr. Levine, and get yourself educated. We currently do not have fully autonomous cars and will not for some more time.

Mr. DOYLE. Thank you very much, Professor.

Madam Chair, thank you so much for your courtesy, and I yield back.

Ms. SCHAKOWSKY. I thank the gentleman for yielding back, and I thank him for sticking around and participating in this hearing today.

So we have reached the end of the questioners. And I would like to really thank our witnesses, Mr. Levine, Mr. Regan, and Professor Rajkumar, for being here today.

I want to let you know—and I also want to say a special thank you to Representative Lesko for staying throughout the entire hearing.

We—Mr. Bilirakis should be happy that we had almost perfect attendance today at our hearing, plus three individuals who wanted just to come and sign on. And the witnesses should know that, as well, because I think this is—shows the interest in your areas of expertise and the help that we are going to need from you, going forward.

Before we adjourn, I do want to have—request unanimous consent to enter the following documents into the record.

Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Ms. SCHAKOWSKY. And I want to just remind—even though they are not here—remind all Members that, pursuant to the committee rules, they have 10 business days to submit additional questions for the record to be answered by our witnesses who have appeared here today. And I ask the witnesses to respond as promptly as possible to any questions that you may receive.

At this time I will read the list. But if the witnesses are—want to go, then I would excuse you, and thank you once again. But here is the list. If you want to stay and hear it, you have got it.

So letters for the record: a letter from AAVOR; a letter from the Center for Justice and Democracy; a letter from the Motor and Equipment Manufacturers Association; a letter from Advocates for Highway and Auto Safety; a letter from the Institute of Electric and Electron Engineers Standards—OK—Association; a letter from Consumer Reports; a letter from National Association of Mutual Insurance Companies; a letter from the Transportation Trade Department of the AFL–CIO; a report from the Federal Trade Commission; an article from Auto Innovations; one-pager from Alliance for Automotive Innovation; one-pager from Self-Driving Coalition entitled "America Loses Too Many Lives on Our Roads;" an article from Bloomberg; an article entitled "The Automatic Future–What is at Stake?;" "Auto Innovation Plan to Add"—oh boy, I am sorry—"Advance Safety at the Speed of Innovation;" a letter from the Chamber of Commerce Technology Engagement Center; one-pager from Self-Driving Coalition entitled "U.S. Must Maintain Global Leadership in AVs;" and finally, a letter from the National Federation for the Blind.[1]

So I—you can leave now. At this time the subcommittee is adjourned.

[Whereupon, at 1:30 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

PREPARED STATEMENT OF HON. DEBBIE DINGELL

Thank you for yielding, Chair Schakowsky.

Two of the major automotive safety challenges before this committee are autonomous vehicles (AVs) and curbing drunk driving.

Chair Schakowsky, I commend your leadership, and I am grateful to partner with you on important legislation to ensure the United States remains the global automotive leader on AV technology that will both keep us on the forefront of innovation and safety. But as we make this transformational shift, we also need to ensure the workforce concerns are thoughtfully addressed.

The Energy and Commerce Committee has done some good bipartisan work in the past, but it was frustrating we were not able to advance a bill in the 116th Congress. To my colleagues: We must redouble our efforts in the long bipartisan tradition of this committee and finally move meaningful AV legislation to the President's desk.

Here is the hard truth: AVs are here and every day we do not have a Federal framework in place for the safe deployment of AVs we risk falling behind the rest of the world.

Now is the time for us to roll up our sleeves, come together, and work in good faith to find a common path forward. We must not fear compromise.

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[1] The Advocates for Highway and Auto Safety letter and the Federal Trade Commission report have been retained in committee files and are available at https://docs.house.gov/Committee/Calendar/ByEvent.aspx?EventID=112637.

To our witnesses here today and all the stakeholders we are engaged with, I urge you all to work constructively with this committee with the urgency that this issue demands.

We have a real opportunity to advance AV legislation this year. Let's seize it.

In addition to AV legislation, Congress must address the number one cause of death on America's roadways: drunk driving. I have authored the bipartisan HALT Drunk Driving Act to do just this, as well as honor the Abbas family from my district who died tragically at the hands of a drunk driver.

I look forward to hearing the testimony from each of the witnesses today.

Thank you, and I yield back the balance of my time.

AAVOR

Statement of the
American Alliance for Vehicle Owners' Rights
To the
Subcommittee on Consumer Protection and Commerce
Of the
House Committee on Energy and Commerce
Hearing on
"Promises and Perils:
The Potential of Automobile Technologies"

May 18, 2021

Good morning, Chair Schakowsky, Ranking Member Bilirakis, and Members of the Consumer Protection and Commerce Subcommittee. The American Alliance for Vehicle Owners' Rights (AAVOR) is pleased to present this statement to the Subcommittee with respect to your hearing on "Promises and Perils: The Potential of Automobile Technologies." AAVOR respectfully asks that this statement be made a part of the official record of this hearing.

American Alliance for Vehicle Data Access

AAVOR is a voluntary group of diverse stakeholders – consumer protection and privacy advocates, vehicle fleet owners (both light- and heavy-duty), vehicle equipment suppliers, distributors and repair facilities, telematics and fleet management companies, insurers and others – united by our common belief that vehicle owners must control access to the motor vehicle data generated and stored by the motor vehicles they own.

AMERICAN ALLIANCE FOR VEHICLE OWNERS' RIGHTS
1707 L STREET, N.W.
WASHINGTON, D.C. 20036
WWW.AAVOR.ORG

AAVOR

AAVOR's Views on the Perils and Promises of Automobile Technologies

AAVOR's comments with respect to the subject of this hearing are not complicated: if competition, consumer protection and consumer choice is not preserved through federal legislation, then the future of advanced automobile technologies will primarily be a "peril." If one set of stakeholders is permitted to monopolize the benefits of these advanced technologies and reduce competition and consumer choice, then these technologies hold little "promise" for vehicle owners.

AAVOR's message to this Subcommittee is straightforward and direct: vehicle owners, not vehicle manufacturers or other stakeholders, must control the data being generated by their motor vehicles and have direct, real-time and bi-directional access to this data. This control and access are fundamental rights that are necessary preconditions to achieving the promise of advanced vehicle technologies -- both now and in the future. Without this control and access, competition disappears, innovation is stifled, prices rise and consumer choice is limited. AAVOR urges this Subcommittee to promote federal legislation to guarantee vehicle owners control of and access to the motor vehicle data generated by the vehicles they own.

Thank you for the opportunity to present this statement at this hearing. If you have questions about AAVOR, vehicle data access, or the current threats to a motor vehicle owners' control of and access to their vehicles' data, please contact Greg Scott of AAVOR at gscott@aavor.org or at 202-297-5123.

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AMERICAN ALLIANCE FOR VEHICLE OWNERS' RIGHTS SUPPORTS VEHICLE OWNER CONTROL OF AND ACCESS TO VEHICLE-GENERATED DATA

Diverse Coalition Membership Calls for Right of Vehicle Owners to Secure, Real-Time and Fair Access to Vehicle-Generated Data

VEHICLE-GENERATED DATA AND OWNER RIGHTS:

Vehicle-generated data is the new frontier for the development of future of mobility. Today's connected vehicles (cars, trucks and busses) offer consumers innovative new services, and bring significant downstream business development potential for all stakeholders in the automotive sector, including, but not limited to, navigation (real-time localization/traffic information), infotainment (access to online movies/music), maintenance (fleet management/remote diagnostics/vehicle recovery), insurance (pay-as-you-drive/claim investigation), traffic efficiency (reduced congestion), sustainability (reduced fuel consumption), and safety.

However, this requires the right legal framework, which enables all stakeholders to access data generated by vehicles, starting with individual consumers and fleet owners, and extending through Original Equipment Manufacturers (OEMs), parts suppliers, vehicle repairers, and the other many players across the entire transportation sector. This vehicle-generated data is related to nearly every aspect of the vehicle's operation and has been historically accessed through a physical "on-board diagnostics" (*e.g.,* OBD-II in passenger cars) port. A growing number of vehicles are transitioning to wireless access, bypassing the in-cabin, wired-access port. Increasingly, vehicle owners' access to the data their vehicles generate is being restricted by the technology embedded in the vehicle.

Vehicle-generated data – whether accessed through a wired port or wirelessly -- already provides many benefits to both consumers who own individual cars and companies that own dozens or thousands of vehicles. But these benefits will only be realized if vehicle owners: (1) retain the ability to securely access and control the data their vehicles (and equipment attached to their

AAVOR

vehicles) generate, collect and store; (2) without artificial barriers that reduce consumer choice or competition; (3) in real-time through secure, technology-neutral, standards-based, in-vehicle access; and, (4) without obtaining consent from an entity that does not own or lease the vehicle.

COMPETITION IN THE MOBILITY MARKET:

Two significant public policy challenges are on the near-term horizon with respect to owner rights with respect to control of and access to vehicle-generated data: (1) the danger of reduced consumer choice if access to vehicle-generated data is controlled by entities other than the owner or lessee of the vehicle; and, (2) a high risk of reduced competition for mobility services – in fact of vertical monopolization -- if entities that do not own or lease the vehicles – such as vehicle manufacturers or software providers -- are permitted to restrict and control access to vehicle-generated data that is created by the vehicle owner's or lessee's use of a vehicle.

CYBERSECURITY IN MOTOR VEHICLES, INCLUDING CONNECTED AND AUTONOMOUS VEHICLES

There is nothing more important than safety and security when discussing motor vehicles, including securing the data collected and stored by vehicles. Unfortunately, cybersecurity as it relates to these vehicles is often viewed as an "either/or" proposition in terms of vehicle owner rights and data access. It is factually incorrect to posit that data access cannot be provided to vehicle owners due to the need to protect the integrity of a vehicle's data system. In fact, industry standards are already in place that will permit data to be both accessible and controllable by vehicle owners while still ensuring a high level of cyber security.

AAVOR

AAVOR'S POSITION ON CONGRESSIONAL ACTION

The American Alliance for Vehicle Owners' Rights (AAVOR) believes Congress should have the lead role in guaranteeing vehicle owners and lessees access to and control of all data generated, collected and stored by vehicles. AAVOR supports enactment of legislation that safeguards the rights of vehicle owners to:

- securely access and control their vehicle data (including authorizing access by third parties);
- directly, through in-vehicle access, in real-time;
- through a technology-neutral, standards-based, secured interface;
- that provides interoperable and bi-directional communication with the vehicle.

The rights of vehicle owners to control and access the data generated by their vehicles is too important to be left unaddressed by Congress. AAVOR supports bi-partisan, bi-cameral legislative efforts to establish a framework for securing the continued rights of vehicle owners – and entities that secure the express permission of vehicle owners -- to control and access vehicle-generated data on a real-time, secure and competitive basis.

American Bus Association
American Car Rental Association
American Property Casualty Insurance Association
Automotive Service Association
Automotive Recyclers Association
Consumer Action
NAFA Fleet Management Association
National Consumers League
National Vehicle Leasing Association
National Motor Freight Traffic Association
Owner Operator Independent Drivers Association
Allianz Technology
Enterprise Holdings Inc.
Geotab, Inc.
Hertz Corporation
Lytx, Inc.
MiX Telematics
Privacy4Cars
Recall Masters
Safelite Group

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May 17, 2021

Honorable Jan Schakowsky, Chair
Subcommittee on Consumer Protection and Commerce
Committee on Energy and Commerce
U.S. House of Representatives
Washington, DC 20515

Honorable Gus Bilirakis, Ranking Member
Subcommittee on Consumer Protection and Commerce
Committee on Energy and Commerce
U.S. House of Representatives
Washington, DC 20515

Dear Chairwoman Schakowsky and Ranking Member Bilirakis:

Re: AV's and Forced Arbitration

We join the many public interest organizations that have shared numerous safety concerns about autonomous vehicle (AV) legislation. We write to bring to your attention an additional urgent issue that, if not remedied, will have drastic implications for the safety of these vehicles: the need for any legislation to ban companies' use of forced arbitration clauses.

AVs will be offered to the public most often as an automated mobility-as-a-service platform, similar to an Uber model. Or they will be sold directly to the public, as Tesla cars are sold today. Unless legislation prevents manufacturers from doing so, they will insert extremely broad forced arbitration clauses into their contracts, blocking consumers from meaningful remedies if they are hurt or their privacy violated. Even pedestrians' claims could be kept out of court.

Auto companies have a long history of cutting safety corners and weighing the potential costs of liability to determine whether a dangerous vehicle should be redesigned or removed from the market, or an unsafe practice should be stopped. Forced arbitration, where disputes are resolved in secretive, rigged proceedings that the company controls and which keeps information hidden from regulators and the public, would undermine this entire liability and accountability structure. If all auto defect cases had been forced into arbitration, we would never have learned about such deadly defects as exploding Ford Pintos or faulty GM ignition switches. A world in which auto defect cases are litigated in such a system, without benefit of rules of discovery and evidence or the right to appeal, will be a much more dangerous world for America's drivers, passengers, pedestrians and others who share the roadways with AVs.

In the interest of safety and accountability, we strongly urge you to ban the use of forced arbitration clauses in any AV legislation.

Sincerely,

Alliance for Justice
American Association for Justice
Center for Justice & Democracy
Consumer Action
Consumer Federation of America
Consumer Watchdog
Consumers for Auto Reliability and Safety
Earthjustice
Googlers for Ending Forced Arbitration
KidsAndCars.org
National Association of Consumer Advocates
National Consumer Law Center (on behalf of its low income clients)
National Consumers League
National Employment Law Project
People's Parity Project
Public Justice
Texas Watch
U. S. PIRG

Motor & Equipment Manufacturers Association
1425 K Street, NW Suite 910 Washington, DC 20005
Tel 202.393.6362 Fax 202.737.3742 www.mema.org

May 17, 2021

The Honorable Frank Pallone
Chairman
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515

The Honorable Cathy McMorris Rodgers
Ranking Member
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515

The Honorable Jan Schakowsky
Chairman
Subcommittee on Consumer Protection and Commerce
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515

The Honorable Gus Bilirakis
Ranking Member
Subcommittee on Consumer Protection and Commerce
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515

Dear Chairman Pallone, Ranking Member Rodgers, Chairman Schakowsky, and Ranking Member Bilirakis:

The Motor & Equipment Manufacturers Association (MEMA) represents more than 1,000 vehicle suppliers that develop innovative technologies and manufacture and remanufacture original equipment (OE) and aftermarket components and systems for use in passenger cars and commercial trucks.[1] This industry operates in all 50 states, directly employs almost one million Americans, and is the largest sector of manufacturing jobs in the United States.[2] On behalf of this industry, I respectfully submit this letter to you for the record for the Consumer Protection and Commerce Subcommittee's hearing titled "Promises and Perils: The Potential of Automobile Technologies."

Across the entire range of new vehicle innovation – from automated to zero-emission technologies – vehicle suppliers are leading the way. Vehicle suppliers conceive, design, and manufacture the OE components and technologies that make up more than 77 percent of the value in new vehicles. Vehicle suppliers also manufacture aftermarket parts and materials for the maintenance and repair of over 290 million vehicles on the road.

MEMA supports infrastructure legislation that accelerates the development, commercialization, manufacture, and deployment of new, advanced technologies in the United States.[3] This includes the more rapid deployment of the critical building-block technologies needed to reach the targets for electrified and automated vehicles. The promotion of technology development will allow the U.S. to be more innovative and globally competitive and to lead the world on the path of enhanced mobility for all citizens.

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[1] MEMA represents its member companies through its four divisions: Automotive Aftermarket Suppliers Association (AASA); Heavy Duty Manufacturers Association (HDMA); MERA - The Association for Sustainable Manufacturing; and Original Equipment Suppliers Association (OESA).
[2] U.S. Labor and Economic Impact of Vehicle Supplier Industry, MEMA and IHS Markit. February 2021.
[3] MEMA will provide this committee with additional views on the commercial vehicles and freight transportation.

MEMA members have long led in developing innovative vehicle technologies that save lives, improve efficiencies, and reduce emissions. We believe infrastructure legislation must be part of an overall comprehensive, strategic, and meaningful plan to prepare the U.S. for a technologically advanced transportation future. For too long, the U.S. has not moved forward at an adequate pace to accommodate and prepare our nation for these advanced technologies in a concerted, dedicated, and clear fashion.

The vehicle industry has long product cycles; suppliers must plan for components and systems ahead of the curve and well in advance of deployment. Vehicle suppliers and our vehicle manufacturer customers are being encouraged by policymakers to design, develop, and deploy these technologies in the U.S. Meeting these goals will require a more substantive framework within which the industry can innovate and create jobs. While there is an array of guidelines, best practices, voluntary agreements, and incomplete or shelved rulemakings, a more structured, coordinated policy framework is critical to abating the uncertainty that persists in the U.S. There are other regions in the world that are rapidly closing these gaps. A structured roadmap is needed to keep our country on the leading edge as a manufacturing and innovation center and to provide Americans with greater mobility, safety, and environmental benefits.

Congress and the Administration must focus on advanced technology readiness and competitiveness. To meet this goal, the U.S. must provide a policy framework for our manufacturers to compete globally for technology development and deployment. Our country has a strong foundation to be the global leader in creating new innovative, forward-leaning technology, including automated and electric vehicles. This leadership will require significant investments and incentives with an established roadmap.

One of the tools that MEMA urges the Committee to consider is a substantive update of the U.S. New Car Assessment Program (NCAP). The timeline to update the program can be done in a relatively short period while encouraging deployment and providing consumers with more comparable information, particularly about the benefits of crash avoidance technologies. Updating NCAP will help the U.S. keep pace with other global regions in technological advancements.

The U.S. NCAP is a voluntary program providing consumers with information regarding the performance and equipment in new vehicles. The current program only rates a vehicle's crashworthiness – in other words, how well it protects the vehicle's occupants in a crash. It does not include any ratings for crash avoidance technologies. The U.S. NCAP is not keeping up with technology development or its global counterparts and is not serving the American consumer well. It must be updated.

MEMA urges Congress to specifically direct NHTSA to update and modernize the NCAP. MEMA supported language in the FAST Act in 2015 that required NHTSA to include crash avoidance technology information on the Monroney Label. Although NHTSA has a substantial amount of data on the efficacy of these technologies, the agency never finalized the congressional mandate. However, the 2015 FAST Act requirement is no longer sufficient to ensure that a consumer has enough information about crash avoidance technologies.

Instead, Congress should take additional steps to require NHTSA to plan for a substantive and comprehensive update of the NCAP. NHTSA should immediately update the NCAP by adding a list of pre-determined crash avoidance and mitigation technologies that will be considered when determining the rating of a specific vehicle. Regarding crash avoidance, several technologies are ripe for immediate inclusion and address common crash scenarios. Much of the technical work, research, and test procedures have already been completed for many of these currently available

technologies. As such, there are several that can be immediately included as part of an initial update to the NCAP.

Therefore, NHTSA should be required to move forward quickly and finalize these new requirements without further delay. Equally important, NHTSA must establish a clear roadmap to allow for phased-in future updates by prescribed milestones, providing vital time and certainty needed for product development and planning of vehicle manufacturers and suppliers. These changes will assure that NCAP keeps pace with new technologies and, more importantly, keep the U.S. on the leading edge of safety technology innovation.

MEMA recognizes that the language in the Moving Forward Act (H.R. 2) in the 116th Congress attempted to address some of the shortcomings in the current NCAP. MEMA appreciated the inclusion of a roadmap and the requirement to include crash avoidance technologies in the rating system. While MEMA raised concerns about some of the specific provisions in the NCAP section, we applaud the Committee's interest in and attention to updating the program. We welcome the opportunity to provide stakeholder input on legislation this Congress.

MEMA encourages the Committee to remember that NCAP is only one part of a policy framework that suppliers rely on for technology deployment. Other provisions, such as parity with vehicle manufacturers for testing technology and comprehensive automated vehicle policy, must also be considered and enacted.

In conclusion, the supplier industry is in a transformative moment that can provide greater mobility, safety, and environmental protection for our citizens. MEMA is committed to being a part of the ongoing discussions on all aspects of the legislation facing Congress. As these discussions continue, MEMA urges Congress to consider the industry's needs outlined above to support the supplier industry and our workforce. Our nation requires these tools for the complex vehicle supplier industry in this country to remain competitive.

For any additional information or questions, please contact Catherine Boland, vice president of legislative affairs (cboland@mema.org).

Sincerely,

Ann Wilson

Ann Wilson
Senior Vice President, Government Affairs

Statement for the Record

House Energy and Commerce

Subcommittee on Consumer Protection and Commerce Hearing

"Promises and Perils: The Potential of Automobile Technologies"

Tuesday May 18, 2021, at 10:30 a.m. via Cisco Webex

Submitted by

Thomas M. Kowalick

Chair, Institute of Electrical and Electronics Engineers IEEE 1616: Standard for Motor Vehicle Event Data Recorders (MVEDRs)

Thank you, Chair Janice D. Schakowsky and Ranking Member Gus M. Bilirakis:

Today's hearing provides an opportunity to inform your committee about automotive technology being standardized by the Institute of Electrical and Electronic Engineers (IEEE) to reduce the risk of vehicle theft, odometer fraud, Vehicle Identification Number (VIN) cloning, crash data tampering and re-flashing of vehicle electronic networks towards greatly enhancing the cybersecurity of motor vehicles.

IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity.

IEEE and its members inspire a global community to innovate for a better tomorrow through its more than 400,000 members in over 160 countries, and its highly cited publications, conferences, technology standards, and professional and educational activities.

IEEE is the trusted voice for engineering, computing, and technology information around the globe.

IEEE and its organizational units engage in coordinated public policy activities at the national, regional, and international levels in order to advance the mission and vision of securing the benefits of technology for the advancement of society.

Since the House Commerce and Energy committee jurisdiction includes: consumer affairs and consumer protection; consumer privacy and data security; cybersecurity; consumer product safety; product liability; motor vehicle safety; the Federal Trade Commission; the Consumer Protection Safety Commission; and the National Highway Traffic Safety Administration this IEEE standard will be very valuable towards enhancing cybersecurity of vehicle and highway safety.

No other standards setting organizations cover the scope and purpose of this standard.

BACKGROUND

The vehicle DLC (OBD-II) is regulated by the Code of Federal Regulations (CFR) 40 CFR 86.094-17(h)[1] and revisions for subsequent model years. It is standardized by the Society of Automotive Engineers (SAE) Vehicle Electrical Engineering Systems Diagnostic Standards Committee. The physical configuration of the output plug is specified under SAE J1962-2007[2] and thru the International Standards Organization (ISO) under ISO 15031-3-2004 and is increasingly used as an access point to other in-vehicle electronics systems, subsystems, computers, sensors, actuators and an array of electronic control modules (ECU) including airbag sensing diagnostic modules (SDM). The onboard DLC is also used as a serial port to retrieve data elements from on-board systems, subsystems, modules, devices and functions that collect and store data elements related to a vehicle crash such as a restraint control module (RCM) and an event data recorder (EDR) as per 49 CFR 563: Event Data Recorders.[3]

An EDR is a device or function in a vehicle that records a vehicle's dynamic, time-series data just prior to or during a crash, intended for retrieval after the crash. The National Highway Traffic Safety Administration (NHTSA) is responsible for general EDR regulatory oversight and requires the installation of EDR in vehicles to provide an accurate and unbiased understanding of a crash event.

According to the Driver Privacy Act of 2015, when the vehicle owner purchases or leases the vehicle they are considered owners of the Event Data Recorder (EDR) data that the vehicle generates and stores. However, the DLC port is so insecure that the FBI issued a public service announcement (available at https://www.ic3.gov/media/2016/160317.aspx and incorporated herein by reference in its entirety).

The IEEE 1616™ is under revision in 2021 to add information pertaining to motor vehicle event data recorder connector lockout apparatuses. The revised standard defines a lockout protocol for EDR output data accessibility by securing the DLC. This standard does not prescribe data security within the vehicle electronic control units (ECUs) or within the intra-vehicle communication and/or diagnostic networks but instead defines ways and means to permit uniform, but controlled access of electronic scan tools to the DLC for legitimate vehicle emissions status, maintenance and/or repair. This standard also defines a means of maintaining data security on the vehicle via a Near Field Communication (NFC) protocol.

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[1] https://www.govinfo.gov/app/details/CFR-2007-title40-vol18/CFR-2007-title40-vol18-sec86-094-17

[2] https://www.sae.org/standards/content/j1962_201207/

[3] https://www.govinfo.gov/app/details/CFR-2011-title49-vol6/CFR-2011-title49-vol6-part563

The Department of Homeland Security's US-CERT tasked the CERT Coordination Center (CERT/CC)[4] at Carnegie Mellon University's Software Engineering Institute (SEI) to study OBD devices to better understand the cybersecurity impact to consumers and the public. The CERT/CC analyzed a representative sample of these devices for vulnerabilities and found widespread failure to apply basic security principles. If these devices are compromised, the potential impact includes loss of privacy, vehicle performance degradation or failure, and potential injury. The goal of CERT/CC's research was to better inform consumers, enterprise fleet managers, insurance companies, and policy makers about the potential risks of these devices.

The NHTSA estimates that 91.6% of modern vehicles include EDRs.[5] When the Haddon Matrix is applied to crashes it cites pre-crash, crash and post-crash. The crash mode is generally the crash site. The 'window of opportunity' to misuse EDR date is from the time of the crash until the time that the data is downloaded by a trusted entity of the Court, such as law enforcement.

Additionally, the CERT/CC report notes, "In enterprise IT environments, the majority of attackers are assumed to be remote, attacking the systems over the Internet. A specific automobile would be difficult to identify on the Internet, if it is directly accessible at all. Attackers are also likely to use computer security vulnerabilities as enablers of other, more physical crimes. Therefore, the threat actors are likely to be local to a targeted vehicle, generally within Wi-Fi or Bluetooth range. This doesn't rule out remote attacks, as a compromised mobile device with Internet connectivity could be connected to the car via an OBD-II device, USB, Bluetooth, or Wi-Fi. A secondary risk of using these devices is that compromise of the manufacturer or operator's back-end server may allow an attacker to access any device connecting to its network. When a consumer decides to plug one of these devices into their vehicle, they are unintentionally moving the security boundary from the vehicle itself to the device manufacturer's network, associated services, and any other connected device."

The House Commerce and Energy Committee is well aware that aftermarket OBD-II devices have the potential to introduce serious safety and security risks to an automobile.[6] The design of the OBD-II port means that such a device has unlimited access to some or all of a car's internal networks. These OBD-II devices also have some sort of external interface that is accessible from outside of the car—typically Wi-Fi, Bluetooth, or cellular.

Thus, there remains a need to secure a vehicle's EDR data from cybersecurity attacks, particularly before, during and after a crash event, while at the same time providing a chain of custody of the vehicle's EDR data.

In some states, EDR data is not protected by the Fourth Amendment and may be obtained without a warrant. See Mobley v. State, 346 Ga.App. 641 (2018).

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[4] https://www.kb.cert.org/vuls/

[5] https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201210&RIN=2127-AK86

[6] https://republicans-energycommerce.house.gov/news/press-release/board-diagnostic-obd-ii-ports-within-your-car-potential-gateway-hackers/

Thus, the IEEE standard provides a system and method for installing a device to prevent unauthorized access to the EDR data or provide permission for others to install the device after a crash event.

In a recent letter NHTSA Deputy Administrator James C. Owens stated:

> It is worth noting that NHTSA does not take issue with efforts relating to data ownership, privacy, or serviceability, to the extent they do not affect motor vehicle safety. In fact, in NHTSA's published Cybersecurity Best Practices for Modern Vehicles document, section 9 recommends that the automotive industry should provide strong vehicle cybersecurity protections that do not unduly restrict access by authorized alternative third-party repair services.[7]
>
> NHTSA's Cybersecurity Interests
>
> As background, NHTSA's statutory authorities center on motor vehicle safety.[8] Accordingly, NHTSA's primary interest focuses on cybersecurity vulnerabilities that present potential vehicle safety consequences, which is a subset of the universe of cybersecurity. The increase in uses of software-intensive motor vehicle components, including telematics systems, introduces new and different risks to motor vehicle safety. Risks include the potential that the technological methods, tools, and capabilities could be compromised and used in ways that create unintended, and at times, unsafe outcomes. The specific possibility of a software vulnerability potentially being used by malicious actors to cause a crash or incident is the primary cybersecurity concern for NHTSA as the safety oversight agency for the automotive industry. NHTSA has authority to order vehicle recalls based on unreasonable risks to safety including those that may be caused by cybersecurity vulnerabilities.
>
> For years, NHTSA has worked to encourage industry to adopt improved cybersecurity practices, recognizing that cybersecurity risks are real, and that protection of safety-critical vehicle systems from malicious hacking attempts is vital to the safety of the motoring public. Telematics systems are an area of great concern to the agency, because such systems could allow actors to receive and/or send information to vehicles outside of the vehicle itself, and potentially interface with multiple vehicles at a time, and to do so without gaining physical access to the vehicle.
>
> NHTSA published a *Cybersecurity Best Practices for Modern Vehicles* document to provide guidance to manufacturers and suppliers in developing strategies to make their vehicles more secure against malicious attacks and more resilient if such attacks are successful. This guidance encouraged manufacturers to harden safety-critical systems, identify and evaluate risk during system and vehicle development processes, and develop layers of protection throughout vehicles to protect against access by unauthorized third-parties and which are appropriate for the identified risks.

[7] https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/vehicle_cybersecurity_best_practices_01072021.pdf

[8] 49 U.S.C 30101 et seq.

See Existing Federal guidance and cybersecurity best practices [9]

SCOPE of IEEE-1616™: Standard for Motor Vehicle Event Data Recorders (MVEDRs)

1. Motor Vehicle Event Data Recorders (MVEDRs) collect, record, store and export data related to motor vehicle pre-defined events in usage history.

2. This standard defines a protocol for MVEDR output data compatibility and export protocols of MVEDR data elements.

3. This standard does not prescribe which specific data elements shall be recorded, but instead provides a data dictionary of data attributes.

4. This standard also defines a means of maintaining data security on the vehicle via a motor vehicle diagnostic link connector lockout apparatus (MVEDRCLA) by securing the vehicle output diagnostic link connector (DLC).

5. This standard does not prescribe data security within the vehicle electronic control units (ECUs) or within the intra-vehicle communication and/or diagnostic networks; it instead defines ways and means to permit uniform but controlled access of electronic scan tools to the DLC for legitimate vehicle emissions status, maintenance, and/or repair.

6. This standard also defines a Motor Vehicle Event Data Recorder Connector Lockout Apparatus (MVEDRCLA) and a Near Field Communication (NFC) protocol of safeguarding access to a vehicle's event data recorder (EDR) data by securing the vehicle output diagnostic link connector (DLC).

7. This standard is without prejudice to requirements of national or regional laws related to privacy, data protection and personal data processing.

8. This standard does not directly address related issues with regard to human health or human safety.

9. It is applicable to vehicles and their respective event data recorders for all types of motor vehicles licensed to operate on public roadways, whether offered as original or aftermarket equipment, whether stand-alone or integrated within the vehicle.

PURPOSE of IEEE-1616™

[9] https://csrc.nist.gov/News/2019/nist-publishes-nistir-8228

1. Many light-duty motor vehicles, and increasing numbers of heavy commercial vehicles, are equipped with some form of MVEDR.

2. These systems, which are designed and produced by individual motor vehicle manufacturers and component suppliers, are diverse in function, and proprietary in nature, however, the SAE J1962 vehicle DLC has a common design and pinout and is thus universally used to access event data recorder information.

3. Data access via the DLC can be accomplished by using scan tools or microcomputers and network interfaces.

4. This same DLC and network interface is also used for re-calibrating electronic control units on a vehicle.

5. Such ECU applications can include restraint controls, engine controls, stability controls, braking controls, etc.

6. This standard defines a protocol to protect against misuse of electronic tools which use the DLC to erase, modify or tamper with electronic controller or odometer readings, or to improperly download data.

7. Implementation of MVEDRCLA provides an opportunity to voluntarily achieve DLC security by standardizing a MVEDRCLA which will act to prevent vehicle tampering, which can include odometer fraud, illegal calibrations leading to emissions violations and theft of personal data.

8. Adoption of this standard will therefore make the common MVEDR/DLC data more secure and credible while still permitting accessibility to legitimate end users.

9. The continuing implementation of MVEDR systems provides an opportunity to voluntarily standardize data output and retrieval protocols to facilitate analysis and promote compatibility of MVEDR data.

10. Adoption of the standard will therefore make MVEDR data more accessible and useful to end users.

Introduction to IEEE-1616™

Crash information is critical to understanding causation leading up to the crash, occupant kinematics and vehicle performance during a crash, and post-crash events. Manufacturers, engineers, policy makers, researchers, and others rely on crash information to improve vehicle design, shape regulatory policy, develop injury criteria, detect vehicle defects, and resolve investigations and litigation.

Motor vehicles have markedly transitioned from mechanical machines with mechanical controls to highly technological vehicles with integrated electronic systems and sensors. Modern automobiles

generate, utilize, and analyze electronic data to improve vehicle performance, safety, security, comfort and emissions. Surrounding a crash, capture of a subset of vehicle data on an MVEDR makes important information readily available for medical responders, crash investigators, and researchers. The degree of societal benefit from MVEDRs is directly related to the number of vehicles operating with an MVEDR and the ability to retrieve and utilize these data. Having standardized data definitions and formats allows the capture of vehicle crash information.

The P1616 Working Group of IEEE recognizes the value of improved crash information in improving the knowledge of what happens before, during, and after a motor vehicle crash. Such insights will provide major benefits to society and significantly improve the science of motor vehicle crashes. This standard defines a protocol for MVEDR output data compatibility and export protocols of MVEDR data elements

The impact of improved crash data goes beyond just understanding the dynamics of a crash; it affects a myriad of important societal and business functions. With that in mind, the Working Group solicited input from a range of end users to help identify important data element and critical uses of motor vehicle crash data. Both individual crash events and aggregate data have value for end users, depending on the application and data used.

Some users and uses include the following:

- Automotive industry: Data-driven design of vehicles, using larger numbers of crashes across a continuum of severity; early evaluation of system and vehicle design performance; and international harmonization of safety standards.
- Insurance industry: Help to identify fraudulent claims, costing more than $20 billion annually; improve risk management; expedite claims and decrease administrative cost. Insurers require accurate crash data for subrogation of claims and recovery of expenses.
- Government: Promulgating and evaluating standards; identifying problem injuries and mechanisms; stipulating injury criteria and investigating defects. State and local officials require crash information to identify problem intersections and road lengths, to determine hazard countermeasures, and to evaluate the effectiveness of safety interventions.
- Researchers: Human factors research, such as the man-machine interface; crash causation, the effects of aging and medical conditions, and fatigue; biomechanics research on human response to crashes, harmonized dummy development, and injury causation.
- Medical providers: On-scene field triage of motor vehicle crash victims; improved diagnostic and therapeutic decisions; automatic notification of emergency providers; better organization of trauma and EMS system resources.
- The Public: Better policies, vehicle design, emergency response, roadway design, and driving habits; lowered insurance costs, decreased possibility for fraud; fewer crashes and more efficient systems.

In the United States, an estimated 80 million motor vehicles already use some type of event-recording equipment that collects not only acceleration and deceleration speed but also braking and steering data. Proponents of standard data recorders hope the crash data they collect will be a useful complement to accident information gathered from victims and eyewitnesses.

However, the implementation of event data recorders (EDRs) has not been without controversy.

The United States Department of Transportation (USDOT) Docket Management System (DMS) contains over 1000 submissions reflecting the pros and cons of a decade-long debate amongst automakers, government regulators, safety and privacy advocates, and the public.

The National Highway Traffic Safety Administration (NHTSA) Rule on Event Data Recorders (49 CFR 563 does not address issues generally within the realm of state law, such as the following:

- The ownership of EDR data
- How EDR data can be used/discovered in civil litigation
- How EDR data may be used in criminal proceedings
- Whether EDR data may be obtained by the police without a warrant
- Whether EDR data may be developed into a driver-monitoring tool
- The nature and extent that private parties will have or may contract for access to EDR

The Congressional Research Service (CRS) Report R43651 "Black Boxes" in Passenger Vehicles: Policy Issues cites IEEE standards. Can technology also protect privacy? While NHTSA was studying EDR technology, the Institute of Electrical and Electronics Engineers (IEEE) issued in 2004 the first universal, voluntary standard specifying minimal performance characteristics for memory devices in autos, trucks, buses, ambulances, and fire trucks. IEEE Standard 1616™ is an international protocol issued to help manufacturers develop black boxes with up to 86 data elements that will survive in crash situations. IEEE and others have argued that NHTSA's pending EDR regulation does not go far enough to protect owners' privacy. In 2010, IEEE issued a new Standard 1616a™, which specifies a lockout system to block unauthorized access that could otherwise lead to data tampering, odometer fraud, and VIN theft. It argued that such steps are necessary to ensure that motorists embrace the EDR technology in the long run. With this lockout standard, a motorist would have a separate key which would lock access to the OBD-II connector (as well as the EDR). Note. IEEE-1616™a is being incorporated into IEEE-1616™-2021.

REGULATION & ADVOCACY

Petitions were denied on this basis: "Despite the purported availability of such devices, we have still not seen evidence of tampering during our real world data collections, and the petitioner provided no new information that would suggest that we should reconsider our previous denial of this request."

PROVIDING NEW EVIDENCE: Since NHTSA denials there have been motor vehicle event data recorders (EDRs) installed in 91% of U.S. light vehicles, hundreds of YouTube videos were created showing how to erase crash data and reset air bags, worldwide there were increases in vehicle theft and examples of data tampering on major news networks. The FBI issued a public service announcements about OBD ports and the USDOJ announced numerous large scale odometer fraud convictions. Tragically, the NHTSA research on cybersecurity is reactive vs. proactive.

To date, NHTSA denied all letters of recommendations submitted to the docket, recommendations via meetings at NHTSA headquarters, petitions and petitions for reconsideration to enhance vehicle cybersecurity.[10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21]

The Electronic Privacy Information Center (EPIC) web site at https://www.epic.org/privacy/edrs/ is updated frequently.

CONCLUSION

NHTSA's 'BLIND-SPOT' is BALANCING TECHNOLOGY FORESIGHT UNCERTAINTIES AND CONSUMER PROTECTION IN EDR REQUIREMENTS

The NHTSA "safety only" mandate ignores consumer protection, consumer acceptance and privacy issues. Simply put, NHTSA erroneously requires quantitative evidence that a sizable problem exists (regarding tampering of EDRs and odometer roll-back) before it will act. In reality, NHTSA would in fact be creating a sizable problem by mandating EDRs in light vehicles without providing owners of the vehicle basic consumer protection. The owner of the vehicle, not the automaker should control access to this device (EDR) since it is widely known that In-vehicle electronic modules are subject to tampering, spoliation of evidence, undetectable surveillance, unauthorized access, misuse of data, and mischief.

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[10] https://www.regulations.gov/document/NHTSA-2008-0019-0006

[11] https://www.regulations.gov/document/NHTSA-2006-25666-0438

[12] https://www.regulations.gov/document/NHTSA-2008-0004-0007

[13] https://www.regulations.gov/document/NHTSA-2008-0004-0012

[14] https://www.regulations.gov/document/NHTSA-2008-0004-0013

[15] https://www.regulations.gov/document/NHTSA-2012-0177-1046

[16] https://www.regulations.gov/document/NHTSA-2008-0004-0014

[17] https://www.regulations.gov/document/NHTSA-2008-0004-0001

[18] https://www.regulations.gov/document/NHTSA-2008-0004-0015

[19] https://www.regulations.gov/document/NHTSA-1999-5218-0009

[20] https://www.regulations.gov/document/NHTSA-2006-25666-0457

[21] https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201010&RIN=2127-AK71

Thus, common sense dictates that more emphasis is needed on sealing access to the data at the federally-mandated On-Board Diagnostics (OBD-II) download connector port, located under the dash in virtually all modern vehicles, therefore establishing a chain of custody and preventing tampering.

NHTSA should adhere to the National Technology Transfer Advancement Act (CNTTAA) and incorporate by reference IEEE-1616™ into 49 CFR 563: Event Data Recorders. The IEEE EDR standards offer vehicle owners, fleets, rentals and lessor's accountability, protection and security. Use of IEEE standards would be consistent with applicable law and would improve motor vehicle safety by preventing a consumer backlash towards implementing EDR technology. Use of IEEE EDR standards would be practical. The IEEE EDR standard provides a promising countermeasure addressing the safety promise and challenges of 21st Century in-vehicle automotive networks and vehicular electronics. Specifically, vehicle owners must "own" the EDR data, become "aware "of EDRs existence and functioning and must "control access" to the EDR data in their vehicles.

Given these goals, it it recommended that the House Energy and Commerce Committee direct NHTSA to amend 49 CFR 563: Event Data Recorders by adding the following:

563.13 Motor Vehicle Event Data Recorder Connector Lockout Apparatus (MVEDRCLA). Each manufacturer of a motor vehicle equipped with an EDR shall ensure that a motor vehicle event data recorder connector lockout apparatus (MVEDRCLA) as standardized by the Institute of Electrical and Electronics Engineers (IEEE 1616-2021) to help protect the security, integrity, and authenticity of the data that are required by this part is attached to the vehicle's SAE J1962 (150/015 15031-3) vehicle diagnostic link connector (OLC) at the point of motor vehicle sale, including leased and rented vehicles.

DEFINITION: Connector Lockout Apparatus (CLA) is a device or mechanism to secure a vehicle diagnostic link connector (DLC) as standardized by IEEE-1616™-2021.

IEEE 1616 will be issued in 2021 at https://www.ieee.org/standards/buy-standards.html

ADDITIONAL RESOURCES:

American Civil Liberties (ACLU) AMICUS Brief see https://www.aclu.org/legal-document/mobley-v-state-amicus-brief

Code of Federal Regulation (CFR) 563: Event Data Recorder. See https://www.govinfo.gov/content/pkg/CFR-2011-title49-vol6/pdf/CFR-2011-title49-vol6-part563.pdf

Congressional Research Service (CRS) Report R43651 “Black Boxes” in Passenger Vehicles: Policy Issues. See https://crsreports.congress.gov/product/pdf/R/R43651

Congressional Research Service (CRS) IF Autonomous Vehicles: Emerging Policy Issues at https://crsreports.congress.gov/product/pdf/R/R44940

ECE/TRANS/WP.29/2020/123: 01 Series of Amendments for UN Regulation No.[XXX], UN Regulation on uniform provisions concerning the approval of motor vehicles with regard to the Event Data Recorder. See https://unece.org/fileadmin/DAM/trans/doc/2020/wp29grva/GRVA-07-60e.pdf

European Commission (EC) VERONICA II Final Report at https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/projects/veronica.pdf

Electronic Privacy Information Center (EPIC) Cahen v. Toyota Motor Corporation: Whether drivers can sue for privacy and security vulnerabilities in connected cars at https://epic.org/amicus/cahen/

Electronic Privacy Information Center (EPIC) COMMENTS OF THE ELECTRONIC PRIVACY INFORMATION CENTER TO THE NATIONAL HIGHWAY TRANSPORTATION SAFETY ADMINISTRATION (NHTSA) see https://epic.org/privacy/edrs/EPIC-Coal-NHTSA-EDR-Cmts.pdf

National Conference of State Legislatures (NCSL) Privacy of Data from Event Data Recorders: State Statutes at https://www.ncsl.org/research/telecommunications-and-information-technology/privacy-of-data-from-event-data-recorders.aspx

National Institute Standards Technology (NIST) Automotive and Industrial Data Security presentation https://csrc.nist.gov/CSRC/media/Presentations/Automotive-and-Industrial-Data-Security/images-media/presentation-2_weimerskirch.pdf

National Research Council (NRC) of the National Academies of Sciences (NAS) Transportation Research Board (TRB) Special Report 308: The Safety Challenge and Promise of Automotive Electronics [ISBN 978-0-309-22304-1] see https://www.nap.edu/catalog/13342/trb-special-report-308-the-safety-challenge-and-promise-of-automotive-electronics

U.S. Congress https://www.scribd.com/document/401616402/Internet-of-Things-IoT-Cybersecurity-Improvement-Act-of-2019

U.S. Congress DRIVER'S PRIVACY ACT OF 2015 see https://epic.org/privacy/edrs/EPIC-Coal-NHTSA-EDR-Cmts.pdf

Federal Bureau of Investigation (FBI) see https://www.ic3.gov/Media/Y2016/PSA160317

Federal Trade Commission (FTC) See https://www.ftc.gov/policy/advocacy/advocacy-filings/2016/11/comment-jessica-l-rich-director-bureau-consumer-protection

Society of Automotive Engineers (SAE) Automotive Cybersecurity at https://www.sae.org/cybersecurity/

USDOT/NHTSA: Vehicle Cybersecurity at
https://www.nhtsa.gov/technology-innovation/vehicle-cybersecurity

U.S. Congress https://www.scribd.com/document/401616402/Internet-of-Things-IoT-Cybersecurity-Improvement-Act-of-2019

U.S. Congress DRIVER'S PRIVACY ACT OF 2015 see https://epic.org/privacy/edrs/EPIC-Coal-NHTSA-EDR-Cmts.pdf

Respectfully Submitted on May 17, 2021

Thomas M. Kowalick

[redacted]

Consumer Reports

May 17, 2021

The Honorable Jan Schakowsky, Chair
The Honorable Gus Bilirakis, Ranking Member
U.S. House Committee on Energy and Commerce
Subcommittee on Consumer Protection and Commerce
2125 Rayburn House Office Building

Dear Chair Schakowsky and Ranking Member Bilirakis:

Consumer Reports (CR), the independent, nonprofit, nonpartisan organization, writes regarding the hearing, "Promises and Perils: The Potential of Automobile Technologies." As advocates who work with policymakers, consumers, and industry to build a fair and just marketplace, we welcome the opportunity to communicate with you on this vital subject.

Today's cars and trucks have numerous capabilities that many Americans would have considered unimaginable two decades ago. Tomorrow's vehicles may follow suit, thanks to the creativity of automotive engineers and advances in software, electronics, and sensors.

At the same time, it is an open question whether future vehicles will truly account for the challenges we face. More than 35,000 people die in vehicle-related crashes in the U.S. each year, and millions are injured. Auto emissions contribute to another 70,000 annual pollution-related deaths nationwide, and motor vehicles are among the largest contributors to climate change. Some industry practices continue to run counter to basic consumer rights that must be upheld.

CR urges the Subcommittee to ensure the cars and trucks of the future are substantially safer, less polluting, and more efficient than the vehicles of today. We also urge members to prioritize fairness for all consumers, to ensure their fundamental rights in the marketplace are not violated. As automotive technology continues to move forward at a rapid pace, policymakers can capitalize on several essential opportunities to put people first.

Opportunity #1: Safer cars. The current Congress has an opportunity to pass transformative and necessary road safety legislation that would substantially reduce the toll of car crashes. In particular, CR strongly supports provisions that would require existing auto safety technologies, including automatic emergency braking and blind spot warning, to come standard on all new vehicles and meet minimum federal performance requirements. We also support provisions to require technology on all new vehicles to reduce driver inattention and prevent drunk driving. It is furthermore important for the Subcommittee to approve CR-endorsed legislation to enhance the five-star new car safety ratings program, help stop child heatstroke deaths, and improve safety in cars with keyless ignitions, among other measures.

In June 2020, CR released an analysis on the expected benefits of existing safety technologies if they were equipped on the entire fleet of light vehicles in the United States. CR's study found that full adoption of currently available crash avoidance technologies and other existing safety systems could cut road deaths in half by saving 16,800-20,500 lives per year.[1] Another CR study found that these safety technologies frequently come only with the purchase of a package of expensive add-ons, including features like a premium stereo system or sunroof, which often costs more than $2,000 extra.[2] By making existing safety technologies standard on all new cars, Congress would save lives and stop automakers from treating safety as a luxury.

For their part, automated vehicles (AVs) have enormous potential to help make future transportation safer and more accessible, but AV innovation must be accompanied by robust, sensible safety rules if the technology's full potential is to be realized. Federal AV legislation is likely to bring the most significant changes to federal auto safety laws in decades. Such legislation should include strong safety measures that truly would protect consumers regardless of whether a human or software is doing the driving – and it should not undermine federal safety standards or the authority of state and local governments, nor establish a separate, weaker legal framework for highly automated vehicles. Strong AV legislation also would ensure that the National Highway Traffic Safety Administration (NHTSA) ends its misguided "hands-off" approach to the safety of AVs and vehicles with active driving assistance systems, and instead implements critical measures recommended by the National Transportation Safety Board following crash investigations involving driving automation.[3]

Additionally, it is important for the Subcommittee to recognize that NHTSA is chronically underfunded, and does not have the resources it needs to fully carry out its mission today – much less in the future, as vehicles become increasingly complex and new regulatory challenges emerge. Every member should support at least doubling NHTSA's budget and staff resources, and empowering the agency with new tools and authorities so that it can more effectively do its job of protecting the public from death and injury in motor vehicle crashes.

Opportunity #2: Cleaner cars. The current Congress can take pivotal steps to shape a cleaner, more sustainable transportation future. In particular, electric vehicles (EVs) are poised to play an increasingly important role over the coming years. CR is seeing strong consumer interest in electric vehicles in recent surveys, and interest grows even stronger as consumers gain more first-hand experience with these vehicles.[4] Our research has also shown great potential for EVs

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[1] Consumer Reports, "Safety First: Car crashes, innovation, and why federal policy should prioritize adoption of existing technologies to save lives" (June 29, 2020) (online at: advocacy.consumerreports.org/research/cr-safety-first-car-crashes-innovation-federal-policy-study).

[2] Consumer Reports, "A High Price on Safety: How automakers require consumers to pay a premium for proven vehicle safety features" (June 1, 2020) (online at: advocacy.consumerreports.org/research/cr-high-price-on-auto-safety-study).

[3] See, e.g., "Consumer Reports: Uber crash should be 'a wake-up call' for companies developing self-driving cars, DOT, and state governments" press release (Nov. 19, 2019) (online at: advocacy.consumerreports.org/press_release/cr-uber-ntsb-nov-19-2019).

[4] Consumer Reports, "New Consumer Reports survey finds majority of drivers are interested in electric vehicles" (Dec. 17, 2020) (online at: advocacy.consumerreports.org/press_release/new-consumer-reports-survey-finds-most-drivers-are-interested-in-electric-vehicles).

to deliver consumer savings from lower fuel and maintenance costs.[5] In addition to pure savings, electric vehicles can also provide consumers with greater resilience to shocks in fuel price and availability that can unexpectedly stress family budgets. Furthermore, recent research from the Insurance Institute for Highway Safety (IIHS) has shown that EVs can deliver on these benefits with no tradeoffs in terms of safety. Congress should support this growing market by extending consumer purchase incentives for EVs while making them more equitable. Congress should also further support the development of a robust national charging network so that electric vehicles can become a convenient choice for all consumers.

However, while EV ownership is likely to increase rapidly, the majority of vehicles sold in the coming decade will still be powered by gasoline. Fortunately, there is still plenty of existing technology that can be deployed on conventional vehicles to reduce fuel consumption and emissions. On average, fuel savings technologies provide three dollars of fuel savings for each dollar of up-front investment.[6] Given this fact, it will be important for the Environmental Protection Agency (EPA) and NHTSA to set strong fuel economy and greenhouse gas standards that ensure automakers continue to deploy these cost-effective fuel savings technologies while they continue to develop newer and cheaper electric vehicles, so that all consumers have an opportunity to save money and energy.

Opportunity #3: Fairer practices around cars. We recognize that major technological changes are likely to be accompanied by major changes in auto industry business practices, some of which could run counter to fundamental consumer rights. Unfair and deceptive business practices in the automotive marketplace are already an area of attention for the Federal Trade Commission (FTC), but the Subcommittee should help protect consumers both now and in the future by bolstering the Commission's authorities and resources, and enhancing its practical ability to deter misconduct and compensate consumers for their losses.

Relatedly – and especially given the vast and growing collection of personal information by cars and trucks – all vehicle manufacturers should be required to comply with robust data privacy and security safeguards. Any personal information should only be collected or shared for purposes of delivering the services a consumer has requested, or otherwise at the consumer's direction, with appropriately tailored exceptions for essential public purposes. Companies should be required to be transparent with consumers about the collection and sharing of information, protect information associated with the vehicle and the vehicle itself from data breaches, share personal information only as directed by the consumer, and provide consumers the ability to access and delete personal information.

Finally, companies in various industries are increasingly adding forced arbitration clauses into their standard contracts and terms of use, stripping consumers of their right to go to court if

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[5] Consumer Reports, "New analysis from CR finds that the most popular electric vehicles cost less to own than the best-selling gas-powered vehicles in their class" (Oct. 8, 2020) (online at: advocacy.consumerreports.org/press_release/new-analysis-from-cr-finds-that-the-most-popular-electric-vehicles-cost-less-to-own-than-the-best-selling-gas-powered-vehicles-in-their-class).

[6] Consumer Reports, "New Consumer Reports analysis shows near-freeze of fuel economy rules would cost consumers $300 billion" (Nov. 13, 2019) (online at: advocacy.consumerreports.org/press_release/new-consumer-reports-analysis-shows-near-freeze-of-fuel-economy-rules-would-cost-consumers-300-billion).

they are harmed by a product or service. Instead, legal disputes get shunted off to private forums where many basic legal protections do not apply, and the company often has an unfair advantage. Typically, the only way for consumers to avoid submitting to forced arbitration is to decline the product or service altogether, which is seldom a practical option. CR has endorsed H.R. 963, the Forced Arbitration Injustice Repeal (FAIR) Act, which would prohibit companies from imposing forced arbitration as a precondition for buying or using a product or service. The bill passed the House last Congress and has been reintroduced in both the House and Senate this year. With consumer use of mobility services and fleet vehicles predicted to increase in the coming years, car companies would be apt, unless prohibited, to employ forced arbitration clauses to shield themselves and block consumers from taking them to court – as several ride-hailing and car-sharing services do today. As a part of your work, we urge you to proactively express your support for a prohibition on forced arbitration clauses in the auto industry and throughout the marketplace.

Thank you for your consideration. We look forward to working with you to ensure that automotive innovation truly serves the public, and comes hand-in-hand with an emphasis on people's safety, clean air and the climate, and basic marketplace fairness.

Sincerely,

William Wallace
Manager, Safety Policy
Consumer Reports

Christopher Harto
Senior Sustainability Analyst
Consumer Reports

cc: The Honorable Frank Pallone, Jr., Chairman
The Honorable Cathy McMorris Rodgers, Ranking Member
U.S. House Committee on Energy and Commerce

Members of the Subcommittee on Consumer Protection and Commerce

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May 18, 2021

The Honorable Janice Schakowsky
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The Honorable Gus Bilirakis
2322-A Rayburn House Office Building
Washington, DC 20515

Dear Representatives,

The National Association of Mutual Insurance Companies ("NAMIC") is pleased to offer comments to the House of Representatives Subcommittee on Consumer Protection and Commerce of the Committee on Energy and Commerce on the promises and challenges of evolving automotive technologies.

NAMIC is the largest property/casualty insurance trade group, with a diverse membership of more than 1,400 local, regional, and national member companies, including seven of the top 10 property/casualty insurers in the United States. NAMIC members lead the personal lines sector representing 66 percent of the homeowners insurance market and 53 percent of the auto market. Through our advocacy programs, we promote public policy solutions that benefit NAMIC member companies and the policyholders they serve as well as foster greater understanding and recognition of the unique alignment of interests between management and policyholders of mutual companies.

The development of Automated Driving Systems (ADS) may be the most consequential transportation issue of our time. New technology and novel service strategies promise faster and better mobility that will be less expensive, and more environmentally friendly. Spring boarding from existing and widely accepted "assisted driving" systems such as cruise control, ADS developers promise a wider array of functions from greater driver assistance to vehicles that will perform every driving operation with no human intervention.

Safety Must Be the Primary and Overriding Focus

The single most important reason to support the development of ADS is the potential to enhance safety and save lives. While the idea of working, napping, or watching a movie while the car drives itself may be enticing to many, enhanced safety must always be the primary focus of ADS development. ADS that are proven safer than existing drivers will have innumerable benefits to society. However, the development and deployment of proven, safe ADS will require significant technological advances, revisions to the regulatory paradigm, and the active participation of all stakeholders.

The potential for technology to move the needle on crash statistics is extraordinary; however, there will still be crashes, especially in an environment where automated vehicles continue to share the road with human drivers. It is important to note that ADS, in and of themselves, do not fundamentally change the legal theories of liability associated with motor vehicle crashes. As these ADS crashes happen and questions of liability arise, insurance will play a crucial role for ADS manufacturers, suppliers, owners, operators, and passengers.

Safety must be the primary goal for ADS development but defining and proving what "improved safety" means for ADS is not simple. Currently, federal auto safety regulations focus more on the structure and design of vehicles and less on the driving operations that are subject to human control. With ADS, the vehicle will assume driving operations formerly performed by the human driver. Thus, the safety responsibilities of the vehicle will expand and will continue to expand until the vehicle assumes all driving operations without any human control and reduces the frequency of crashes caused by sleeping, intoxication, distraction, or speeding.

According to the NHTSA, "Fully automated vehicles that can see more and act faster than human drivers could greatly reduce errors, the resulting crashes, and their toll." On the other hand, the elimination of certain human errors does not tell us anything about the introduction of computer, sensor, or software error. Safe ADS will require a substantial amount of specialized software, sensors, controllers, and actuators to collectively perform without error, or at least as well as those human drivers, the large universe of operations that human drivers already perform. The bar for performance has been set high: human drivers since 2017 have averaged approximately 500,000 vehicle miles between crashes, more than one million vehicle miles between crashes with an injury and nearly 100 million vehicle miles between fatal crashes. [1]

The development of ADS will require a new way to look at the fundamental nature of driving, and that development should not be hindered by requiring outdated safety requirements that do not apply to new technologies. At the extreme end of the spectrum, the development of ADS with no driver controls will mean that vehicle features that are now required for human operation may not be necessary or practical. Sound policy should include a review of which requirements would no longer be relevant for a fully autonomous vehicle. The Federal Motor Vehicle Safety Standards (FMVSS) are the U.S. federal regulations specifying nationwide design, construction, performance, and durability requirements for auto-safety-related components, systems, and design features.

FMVSS focus mostly on crash avoidance, crashworthiness, and crash survivability. Existing FMVSS specify that controls and displays must be located where they are visible to or within the reach of a person sitting in the driver's seat. Depending on whether the occupants have "dual mode" or no control of an ADS, there may not be a "driver's seat" or the relevant controls or displays of driving operations may vary with the driving operations that the human retains. In various iterations of ADS, auto parts subject to FMVSS such as rearview mirrors may or may not be superfluous for driving operations. Similarly, controls for turn signals, lights, or wipers may or may not be required and may or may not be subject to safety standards.

The focus must remain on ensuring that critical safety aspects are examined and validated and that any safety assurance gaps that may be created by the introduction of ADS onto the roads are identified and addressed. This is far more complicated than it may seem. While many human-driver focused FMVSS do not make sense for ADS, perhaps ADS-specific safety tests should accompany broad exemptions. Existing self-certification should be supplemented by governmentally defined and publicly disclosed standards and then supplemented by third-party validation of design and testing.

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[1] US Department of Transportation Bureau of Transportation Statistics https://www.bts.gov/content/motor-vehicle-safety-data

Pre-market approval has many downsides, but some level of independent ADS safety review could supplement self-certification.

The State of Automated Driving Systems Today

As more completely defined in the NAMIC 2019 white Paper *Responsibility Assessment Standards For Conditional Automation/Dual Control Vehicles*, attached hereto as an Appendix, today, and possibly for a long time to come, the full driving task – SAE Levels 4 and 5 – is too complex an activity to be fully formalized as a sensing-acting robotics system that can be explicitly solved through model-based and learning-based approaches in order to achieve full unconstrained vehicle autonomy.[2] Car companies – or original equipment manufacturers, as they are known – are building and offering cars today in which the dynamic driving tasks of the vehicle can be controlled at times by the vehicle and at times by the occupant. These conditional automation/dual-control cars can be as relatively simple as the widely used automatic braking.

In November 2019 testimony before the United States Senate Committee on Commerce, Science, and Transportation, Robert Sumwalt, board chairman of the National Transportation Safety Board, noted that one of the main sources of confusion in discussions about AVs is the language used in the auto industry and by researchers and regulators compared to what is used by the public. Industry, regulators, and academics frequently use the six-level SAE automation taxonomy as a reference point when discussing vehicle capabilities and operator responsibilities, but Sumwalt maintained that the SAE automation levels may not be easily relatable to the public, and the terms used by vehicle manufacturers to market their partial-driving automation systems can add to public confusion about the degree of automation in the production-level vehicles now available.[3]

Advanced driving assistance features today specify that they do not substitute for the driver's responsibility to operate the vehicle in a safe manner; that the driver should remain attentive to traffic, surroundings, and road conditions at all times; and that visibility, weather, and road conditions may affect feature performance. Although much attention and federal effort have been focused on highly automated SAE Level 3–5 vehicles, NTSB's Sumwalt advised that of equal and more immediate concern should be the current deployment of partial-driving automation systems on our nation's highways.[4]

As further detailed in the white paper, the lack of any standards or common understanding of vehicle capabilities and limitations greatly increases safety risks. The respected Insurance Institute for Highway Safety (IIHS) has found that mismatches among a designer's intent for how systems should be used, what the interfaces should communicate to drivers

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[2] Citing MIT Advanced Vehicle Technology Study: Large-Scale Naturalistic Driving Study of Driver Behavior and Interaction with Automation, available at https://arxiv.org/pdf/1711.06976.pdf .

[3] Testimony of The Honorable Robert L. Sumwalt, III, chairman, National Transportation Safety Board, before the Committee on Commerce, Science, and Transportation,
United States Senate hearing "Highly Automated Vehicles: Federal Perspectives on the Deployment of Safety Technology," pages 1-2 at https://www.commerce.senate.gov/services/files/B8EF39B5-DE24-48AA-A870-B6CF8E0D5033 .

[4] Sumwalt testimony, page 5.

about those systems, and how drivers should use that information when operating the vehicle result in driver misuse and overreliance on the systems.[5]

The Challenge: Defining What Dual Control Automated/Driver Vehicles Can Do and Cannot Do

It is important to understand the designed capabilities and limitations of the dual control vehicle and how and when driving operations were engaged or disengaged leading up to the crash. NTSB Chair Sumwalt has stated, "As more manufacturers deploy driving automation systems on their vehicles, to improve system safety, it will be necessary to develop detailed information about how the active safety systems performed during, and how drivers responded to, a crash sequence. Manufacturers, regulators, and crash investigators all need specific data in the event of a system malfunction or crash."[6]

One the biggest impediments today is public wariness of automated vehicles, with, based on recent studies, public confidence in "self-driving" cars rated as low.[7] Providing more specific information about what each model is designed to do will enable consumers to better understand and accept their responsibilities in these vehicles. Again, as detailed further in the white paper, increasing confidence in the technology through access to more and better information of specific capabilities and limitations of a vehicle could enhance the safe operation of these vehicles and prepare consumers for higher levels of automation in the future. This same information can greatly assist the further development and implementation for clear federal and state regulations for the deployment of these vehicles. By making this information widely available without government regulations, OEMs can provide regulators with the assurances they need but retain the flexibility to modify disclosures to address upgrades and revisions. False or misleading information will remain subject to existing civil and criminal sanctions.

Insurance Companies Have the Expertise to Help Assessment of the Safety Testing of Automated Vehicles

Insurers have long championed auto and highway safety issues and have helped raise public awareness through the creation and ongoing support of auto safety research organizations such as the Insurance Institute for Highway Safety and the Highway Loss Data Institute. The Insurance Institute for Highway Safety is an independent, nonprofit scientific and educational organization dedicated to reducing the losses – deaths, injuries and property damage – from motor vehicle

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[5] Effects of training and display content on Level 2 driving automation interface usability, available at https://www.iihs.org/topics/bibliography/ref/2191

[6] Sumwalt testimony, page 9

[7] A 2019 Reuters/Ipsos poll found half of U.S. adults think automated vehicles are more dangerous than traditional vehicles operated by people, and more than 60 percent of respondents would not pay more to have a self-driving feature on their vehicle. Americans still don't trust self-driving cars, Reuters/Ipsos poll finds, at https://www.reuters.com/article/us-autos-selfdriving-poll/americans-still-dont-trust-self-driving-cars-reuters-ipsos-poll-finds-idUSKCN1RD2QS . A 2018 poll by J.D. Power and NAMIC found that 42 percent said they would never ride in a fully automated vehicle. AAA reports that more than 70 percent of Americans are afraid to ride in a self-driving car, an increase from 63 percent in 2017. Three in Four Americans Remain Afraid of Fully Self-Driving Vehicles, at https://newsroom.aaa.com/2019/03/americans-fear-self-driving-cars-survey/.



crashes. The Highway Loss Data Institute shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model. Insurers have long allied with safety groups to work together to make America's roads safer.

The critical issues related to passenger safety, liability, and recovery after a crash require that insurance companies are included in the development, deployment, regulation, and use of ADS, including any NHTSA research program. Consumers will continue to look to property/casualty insurers to provide them with the protections they have come to expect as this new frontier of automotive products and services evolves. A 2018 JD Power survey found that consumers have the highest levels of confidence in insurance dealing with ADS.[8]

The business of insurance demands that it applies hard data and institutes actuarial science to assess and mitigate risk. It was more than 30 years ago that coalitions of insurance companies together with consumer groups first favored state requirements for seat belts and air bags and opposed the auto makers reluctance to provide such safety features.

Insurers have a long and proven history of working hand-in-hand with regulators and auto manufacturers to facilitate developments that save lives and prevent injuries and damage. The revolutionary replacement of the human driver with ADS will require auto insurers to understand each vehicle's design and operation. Ultimately, drivers may not be comfortable with "dual mode" or no control whatsoever, which means that the insurer of that human driver must fully understand the planned automated driving operations as well as any possible human operation of the vehicle under any circumstances.

The insurance industry understands that new and different data will be needed for insurers to write ADS-related insurance policies. The extensive history and level of human driving data that insurers have developed must now be supplemented by increasingly complex data on the automated driving systems that assist or replace those human drivers. Insurers have a proven record of assessing driving risks and communicating to auto owners the methods to mitigate that risk.

Defining and Analyzing the Appropriate Safety Data is Critical

Insurers should have access to a robust ADS information and data framework – including crash accident and incident information and data for businesses purposes including underwriting and rating – that is timely, complete and useful. It is critically important for Congress to address these issues when writing any legislation for the development and deployment of automated vehicles.

Now, and for a long time to come vehicles equipped with ADS will share the road with vehicles with no automation and these vehicles will inevitably be involved in crashes. Furthermore, the increased removal of human driver error through automation introduces new risk factors that could cause crashes such as sensor, camera, and software errors. Because of

[8] Automated Vehicles and Insurance Pulse Survey, https://www.namic.org/pdf/18memberadvisory/181008_Automated_Vehicles_JD_Power_NAMIC_Questionnaire.pdf

this, determining liability following a crash will increasingly rely on the data that the vehicle generates prior to and during a crash. Making a liability determination and addressing claims will require a more complete understanding of what the vehicle was designed to do and not do, what the human driver was required to do and not do, and under what conditions, as well as the proper upkeep of the vehicle and all relevant traffic and weather conditions. Recent high-profile examples of fatal automobile crashes where it is in dispute whether the vehicle was in "autopilot" mode tragically highlight the need to ensure that incident data is available to third parties, especially insurers.

Additionally, the types of objective and verifiable data that will be required to provide insurance for ADS -- data on crash frequency, crash severity, and repairs -- are the same types of data that can authoritatively validate safety levels of ADS to the public and regulators. Auto insurance rates and coverage are established by insurance companies using vast amounts of historical data and established actuarial science, analyzing years of relevant data on frequency and severity of incidents. The rates determined by insurance companies are then frequently subject to a review by the state insurance regulators to ensure that they are fair and supported by data.

Valid and understandable data on ADS is critical to safety. The development and deployment of ADS -- particularly the proposed ADS with no controls for a human driver -- is a game changer. It will entail a fundamental change in transportation, mobility, infrastructure, and myriad other areas. The adoption of ADS on a wide scale will impact millions of people and will require adaptation by governments, industries, and the culture in general. The precondition to this development is an accepted belief that ADS improve safety, which will itself require sufficient data and information upon which to validate that belief. To date, information about ADS development in general and safety specifically has been limited.

ADS development is still in the early stages and myriad business, design, technical, and other issues are still only being discussed. In the competition to bring ADS to market, there should be a requisite level of confidentiality. Insurance companies understand confidential information and have a long history of working with auto companies to obtain and use available data. Similarly, insurance companies have deep experience in data security and the wide scope of data privacy requirements.

It would be in the best interests of proponents of safe ADS to coordinate and consider new and improved alternatives to communicate on ADS technology and performance. Somewhere between the extreme poles of "just trust us" and reams of federal regulations requiring submission of millions of certified data points is a system of information and communication that is usable and comprehensible for the public, governments, and other industries. Validation of safe ADS development and a resulting public acceptance can be greatly enhanced by a measurable gauge of ADS safety/risks through recognized analysis of the most relevant data. Insurers, with their direct and ongoing contact with drivers and owners, are a most effective way to enhance that communication.

Conclusion

The insurance industry has continuously proven its commitment to supporting the development and deployment of real auto safety benefits at the earliest time. For ADS, these benefits are dependent, however, on many and daunting technological, logistical, and regulatory revisions that remain to be designed and successfully implemented. The existing environment of auto safety regulation evolved with a human-driver focus and has not fully considered the many nuances of increased assisted and automated driving systems. As these systems develop and evolve, the risk of regulatory safety gaps increases and the need for a comprehensive reassessment of driving operation safety grows exponentially, starting with the paramount focus on the safety of vehicle occupants, occupants of other vehicles, and the public.

For the public to understand and accept ADS safety developments[9], we must show how we got to the answer; to illustrate the exact steps taken to achieve specific metrics of safety for ADS. Broad assurances of overall safety must be bolstered by facts and data on ADS design and operation. Third party validation of ADS data and safety testing by insurers will help to develop the requisite public, insurer, and governmental trust to support further ADS deployment.

A prerequisite of that trust, particularly for insurers, is the access to more and better data on the proposed and adopted design and operation of ADS, as well as a framework for the access and analysis of accident information for purposes of establishing liability. Through their highly regulated development of rates and coverage, insurers apply many of the objective and independent validations sought for ADS operational safety. Just as with the established and active advocacy of seat belts and air bags, auto insurance companies are committed to working with auto manufacturers and safety advocates to develop and implement commercial standards that can save lives.

As an industry that has extensive experience with automobile technology and safety, we look forward to working with the Committee on this important issue. Thank you for your consideration and we would welcome the opportunity to discuss further.

Sincerely,

Jonathan Bergner
Vice President, Public Policy and Federal Affairs

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[9] A 2019 Reuters/Ipsos poll, half of U.S. adults think automated vehicles are more dangerous than traditional vehicles operated by people, and more than 60 percent of respondents would not pay more to have a self-driving feature on their vehicle. Americans still don't trust self-driving cars, Reuters/Ipsos poll finds, at https://www.reuters.com/article/us-autos-selfdriving-poll/americans-still-dont-trust-self-driving-cars-reuters-ipsos-poll-finds-idUSKCN1RD2QS AAA reports that more than 70 percent of Americans are afraid to ride in a self-driving car, an increase from 63 percent in 2017. Three in Four Americans Remain Afraid of Fully Self-Driving Vehicles, at https://newsroom.aaa.com/2019/03/americans-fear-self-driving-cars-survey/

NAMIC ISSUE ANALYSIS



NAMIC® ADVOCACY

RESPONSIBILITY ASSESSMENT STANDARDS FOR CONDITIONAL AUTOMATION/DUAL CONTROL VEHICLES

Tom Karol
General Counsel – Federal
National Association Of Mutual Insurance Companies

NAMIC®
ISSUE ANALYSIS

TOM KAROL

Tom Karol serves as General Counsel – Federal in NAMIC's Washington, D.C., office. Tom represents NAMIC on issues impacting property/casualty insurance companies and has primary management of NAMIC's response to federal legislation and regulation. Tom has extensive legal, regulatory, and operations experience with major financial services companies, law firms, regulatory agencies, and Congress, having served as legal counsel in federal agencies and with the U.S. Senate Committee on Governmental Affairs.

Acknowledged as a leader in the insurance industry on autonomous vehicles, Tom is on the Board of Directors of both the Highway Loss Data Institute and Advocates for Highway Safety and Auto Safety, and is an Observer on the Uniform Law Commission Committee on Highly Automated Vehicles. Tom has worked directly with National Highway Transportation Safety Administration officials and has provided testimony to Congressional committees on automated driving systems. Tom leads NAMIC's Autonomous Vehicles Council and has been a featured speaker at insurance, actuary and legal conferences. He served on NHTSA panels relating to state jurisdiction and pre-market approval, has worked with the Insurance Institute for Highway Safety supporting the Virginia Tech Transportation Institute as part of the National Cooperative Highway Research Program, and is a stakeholder in the NHTSA Federal Motor Vehicle Safety Standards Considerations for Automated Driving Systems peer review.

For more information about NAMIC Issue Analyses, please visit namic.org/issues/our-positions or contact:

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NAMIC membership includes more than 1,400 member companies. The association supports regional and local mutual insurance companies on main streets across America and many of the country's largest national insurers. NAMIC member companies write $268 billion in annual premiums. Our members account for 59 percent of homeowners, 46 percent of automobile, and 29 percent of the business insurance markets.

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NAMIC ISSUE ANALYSIS

KEY TAKEAWAYS

- While completely autonomous vehicles remain decades away, cars are being developed and sold today in which the driver and the systems in the car share driving tasks.
- These conditional automation/dual control, or CADC, vehicles are complex and vary model to model, with continuous upgrades and modification being made in real time over the air.
- There is a serious lack of understanding of these CADC vehicles, which directly impedes consumer confidence, effective regulation, and the development of these vehicles.
- NAMIC proposes the need for standards that define what the CADC vehicles can and cannot do before they are operated on the public roads, which could greatly increase consumer confidence, provide more protection to developers, help guide regulators, and enable law enforcement and insurers to understand and mitigate crashes.

THE STATE OF AUTOMATED DRIVING SYSTEMS TODAY

There are tremendous efforts underway to develop and deploy automated driving systems. An ADS is a complex computer and mechanical system that gathers information from the environment; filters and interprets that information; chooses driving operations; and initiates mechanical actions to perform those driving operations.

Many ADS developers are actively engaged today in developing vehicles in which some of the dynamic driving tasks of the vehicle – the real-time operational and tactical functions required to operate a vehicle – can only be controlled by the ADS of the vehicle. The Society of Automotive Engineers has created categories of automated driving levels that is widely accepted today.

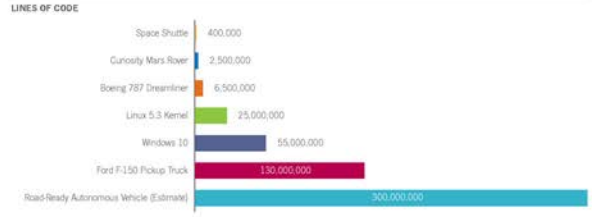


Today, and possibly for a long time to come, the full driving task – SAE Levels 4 and 5 – is too complex an activity to be fully formalized as a sensing-acting robotics system that can be explicitly solved through model-based and learning-based approaches in order to achieve full unconstrained vehicle autonomy.[1]

[1] MIT Advanced Vehicle Technology Study: Large-Scale Naturalistic Driving Study of Driver Behavior and Interaction with Automation, available at https://arxiv.org/pdf/1711.06976.pdf.

- "Ford had overestimated the arrival of autonomous vehicles. At best, we can expect a driverless vehicle that operates within a small, geographically restricted area of a city, like a bus crawling back and forth in a restricted lane at an airport. Anything more is out of the question." Jim Hackett, Ford CEO
- The technology won't be ubiquitous for decades and driverless vehicles will always have constraints. Self-driving cars will require driver assistance for many years to come. Can't envision a day when the technology operates in all weather conditions and without some sort of "user interaction." John Krafcik, Waymo CEO
- "Level 5 will never happen globally. This will only be the case in very few cities." Thomas Sedran, VW CEO
- "The driver can't come out of cars for many years, if not more than a decade." Adam Jonas, Morgan Stanley

A primary impediment to the development and deployment of autonomous vehicles is their mind-boggling complexity and risk, starting with an extremely large amount of computer coding necessary for these vehicles. "[L]et's next look at the average number of defects per 1,000 lines of code, for which there is ample data in various analyst reports: we see up to 50 defects, thereof about ten critical defects, per 1,000 lines of code. Even if only 1% of these were to impact cyber security, our AV would hit the road with an estimated 30,000 cyber defects hidden in its software guts."[2]



Source: NASA, Forbes, Linux, Microsoft, Frost & Sullivan, and BCG Analysis

However, car companies – or original equipment manufacturers, as they are known – are building and offering cars today in which the dynamic driving tasks of the vehicle can be controlled at times by the vehicle and at times by the occupant. These conditional automation/dual-control cars can be as relatively simple as the widely used automatic braking, variations of which include:[3]

[2] Stefan A. Deutscher in "Cyber resilience will make or break the dream of autonomous vehicles at scale," Automotive World, October 7, 2019, at https://www.automotiveworld.com/articles/cyber-resilience-will-make-or-break-the-dream-of-autonomous-vehicles-at-scale/.
[3] Guide to Automatic Emergency Braking, Consumer Reports, August 5, 2019, at https://www.consumerreports.org/car-safety/automatic-emergency-braking-guide/.

- Forward Automatic Emergency Braking: Brakes are automatically applied to prevent a collision or reduce impact force while the car is traveling forward.
- Rear Automatic Emergency Braking: Brakes are automatically applied to prevent a collision or reduce impact force while the car is traveling in reverse.
- Automatic Emergency Braking with Pedestrian Detection: Brakes are automatically applied to prevent a collision or reduce impact force with pedestrians or bicyclists while the car is traveling forward.
- City Speed Automatic Emergency Braking: Brakes are automatically applied to prevent a collision or reduce impact force at city speeds, typically 50 mph and below.
- Highway Speed Automatic Emergency Braking: Brakes are automatically applied to prevent a collision or reduce impact force at highway speeds, above 50 mph.

These OEMs are building and selling cars that perform more and more dynamic driving tasks. Perhaps the best known is the Tesla Autopilot that "enables your car to steer, accelerate and brake automatically within its lane."[4] Cadillac Super Cruise claims to offer "hands-free driving on compatible highways," "maintain a selected following gap between you and the detected vehicle ahead," and "help keep you traveling in your lane."[5] Audi reportedly will be the first automaker to offer a car that can safely control itself, but still needs a human available to take over if, say, the weather turns inclement or the lane lines disappear.[6]

In November 2019 testimony before the United States Senate Committee on Commerce, Science, and Transportation, Robert Sumwalt, board chairman of the National Transportation Safety Board, noted that one of the main sources of confusion in discussions about AVs is the language used in the auto industry and by researchers and regulators compared to what is used by the general public. Industry, regulators, and academics frequently use the six-level SAE automation taxonomy as a reference point when discussing vehicle capabilities and operator responsibilities, but Sumwalt maintained that the SAE automation levels may not be easily relatable to the general public, and the terms used by vehicle manufacturers to market their partial-driving automation systems can add to public confusion about the degree of automation in the production-level vehicles now available.[7]

It is important to note that these and other advanced driving assistance features specify that they do not substitute for the driver's responsibility to operate the vehicle in a safe manner; that the driver should remain attentive to traffic, surroundings, and road conditions at all times; and that visibility, weather, and road conditions may affect feature performance. Additionally, some of the driving automated systems offered today have proven to be far less effective than advertised.[8] Although much attention and federal effort have been focused on highly automated SAE Level 3–5 vehicles, NTSB's Sumwalt advised that of equal and more immediate concern should be the current deployment of partial-driving automation systems on our nation's highways.[9]

[4] Future of Driving. Tesla. at https://www.tesla.com/autopilot
[5] https://www.cadillac.com/world-of-cadillac/innovation/super-cruise
[6] Americans Can't Have Audi's Super Capable Self-Driving System, Wired. May 15, 2019. at https://www.wired.com/story/audi-self-driving-traffic-jam-pilot-ai8-2019-availability/
[7] Testimony of The Honorable Robert L. Sumwalt, III, chairman, National Transportation Safety Board, before the Committee on Commerce, Science, and Transportation, United States Senate hearing: "Highly Automated Vehicles: Federal Perspectives on the Deployment of Safety Technology," pages 1-3 at https://www.commerce.senate.gov/services/files/B0EF39B5-DE24-40AA-A870-D6CF0E005033.
[8] Automatic emergency braking systems with pedestrian detection technology in some late model vehicles perform inconsistently and proved to be completely ineffective at night, new 2019 research from AAA reveals. https://media.aaa.com/public-affairs/press-release/?id=84ff6a49-e645-41e9-92a9-cbd479ba1eb8.
[9] Sumwalt testimony, page 5.

While CADC vehicles are certainly a logical step in technological development, different OEMs will offer various features with diverse functionality operated under assorted conditions and limitations. This wide-ranging variety of CADC vehicles results in significant safety and liability risks.

In a CADC vehicle, a human occupant will be required under varying conditions to assume control under expected conditions, such as leaving a highway to small side roads, as well as under emergency conditions. One of the major perceived benefits of automated vehicles is enabling occupants to be partially disengaged from the driving operations, allowing them to rest, relax, or perform other functions. They are only partially disengaged because control of the vehicles can and will be handed over to them in defined[10] and emergency situations. Prior to and during these driving function handover situations, the human driver is expected to watch and understand all the vehicle's actions, but also be available and prepared to resume vehicle-specific manual control in both defined conditions as well as situations that the vehicle cannot handle. Although testing of more autonomous prototype vehicles has taken place in several cities, these vehicles have had safety drivers behind the wheels to monitor the vehicles and be ready to take over at the first sign of trouble.

This will require that the human driver, perhaps engaged in non-driving activities, remain vigilant to driving conditions. It would be unreasonable to expect people disengaged from the driving task to resume control of the vehicle immediately, but it is equally impracticable to create a handover system that takes an undue length of time once the vehicle indicates the intention of handing back control to the driver. This handover period will vary from function to function and from vehicle to vehicle.

THE PROBLEM – NOT KNOWING WHAT CADCS DO/DON'T DO

Proponents of automated vehicle technology often cite the 2015 NHTSA Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey[11] that found driver operations to be the critical reason for 94 percent of the crashes reviewed. Those driver operations were broadly classified into recognition errors, decision errors, performance errors, and non-performance errors. Recognition error, at 41 percent, was the most frequently assigned critical reason. Decision error accounted for about 33 percent of the crashes, and in about 11 percent of the crashes, the critical reason was performance error with other driver errors recorded as critical reasons for about 8 percent.

However, there are two certainties in which we can be confident. First, CADC vehicles will be involved in crashes; no system is 100 percent safe, and these vehicles have special risks. Second, there will be many questions after crashes of CADC vehicles as to whether the system or the driver was in control of the vehicle leading up to the crash.

The lack of understanding of CADC capabilities and limitations increases safety risks. It might not be immediately apparent who controls the vehicle or whether vehicle control and supervision are shared between the computer (the vehicle) and the human operator.[12] Mismatches among a designer's intent for how systems should be used, what the interfaces should communicate to drivers about those systems, and how drivers should use that information when operating the vehicle result in driver misuse and overreliance on the CADC.[13] When the operator does not understand the capabilities and limitations

[10] For example, leaving a highway and entering a back road in an SAE Level 4 vehicle
[11] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115
[12] Sumwalt testimony, page 4.
[13] Effects of training and display content on Level 2 driving automation interface usability, Insurance Institute for Highway Safety, June 2019. https://www.ihs.org/api/datastoredocument/bibliography/2191.

of a CADC, the operator may not even know when he/she should exercise control. "Poor system limitation comprehension appears to hinder the ability to detect system inactivity when the system encounters situations that it cannot handle, which emphasizes the need for more intuitive interface communication strategies about system functionality and when drivers need to intervene."[14]

DEFINING WHAT CADCS DO/DON'T DO

In order to fully understand a crash involving a CADC vehicle, it is important to understand the designed capabilities and limitations of the CADC vehicle and how and when driving operations were engaged or disengaged leading up to the crash. Combining what the CADC vehicle was designed to do with what the CADC vehicle actually did leading up to the crash will determine whether the human operator or the vehicle's operating system was responsible for the crash.

According to Sumwalt, "As more manufacturers deploy driving automation systems on their vehicles, to improve system safety, it will be necessary to develop detailed information about how the active safety systems performed during, and how drivers responded to, a crash sequence. Manufacturers, regulators, and crash investigators all need specific data in the event of a system malfunction or crash."[15]

It is crucial for the insurance industry to consult with OEMs, tech companies, ride-sharing companies, law enforcement groups, legislators, and regulators to develop a broad outline set of questions that help define the answers needed. The following queries developed by NAMIC provide the backbone for a framework to provide such answers and are illustrated in Appendix I to this paper.

- Can a CADC vehicle control any driving operations (steering, braking, acceleration)?
- Were the vehicle driving operation controls engaged?
- Did the vehicle allow/require occupant control?
- Was the occupant required or notified to take control?
- Was the occupant made aware of all operational domains and constraints?
- Was it reasonable for the occupant to take control?
- Did the control that the operator assumed – or should have assumed – (steering, braking, acceleration) cause or contribute to the crash?

Each of these questions can be addressed in more detail by a series of data points requested and can be used to develop Responsibility Assessment Standards for CADC Vehicles. The purpose of a set of Responsibility Assessment Standards for CADC Vehicles is to enable drivers, OEMs, insurers, and law enforcement to better understand whether the ADS of the vehicle or the occupant was responsible for the crash.

[14] Ibid.
[15] Sumwalt testimony, page 9.

Defining the operational design functions of the vehicle will provide a flexible system that will allow for CADC developments that may be unforeseen. Understanding the operational design of the CADC will be most important since the CADC will evolve in ways that are almost impossible to predict today. Consider the Tesla Smart Summon feature. The California Department of Motor Vehicles has reportedly determined that the combination of Smart Summon and the car's robot system doesn't count as "autonomous technology" that requires a permit and safety features because the car is "under the control" of the person summoning his/her car via a smartphone. As developments in autonomous and CADC vehicles get more complex and novel, the underlying key will be to define how operational control of driving tasks are designed to be allocated, shared, excluded, and required.

Insurance Institute for Highway Safety research in 2019 indicates that consumers will likely look for information on the use of automated and assisted driving systems. While the owner's manual was cited as the primary source of information on how to use the automated driving systems by more than half of respondents to an IIHS survey, these results show that respondents would consult a variety of sources, including the OEM website (60 percent) and consumer information websites (38 percent).[16] Another 2019 study by researchers from the IIHS and the Massachusetts Institute of Technology's AgeLab found that, for the most part, drivers use the technology as it was intended.[17]

It is important to note that data points sought from OEMs in Responsibility Assessment Standards should be crafted with a keen consideration of the proprietary information that OEMs have and need to protect. The data sought should not probe into the mechanics or details of how functionality is achieved, but rather what the OEM has designed and built the CADC to perform and the limitations of that performance. The questions asked in this paper are designed to avoid approaching proprietary information or confidential business information.

One the biggest impediments to the deployment of CADC vehicles is public wariness of automated vehicles. Based on recent studies, public confidence in "self-driving" cars is low.[18] Providing more specific information about what each model of CADC vehicle is designed to do will enable consumers to better understand and accept their responsibilities in these vehicles.

Increasing confidence in CADC technology through access to more and better information of specific capabilities and limitations of a vehicle could enhance the safe operation of these vehicles and prepare consumers for higher levels of automation in the future. By providing clear guidance to operators of CADC vehicles and ensuring the understanding and acceptance by operators, an OEM can also better manage its risk and liabilities for crashes.

The lack of this same information has been an impediment to the further development and implementation for clear federal and state regulations for the deployment of CADC vehicles. By making this information widely available without government regulations, OEMs can provide regulators with the assurances they need but retain the flexibility to modify disclosures to address upgrades and revisions. False or misleading information will remain subject to existing civil and criminal sanctions.

[16] "What's in a name? Drivers' perceptions of the use of five SAE Level 2 driving automation systems, Insurance Institute for Highway Safety, June 2019 https://www.iihs.org/api/datastoredocument/bibliography/2190
[17] Is automation used where it's intended? Insurance Institute for Highway Safety, https://www.iihs.org/news/detail/is-automation-used-where-its-intended.
[18] A 2019 Reuters/Ipsos poll found half of U.S. adults think automated vehicles are more dangerous than traditional vehicles operated by people, and more than 60 percent of respondents would not pay more to have a self-driving feature on their vehicle. Americans still don't trust self-driving cars, Reuters/Ipsos poll finds, at https://www.reuters.com/article/us-autos-selfdriving-poll/americans-still-dont-trust-self-driving-cars-reuters-ipsos-poll-finds-idUSKCN1R20QS. A 2018 poll by J.D. Power and NAMIC found that 42 percent said they would never ride in a fully automated vehicle. AAA reports that more than 70 percent of Americans are afraid to ride in a self-driving car, an increase from 63 percent in 2017. Three in Four Americans Remain Afraid of Fully Self-Driving Vehicles, at https://newsroom.aaa.com/2019/03/americans-fear-self-driving-cars-survey/.

Along those same lines, having detailed and current information on specific CADC vehicle capabilities and limitations would be of benefit to law enforcement and traffic officials who will need to understand when human drivers are required to be focused on driving operations, as well as when investigating crashes involving CADC vehicles.

Operators of CADC vehicles will need insurance, and this information will enable insurers to better gauge relative risk levels of different CADC vehicles and determine coverage responsibility in crashes of CADC vehicles. Insurance for these vehicles today is limited and costly; as evidenced by Tesla's need to create its own insurance company.[19]

NEXT STEPS

NAMIC has worked with various stakeholders to develop proposed Responsibility Assessment Standards for conditional automation or dual control vehicles for wider consideration and refinement that will serve as a platform for further development and adoption, as seen in Appendix I. The acceptance of a platform by all industries will promote the development and deployment of safer vehicles and ensure mutual accountability. Most likely, the standards will continue to evolve with the development of CADCs and more autonomous vehicles.

When standards are sufficiently refined to meet the needs of the public and relevant stakeholders, the next significant step would be the development of specific logistics in collecting, updating, and widely communicating the information relating to these standards. In general, NAMIC believes that the most workable system would be a voluntary platform in which OEMs use the standards to make information publicly available. This will afford the flexibility that will be needed as CADCs and more autonomous vehicles continue to develop. This will also allow OEMs to use the standards to explain their vehicles, rather than having to comport their vehicles to a rigid regulatory category.

Overall, the goal is to provide consumers access to information that would help them operate safer CADC vehicles. Greater disclosure of CADC capabilities and limitations can help OEMs protect themselves from liability for the improper or misuse of their products. This information will also allow legislators and regulators to better understand CADC and autonomous capabilities and limitations in considering relevant laws and regulations. A flexible and evolving system of information may even elevate the need for less flexible federal and state requirements. Armed with detailed information on a specific vehicle's capabilities and limitations, traffic officers will be able to quickly appreciate when driver behavior is permitted and prohibited. When the inevitable crashes occur, law enforcement and insurers can better assess and address responsibility. Insurance companies can use this current information to provide more and better coverage for CADC vehicles, as well as understand and help mitigate risks from the inevitable crashes.

Entities that choose not to participate would subject themselves to a competitive market disadvantage. Entities that provide inadequate or bad information will be subject to prompt and wide public review, as well as existing civil and criminal liability. A central clearinghouse for the collection, maintenance, and distribution of the information may make sense overall and could provide a level of quality control.

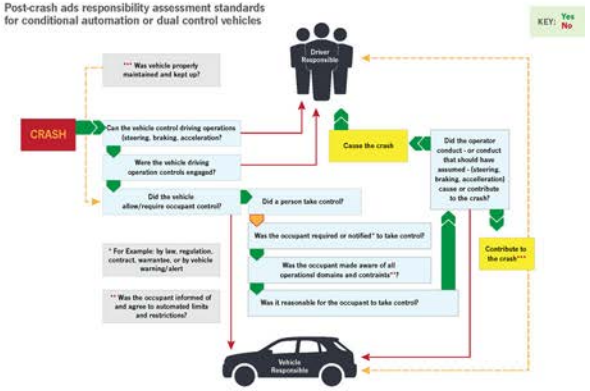
Like CADCs and autonomous vehicles, standards will evolve. With the cooperation of numerous stakeholders, standards such as those proposed in Appendix I can develop for wider consideration to promote the development and deployment of safer vehicles.

[19] How Tesla plans to cut customers' insurance costs: Tap into Autopilot, Automotive News, May 13, 2019, at https://www.autonews.com/finance-insurance/how-tesla-plans-cut-customers-insurance-costs-tap-autopilot

APPENDIX I

RESPONSIBILITY ASSESSMENT STANDARDS FOR CONDITIONAL AUTOMATION OR DUAL CONTROL VEHICLES

Post-crash ads responsibility assessment standards for conditional automation or dual control vehicles



A. CAN THE VEHICLE CONTROL DRIVING OPERATIONS (STEERING, BRAKING, ACCELERATION)?

1) What driving operations is the Automated Driving System ("ADS") of the vehicle designed to control?
   a) Steering
   b) Braking
   c) Acceleration
   d) Other_____

2) Which dynamic driving tasks – the real-time operational and tactical functions required to operate a vehicle in traffic – is the vehicle's ADS designed to control?

a) Lateral vehicle motion control via steering (operational)

b) Longitudinal vehicle motion control via acceleration and deceleration (operational)

c) Monitoring the driving environment via object and event detection, recognition, classification, and response preparation (operational and tactical)

d) Object and event response execution (operational and tactical)

e) Maneuver planning (tactical)

f) Enhancing conspicuity via lighting, signaling, gesturing, etc. (tactical)

g) Other _____

3) What are the operational design domains of the vehicle – i.e. the specific conditions under which the ADS of vehicle is designed to control driving operations?

a) Environmental

b) Geographical

c) Time-of-day restrictions

d) Requisite presence of traffic or roadway characteristics

e) Requisite absence of traffic or roadway characteristics

f) Other _____

4) What are the operational design limitations and constraints – the conditions under which the ADS of vehicle is not designed to control driving operations?

a) Environmental

b) Geographical

c) Time-of-day restrictions

d) Requisite presence of traffic or roadway characteristics

e) Requisite absence of traffic or roadway characteristics

f) Other_____

5) What data on the functions above are recorded, retained, and/or reported?

6) Where is the recorded, retained, and/or reported data accessible?

7) How is the recorded, retained, and/or reported data accessible?

8) For what period is the recorded, retained, and/or reported data accessible?

9) Who is authorized to access the recorded, retained, and/or reported data?

B. HOW ARE THE VEHICLE'S ADS DRIVING OPERATION CONTROLS DESIGNED TO BE ENGAGED?

1) What driving operations are the vehicle's ADS designed to control?

a) Steering

b) Braking

c) Acceleration

d) Other_____

2) Are the ADS of the vehicle driving operations controls designed to be engaged automatically or by the occupant?

	Automatic Engagement	Automatic Disengagement	Human Engagement	Human Disengagement
Steering				
Braking				
Acceleration				
Other				

3) What actions are required in the vehicle design for the ADS driving operations controls designed to be engaged or disengaged?

	Automatic Engagement	Automatic Disengagement	Human Engagement	Human Disengagement
Steering				
Braking				

4) What preconditions, if any, is the ADS designed to require for the vehicle driving operations for controls to be engaged or disengaged?

	Automatic Engagement	Automatic Disengagement	Human Engagement	Human Disengagement
Steering				
Braking				

5) Is the system designed to notify occupants notified of the driving operations controls that are engaged and not engaged by the ADS of the vehicle?

a) No

b) Yes – How?

6) Is the system designed to notify occupants notified of the Operational Design Domains and limitations of the ADS of the vehicle?

a) No

b) Yes – How?

7) Is the system designed to notify occupants of the vehicle operation outside the Operational Design Domains?

a) No

b) Yes – How?

8) What data on the functions above are recorded, retained, and/or reported?

9) Where is the recorded, retained and/or reported data accessible?

10) How is the recorded, retained, and/or reported data accessible?

11) For what period is the recorded, retained, and/or reported data accessible?

12) Who is authorized to access the recorded, retained, and/or reported data?

C. HOW IS THE VEHICLE DESIGNED TO ALLOW OR REQUIRE OCCUPANT CONTROL?

1) What driving operations is the vehicle's ADS designed to control?

a) Steering

b) Braking

c) Acceleration

d) Other_____

2) When the vehicle ADS is controlling any driving operation, is the ADS designed to allow occupants to mutually control that same driving operations?

ADS Control Is Engaged	Steering	Braking	Acceleration	Other
Occupant Can Steer				
Occupant Can Brake				
Occupant Can Accelerate				

3) Which dynamic driving tasks of ADS driving operations controls are designed to be **voluntarily** disengaged by occupants?

a) Steering

b) Braking

c) Acceleration

d) Other_____

4) Which dynamic driving tasks of ADS driving operations controls are designed to be disengaged by the ADS and **required** to be reengaged by occupants?

a) Steering

i) Conditions:

b) Braking

i) Conditions:

c) Acceleration

i) Conditions:

d) Other_____

i) Conditions:

5) SAEJ3016 8.3 provides that level 4 or 5 vehicles may have "an emergency stop lever." Does this vehicle have this feature or its equivalent?

a) If so, under what conditions is the vehicle designed to allow the feature to be engaged?

b) How is the vehicle designed for the occupant to be required, allowed, limited, or prohibited to engage the feature?

6) What data on the functions above are recorded, retained, and/or reported?

7) Where is the recorded, retained, and/or reported data accessible?

8) How is the recorded, retained, and/or reported data accessible?

9) For what period is the recorded, retained, and/or reported data accessible?

10) Who is authorized to access the recorded, retained, and/or reported data?

D. HOW IS VEHICLE DESIGNED TO ALLOW OR REQUIRE AN OCCUPANT TO TAKE CONTROL OF DRIVING OPERATIONS?

ALLOW

1) Is the vehicle designed to allow an occupant to voluntarily disengage **all** ADS driving control and assume manual control of driving operations?
   a) How is the vehicle designed to allow an occupant to voluntarily disengage **all** ADS driving control and assume manual control of driving operations?

2) Is the vehicle designed to allow an occupant to voluntarily disengage **some but not all** ADS driving control and assume manual control of driving operations?
   a) How is the vehicle designed to allow an occupant to voluntarily disengage **some but not all** ADS driving control and assume manual control of driving operations?

RESTRICT

3) Is the vehicle designed to restrict an occupant from voluntarily disengaging **all** ADS driving control and assuming manual control of driving operations?
   a) How is the vehicle designed to restrict an occupant from voluntarily disengaging **all** ADS driving control and assuming manual control of driving operations?

4) Is the vehicle designed to restrict an occupant from voluntarily disengaging **some but not all** ADS driving control and assuming manual control of driving operations?
   a) How is the vehicle designed to restrict an occupant from voluntarily disengaging **some but not all** ADS driving control and assuming manual control of driving operations?

PROHIBIT

5) Is the vehicle designed to prohibit an occupant from voluntarily disengaging **all** ADS driving control and assuming manual control of driving operations?
   a) How is the vehicle designed to prohibit an occupant from voluntarily disengaging **all** ADS driving control and assuming manual control of driving operations?

6) Is the vehicle designed to prohibit an occupant from voluntarily disengaging **some but not all** ADS driving control and assuming manual control of driving operations?
   a) How is the vehicle designed to prohibit an occupant from voluntarily disengaging **some but not all** ADS driving control and assuming manual control of driving operations?

7) Is the vehicle designed so that all vehicle driving operation controls taken back by the occupant are in compliance with the relevant FMVSS requirements?

8) Is the vehicle designed for an occupant who has taken control of driving operations to give vehicle driving operations control back to the ADS?
   a) How is the vehicle designed so that an occupant who has taken control of driving operations can give vehicle driving operations control back to the ADS?
   b) Is the vehicle designed to inform the occupant as to which controls of driving operations the ADS have and have not resumed?

9) Is the vehicle designed to enable the ADS to take vehicle driving operations control from an occupant without the occupants' consent?
   a) How is the vehicle designed to enable the ADS to take vehicle driving operations control from an occupant without the occupants' consent?

10) What data on the functions above are recorded, retained, and/or reported?

11) Where is the recorded, retained and/or reported data accessible?

12) How is the recorded, retained, and/or reported data accessible?

13) For what period is the recorded, retained, and/or reported data accessible?

14) Who is authorized to access the recorded, retained, and/or reported data?

E. WAS THE OCCUPANT REQUIRED OR NOTIFIED TO TAKE CONTROL OF ANY DRIVING OPERATIONS?

1) Is the vehicle designed to disengage **all** ADS driving control and require an occupant to assume manual control of driving operations?
   a) How is the vehicle designed to disengage **all** ADS driving control and require an occupant to assume manual control of driving operations?

2) Is the vehicle designed to disengage **some but not all** ADS driving control and require an occupant to assume manual control of driving operations?
   a) How is the vehicle designed to disengage **some but not all** ADS driving control and require an occupant to assume manual control of driving operations?

3) Is the vehicle designed to inform the occupant of the driving operations for which the occupant has taken or been required to take control?
   a) How is the vehicle designed to inform the occupant of the driving operations for which the occupant has taken or been required to take control?

4) Is the vehicle designed to verify that the occupant required to assume manual control of driving operations has any specific knowledge, ability, and/or acceptance of that driving operation control responsibility?
   a) How is the vehicle designed to verify that the occupant required to assume manual control of driving operations has any specific knowledge, ability, and/or acceptance of that driving operation control responsibility?

5) If there are multiple occupants in the vehicle, is the vehicle designed to verify that any or all of the occupants have the knowledge, ability, and acceptance of driving operation control responsibility?
   a) How is the vehicle designed to verify that any or all of the occupants have the knowledge, ability, and acceptance of driving operation control responsibility?
   b) Is the vehicle designed to continue to operate under the ADS without verified knowledge, ability, and acceptance of any occupant driving operation control responsibility?

6) Is the vehicle designed to provide any information or instructions to occupants of driving operation control for which an occupant may be responsible?
   a) How are these instructions provided?
   b) How do occupants verify knowledge and/or ability for acceptance of driving operation control responsibility?
   c) How do occupants accept driving operation control responsibility?

7) What data on the functions above are recorded, retained, and/or reported?

8) Where is the recorded, retained, and/or reported data accessible?

9) How is the recorded, retained, and/or reported data accessible?

10) For what period is the recorded, retained, and/or reported data accessible?

11) Who is authorized to access the recorded, retained, and/or reported data?

F. WAS THE OCCUPANT MADE AWARE OF ALL OPERATIONAL DOMAINS AND CONSTRAINTS?

1) Is the vehicle designed to inform occupants of any and all occupant responsibilities?
   a) How is the vehicle designed to inform occupants of any and all occupant responsibilities?

2) Is the vehicle designed to inform occupants as to what the ADS can do and what the ADS will not do, and under what conditions and limitations?
   a) How is the vehicle designed to informed occupants of the ADS operational domains and constraints?

3) Is the vehicle designed to inform occupants of any notifications or warnings that the occupants may be given during driving operations and what the notifications mean?
   a) How is the vehicle designed to inform occupants of any notifications or warnings that the occupants may be given during driving operations and what the notifications mean?

4) Is the vehicle designed to require occupants to verify that they understand and accept the ADS the information in 1), 2), and 3) prior to use of the vehicle?
   a) How is the vehicle designed to require occupants to verify that they understand and accept the ADS the information in 1), 2), and 3) prior to use of the vehicle?

5) What data on the functions above are recorded, retained, and/or reported?

6) Where is the recorded, retained, and/or reported data accessible?

7) How is the recorded, retained, and/or reported data accessible?

8) For what period is the recorded, retained, and/or reported data accessible?

9) Who is authorized to access the recorded, retained, and/or reported data?

G. HOW AND WHEN CAN THE OCCUPANT TAKE CONTROL?

1) Voluntary Occupant Assumption of Control
   a) Which controls of driving operations is the vehicle designed to allow the occupant to voluntarily engage or disengage from the ADS during driving operations?
   b) Which controls of driving operations is the vehicle designed to **not** allow the occupant to voluntarily engage or disengage from the ADS during driving operations?
   c) What preconditions, if any, is the vehicle designed to require for driving operations controls to be voluntarily engaged or disengaged by an occupant?
   d) Are there conditions in which the vehicle is designed to not allow the occupant to voluntarily assume control of driving operations?
   e) What actions is the vehicle designed to require from an occupant for driving operation controls to be engaged or disengaged by an occupant?
   f) How much time is required by the vehicle to allow the occupant to voluntarily assume control of driving operations?

2) Vehicle Requires Occupant Assumption of Control

a) Under what conditions is the vehicle designed to **require** an occupant to assume any control of driving operation controls?

b) If the ADS require an occupant to assume control, how is the vehicle designed to notify an occupant of which driving operations controls to take over?

c) How much time, after the occupant is alerted by the ADS for the occupant to assume control, is the vehicle designed to require the occupant to assume control of driving operations?

d) How is the vehicle designed to determine/verify whether the occupant has assumed control of the driving operation?

e) What is the vehicle designed to do if the occupant does not assume control of the driving operation?

3) What data on the functions above are recorded, retained, and/or reported?

4) Where is the recorded, retained, and/or reported data accessible?

5) How is the recorded, retained, and/or reported data accessible?

6) For what period is the recorded, retained, and/or reported data accessible?

7) Who is authorized to access the recorded, retained, and/or reported data?

H. DID THE CONTROL THAT THE OPERATOR ASSUMED – OR SHOULD HAVE ASSUMED – (STEERING, BRAKING, ACCELERATION) CAUSE OR CONTRIBUTE TO THE CRASH?

Immediately prior to the crash and at the time of the crash, insurers and law enforcement will want to know the following:

1) Which driving operation controls to be controlled exclusively by the ADS is the vehicle designed to record?

2) Which driving operation controls to be controlled by a human driver exclusively is the vehicle designed to record?

3) Is the vehicle designed to record when the human operator retained all driving operations from the beginning of the operation of the vehicle?

4) Is the vehicle designed to record when the ADS retained all driving operations from the beginning of the operation of the vehicle?

5) Is the vehicle designed to record when a human operator turned any or all driving operation control over to the ADS?

6) Is the vehicle designed to record when the ADS turned any or all driving operation control over to the human driver?

7) Is the vehicle designed to record when the ADS notified an occupant that the ADS was required to turn any or all driving operation control over to the human driver?

8) Is the vehicle designed to record when a human driver took over or attempted to take over driving operation controls from the ADS?

9) Were there controls of driving operations that the human operator was required or recommended to assume that the human operators did not assume?

10) What data on the functions above are recorded, retained, and/or reported?

11) Where is the recorded, retained, and/or reported data accessible?

12) How is the recorded, retained, and/or reported data accessible?

13) For what period is the recorded, retained, and/or reported data accessible?

14) Who is authorized to access the recorded, retained, and/or reported data?

NAMIC ISSUE ANALYSIS

NATIONAL ASSOCIATION OF MUTUAL INSURANCE COMPANIES

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NAMIC
NATIONAL ASSOCIATION OF
MUTUAL INSURANCE COMPANIES

May 18, 2021

The Honorable Janice D. Schakowsky, Chair
Subcommittee on Consumer Protection and Commerce
House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable Gus M. Bilirakis, Ranking Member
Subcommittee on Consumer Protection and Commerce
House Committee on Energy and Commerce
2322 Rayburn House Office Building
Washington, DC 20515

Dear Chair Schakowsky and Ranking Member Bilirakis,

On behalf of the Transportation Trades Department, AFL-CIO (TTD), I would like to submit the below *Labor Principles for Autonomous Vehicle Legislation* to the Committee. These principles reflect the positions of both TTD and the International Brotherhood of Teamsters on automated vehicle policy and substantively inform the testimony I will give at today's hearing.

Sincerely,



Greg Regan
President

Labor Principles for Autonomous Vehicle Legislation

Autonomous vehicles (AVs) are often touted for their potential to increase safety, improve transportation access, produce environmental benefits, and create new American jobs in the manufacturing and technology sectors. Yet, for all the benefits touted by its cheerleaders, we too often overlook the serious impacts AVs will have on workers, safety, and equity if not properly regulated by the federal government. Reports estimate that as many as 3 million transportation workers may lose their jobs, face a severe degradation of their wages and bargaining power, or otherwise have their job functions fundamentally altered by self-driving vehicle technology.

A deluge of reports about accidents involving Waymo, Tesla, Uber, and other automated vehicle makers and operators should give pause to our policy leaders who have bought in to the argument that it's time to remove barriers to widespread deployment. There have been many accidents involving AVs resulting in multiple deaths and serious injuries. These accidents occurred largely because of the unsafe waiver, exemption, and safety self-reporting regulatory environment propelled by the irresponsible decisions of the Trump administration and its hands-off approach to regulation. And serious questions have been raised about the extent to which AVs will truly improve equity, access, and environmental outcomes.

History tells us that strong unions and worker engagement are essential to mitigate harms inherent in rapid changes to industries. Relatively high union density in the transportation workforce will play an important role in assisting this sector—namely through the opportunities to manage change that the collective bargaining process brings. At the same time, federal regulations that establish a high bar for safety, worker training, assistance and transition policies, and assurances that transportation services will meet a basic public service standard must be in place.

Congress will play a key role in determining whether these technological changes will be viewed by millions of Americans as positive progress or a dangerous upending of the status quo. The following represents transportation labor's key priorities that Congress must consider as the foundation of any legislative framework for the testing, deployment, and regulation of AVs:

1) Put Safety first

– **Abide by the safety framework developed in the Joint AV Tenets introduced by Advocates for Highway and Auto Safety**[1]. Truck drivers, bus operators, and thousands

[1] https://saferoads.org/autonomous-vehicle-tenets/

of other transportation workers will be sharing the road with AVs if widespread use is authorized for years to come. The performance of AVs will be of paramount importance to safety throughout our entire transportation network for both system users and our members, whether they operate on the roads and transit systems or work in other roles with AVs such as performing maintenance or loading the vehicle.

The Joint AV Tenets were developed by safety advocates and equity partners, as well as our unions. All workers deserve to know that an autonomous car or bot driving next to them is safe enough to be on the same road or in the worksite. Any legislation developed by Congress or regulations promulgated by the U.S. Department of Transportation (DOT) must strengthen the development of future Federal Motor Vehicle Safety Standards (FMVSS) for AVs and mandate tests of key components (i.e., a vision test) on any system whose performance is inseparable from the safe deployment of that vehicle. Congress and the federal government must focus on strong safety regulation and enforcement rather than hands-off policies sought out by the AV industry, such as waivers and exemptions that clear the way for widespread piloting and deployment of AVs.

2) Define the scope appropriately

– Continue the carveout for vehicles over 10,000 pounds. Heavy commercial motor vehicles offer a laundry list of unique operational challenges which will greatly complicate the introduction of AVs into that space. Frontline commercial vehicle operators do not just drive, they have unique training to react to adverse situations and an array of challenges that an AV is ill equipped to handle without a human on board. Small vehicles bear little resemblance to the design or operational realities of buses, trucks, or heavy-duty construction vehicles and should not be considered under the same regulatory framework as personal cars or fleets of small vehicles delivering individual packages. The enormous workforce concerns surrounding the use of these larger vehicles also necessitates their separate consideration. We applaud Congress for recognizing these challenges and excluding vehicles over 10,000 pounds in every AV bill that has been introduced to date.

– Sub-10,000 pound AVs providing passenger service must have a human driver. The operators of passenger service vehicles are critical to the safe and accessible delivery of transportation services, both for the passengers and for all other road users. Any legislation or regulations designed to facilitate the deployment of AV technologies must mandate an operator on board who is available to take over operations, regardless of how far AV technology develops. The presence of an operator ensures that someone is there to respond to emergencies and summon first responders, facilitate ADA needs, prevent vehicles from becoming magnets for crime, and critically, to provide a backup in the case of technological failure.

– Include delivery bots and other alternative-design small vehicles. Any AV legislation must also cover alternative design vehicles such as delivery bots. Any vehicle that is under the 10k pound threshold that will travel on public roads must be properly regulated and not made exempt from the safety mandates embodied in any AV legislation. We have already seen these smaller AV vehicles receive special treatment (including waivers from safety

requirements) from regulators simply because they are lighter and travel at lower speeds. These vehicles should also be subjected to proper federal scrutiny and safety requirements.

3) Create a robust workforce plan and move it in conjunction with any AV bill

The impact that AVs will have on workers is not yet fully known. But we know that for many in this industry AVs are a labor-saving and labor-replacing technology during a time when our worker support programs are wholly inadequate. We cannot wait to address these issues after the fact. We have a unique opportunity to prepare for and mitigate impacts **before** they happen.

Congress should attack this issue from multiple fronts. With regard to public transportation, legislation should direct comprehensive regulations through the Department of Transportation and its Federal Transit Administration (FTA) that would require workforce impact assessments be conducted jointly by representatives of the frontline workforce and management at any agency utilizing AVs, and the application of transit-related AV labor standards. Moreover, legislation that allows the commercial application of AVs, which may negatively impact public transportation ridership, must also include provisions that create career ladder and apprenticeship programs for transit workers, ensure the manufacture and development of new technologies is done within the U.S., and that new jobs created come with union protections. For private transportation, Congress should examine the impact smaller AVs will have in high-risk industries such as taxicab and rideshare operations, private shuttles, and food/package delivery operations. These reviews should be combined with aggressive policies aimed at mitigating **both** job losses and wage degradation via job retention, just transition, vehicle taxation regimes, allocation of retraining funds for displaced workers, wage supplements, and the restriction on the use of independent contractors throughout the industry. They should also be combined with robust manufacturing standards to ensure that vehicles, components, and engineering work is done in the United States. These rules should be put into place before any widespread deployment or approvals for AVs are granted.

4) Ensure consumer rights, equity, and accessibility are key components of any framework

The AV industry claims broad deployment of this technology stands to help improve access to transportation for disadvantaged populations. But if wrongly implemented, they also risk exacerbating long-standing inequities which have existed across racial, gender, and socioeconomic lines for generations. Professional driving has long been a solid path to the middle class, including for women and people of color. Nearly 40% of professional drivers are non-white and men and women both work as bus operators across the country at about the same rate. Transportation jobs have higher unionization rates than many other professions, and as a result, they pay significantly better than most jobs the same individuals could find in non-driving occupations.[2] Congress must keep these ladders to the middle class intact before and during the eventual introduction of AVs onto our roads or in our transit systems.

[2] http://globalpolicysolutions.org/report/stick-shift-autonomous-vehicles-driving-jobs-and-the-future-of-work/

Our unions also represent many workers who currently provide paratransit for older adults and individuals with disabilities. We know how much of a lifeline these services can be to many individuals and their families. If deployed, AVs must not degrade universal access to these services. Isolated and marginalized communities must share in the benefits of these mobility options. This will require adequate staffing levels to ensure the presence of well-credentialed safety monitors aboard AV-enabled paratransit operations, and assurance these types of services will remain accessible for all.

5) Federal policies must ensure that jobs in AV manufacturing are good jobs

Promoters of AV technology repeatedly make the claim that we are falling behind China and other countries in the development and deployment of automated driving system technologies. But for workers, the lingering question is what would "leading" in this sector even mean for their future employment opportunities? History tells us that without clear federal leadership American manufacturing workers will be the last to benefit from the economic benefits of these technologies. To ensure broadly shared prosperity and that jobs created in AV manufacturing are good jobs here in the US, lawmakers must take clear steps. They must ensure that U.S. government assistance for the development of AV technologies, and federal procurements of AVs or procurements by transit agencies or state and local governments through federal assistance, come with strong Buy American policies and a U.S. Employment Plan or similar procurement standards that ensure the development and use of AVs also benefit communities and lead to good middle-class domestic manufacturing jobs.



Transportation Trades Department, AFL-CIO
A bold voice for transportation workers

TTD MEMBER UNIONS

Air Line Pilots Association (**ALPA**)
Amalgamated Transit Union (**ATU**)
American Federation of Government Employees (**AFGE**)
American Federation of State, County and Municipal Employees (**AFSCME**)
American Federation of Teachers (**AFT**)
Association of Flight Attendants-CWA (**AFA-CWA**)
American Train Dispatchers Association (**ATDA**)
Brotherhood of Railroad Signalmen (**BRS**)
Communications Workers of America (**CWA**)
International Association of Fire Fighters (**IAFF**)
International Association of Machinists and Aerospace Workers (**IAM**)
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers (**IBB**)
International Brotherhood of Electrical Workers (**IBEW**)
International Longshoremen's Association (**ILA**)
International Organization of Masters, Mates & Pilots (**MM&P**)
International Union of Operating Engineers (**IUOE**)
Laborers' International Union of North America (**LIUNA**)
Marine Engineers' Beneficial Association (**MEBA**)
National Air Traffic Controllers Association (**NATCA**)
National Association of Letter Carriers (**NALC**)
National Conference of Firemen and Oilers, SEIU (**NCFO, SEIU**)
National Federation of Public and Private Employees (**NFOPAPE**)
Office and Professional Employees International Union (**OPEIU**)
Professional Aviation Safety Specialists (**PASS**)
Sailors' Union of the Pacific (**SUP**)
Sheet Metal, Air, Rail and Transportation Workers (**SMART**)
SMART-Transportation Division
Transportation Communications Union/ IAM (**TCU**)
Transport Workers Union of America (**TWU**)
UNITE HERE!
United Automobile, Aerospace and Agricultural Implement Workers of America (**UAW**)
United Mine Workers of America (**UMWA**)
United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union (**USW**)

These 33 labor organizations are members of and represented by the TTD



April 27, 2021 **Press Release**

Auto Innovators Announces Driver Monitoring Safety Principles

Washington, DC – April 27, 2021 – The Alliance for Automotive Innovation (Auto Innovators) today unveiled safety principles to proactively address driver monitoring systems for Level 2 vehicles, in which both lane centering and Adaptive Cruise Control (ACC) are simultaneously engaged. These features can help save lives by assisting drivers and reducing the potential for human error that could result in a crash. They are not designed to operate independently of a human driver.

"Through these principles, automakers representing nearly 99 percent of the new vehicles sold in the U.S. have made a forceful and public statement on the importance of effective driver monitoring for Level 2 automated systems," said Auto Innovators President and CEO John Bozzella. "It is critical that consumers learn and understand the benefits—and limitations—of these features to build and improve confidence in these proven safety technologies.

"There is strong and clear interest from our member companies in reiterating the importance of effective driver monitoring systems in Level 2 vehicles to help ensure appropriate driver engagement and improving consumer confidence in driving automation. There is no commercially available 'self-driving' car on American roadways today, which means the driver remains the most important factor in any vehicle," said Bozzella.

"We look forward to working with policymakers and other stakeholders to advance the conversation around Level 2 driver monitoring in a meaningful way," he added.

The principles outlined by Auto Innovators are focused on driver monitoring systems for purposes of determining or inferring when a driver is not paying sufficient attention to the driving environment. The principles are broken down into several key areas, including consumer information, driver monitoring as a standard feature for Level 2 systems, driver warnings, re-engaging the driver, misuse and abuse, and camera-based systems. They incorporate important recommendations from the Insurance Institute for Highway Safety, Consumer Reports, National Transportation Safety Board, and EuroNCAP.

The principles address areas including:

- Consumer information
- Driver warnings
- Reengaging the driver
- Misuse and abuse
- Camera-based systems

Review all the principles in detail here (https://www.autosinnovate.org/drivermonitoring).

Share


ALLIANCE FOR AUTOMOTIVE INNOVATION
POLICY ROADMAP TO ADVANCE AUTOMATED VEHICLE INNOVATION
We are at a pivotal time on the pathway to a cleaner, safer, and smarter transportation future. There is no doubt that Level 3-5 automated vehicles (AVs) are an important component of this future. Focused and sustained leadership from policymakers is required to ensure this technology and its benefits are realized, using the following four-year action plan and 14 policy recommendations.
REFORM REGULATIONS TO ALLOW FOR AV DEPLOYMENT AT SCALE
CREATE A NEW VEHICLE CLASS FOR AVs
CLARIFY APPLICABILITY OF "MAKE INOPERATIVE" PROHIBITION
ESTABLISH A NATIONAL AV PILOT PROGRAM
IMPROVE THE EXEMPTION PETITION PROCESS
RAISE THE CAP ON EXEMPTIONS FOR AVs
EMBRACE INNOVATIVE REGULATORY APPROACHES
HARMONIZE FEDERAL, STATE, AND INTERNATIONAL POLICIES
MAINTAIN TRADITIONAL FEDERAL AND STATE ROLES
COORDINATE STATE AV POLICIES
ALIGN STATE TRAFFIC LAWS
LEAD IN INTERNATIONAL FORUMS
LAY THE FOUNDATION TO ACHIEVE LONGER TERM GOALS
PROMOTE INDUSTRY STANDARDS
BUILD KNOWLEDGE FOR A SAFETY ASSURANCE FRAMEWORK
PREPARE ROADWAY INFRASTRUCTURE FOR AVs
SUPPORT U.S. LEADERSHIP ON AVs

SELF-DRIVING COALITION FOR SAFER STREETS

America Loses Too Many Lives On Our Roads

In 2019, more than 36,000 people died on U.S. roads in vehicular crashes. That's nearly 100 people every day.

- One of the leading causes of death for children and teens
- 1 person dies every 50 minutes from drunk driving
- More than 2,800 lives are lost each year to distracted driving
- Nearly 14% of crashes involve a truck, with 1 in 3 long-haul truck drivers experiencing a serious crash in their career

NHTSA estimates over 90% of motor vehicle crashes are caused by human error:

- Speeding & reckless driving
- Alcohol
- Fatigue
- Distracted driving

Autonomous vehicles offer an opportunity to dramatically improve public safety on U.S. roads and highways.

Safety Is the AV Industry's Top Priority

The AV industry thinks comprehensively and holistically about how best to develop and test this technology. Every simulation, every test on a public road, every rider survey helps the technology to get better and better.

AVs will be safer than other vehicles because:

- AVs don't speed
- AVs are programmed to be "model drivers"
  - Avoid passing vehicles on the right
  - Avoid blocking an intersection
  - Stay out of other drivers' blind spots
  - Cautious with unpredictable movements of cyclists and pedestrian
- AV technology is building toward an ability to predict errors and drive better than humans
- Zero-occupant delivery vehicles reduce the number of people on the road

AV companies submit voluntary safety reports to NHTSA, providing detailed information about the technology and the steps they are taking to maximize safety. Specific safety considerations include:

- Rigorous simulated and real-world testing of all software, hardware, sensors and vehicles
- Compliance with all federal, state and local laws
- Testing under the supervision of trained human safety drivers and ensuring vehicles can always come to a safe stop
- Technology that provides 360-degree views of dynamic and static objects around each vehicle, including other vehicles, pedestrians, cyclists and road infrastructure

On-Road Testing is Crucial to AV Development

The safe and successful development of AVs relies on testing in a wide variety of scenarios, including both computer simulation and real-world testing. The AV industry develops the technology using a combination of computer simulations, closed track testing and public roads. All types of testing are critical to the technology's advancement, but there is no substitute for the data and validation that comes from real-world testing.

Hyperdrive Daily: China Ramps Up its Autonomous Vehicle Development

bloomberg.com/news/newsletters/2021-05-04/hyperdrive-daily-china-ramps-up-its-autonomous-vehicle-development

Nicholas Albanese

Welcome to the Hyperdrive daily briefing, decoding the revolution reshaping the auto world, from EVs to self-driving cars and beyond.

News Briefs

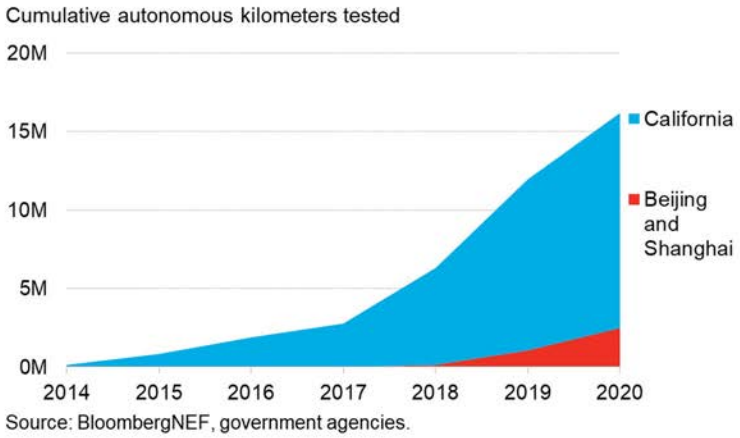
- Auto supplier Infineon estimates about 2.5 million cars won't be made because of the global semiconductor shortage.
- The shortage also means rental car companies are buying used cars at auction.
- India's top carmaker may halve production as it shutters some sales outlets due to the surge of Covid-19 cases.

China Steers the AV Wheel

Hi, it's Nick Albanese here — Colin is off this week. I head up BloombergNEF's Intelligent Mobility research team, which looks at how autonomous vehicles and shared mobility services are scaling up around the world.

Waymo and Cruise are well known for leading the growing pack of U.S. robotaxi developers. The two companies have raised $8 billion and completed over 11 million kilometers (6.8 million miles) of autonomous vehicle testing in California, around 75% of the total there. No doubt, some disillusionment lingers, given various delays. But the industry finally appears to be on the cusp of real deployment: Waymo opened its autonomous ride-hailing service in Phoenix to the public in October and Cruise recently signed a deal to deploy 4,000 robotaxis in Dubai by 2030.

Even so, the U.S. lead in AV development is slipping, as China races to establish itself as the premier testbed for this technology. Since greenlighting AV testing on select public roads in March 2018, BNEF data shows that 27 cities have awarded permits to over 70 companies operating around 600 AVs. Beijing and Shanghai alone – China's two leading cities for AV deployment – have seen over 2.5 million kilometers of AV testing to date. That's about 10% more testing than what U.S. companies completed in California in the same amount of time following the legalization of public road testing.



Source: BloombergNEF, government agencies.

Favorable policy has enabled China's fast progress. Regulators allowed AV developers to start offering passenger rides in June 2019. This January, the Ministry of Industry and Information Technology released a draft policy permitting AV testing on highways. The short-term goal is to commercialize robotaxis, autonomous shuttles and self-driving heavy trucks by 2025. The long-term goal is probably to sell and deploy Chinese AVs abroad, as several Chinese companies already have testing experience in the US. The same is not true for American developers in China.

Baidu is the clear leader for now, with a handful of others catching up: WeRide and AutoX plus ride-hailing operator Didi. Baidu operates China's largest AV testing fleet, with nearly 200 vehicles, and has partnerships with over 100 third parties, including automakers, through its Apollo program.The company's ambitious goals include deploying 3,000 robotaxis in 30 Chinese cities by the end of 2023. (My colleague David Welch wrote about Baidu and other AV leaders in this recent column.)

WeRide – backed by the Renault-Nissan-Mitsubishi Alliance and Nvidia – and AutoX – backed by Alibaba – both have around 70 AVs each. Like some of Baidu's AVs, a few are testing without backup drivers in the driver's seat, a sign of their technological advantage. AutoX even has a robotaxi pilot in Shenzhen that is operating without in-vehicle back-up

drivers or remote operators. Didi operates a fleet of about 40 AVs, but that should increase quickly. The company has raised $800 million for its autonomous driving unit since spinning it off as an independent company in August 2019.

Other vehicle types like trucks also are being developed as self-driving in China. Shanghai, home to the world's largest container port by volume, is working to speed up deployment of autonomous heavy trucks, for example, and companies like SAIC-IVECO Hongyan and newly public TuSimple are already testing some 50 autonomous trucks.

China's fast-growing AV road testing and favorable regulatory environment make it an ideal market for AV deployment. 2021 could be a breakout year for the sector if investment holds steady.

Before You Go



Bolt Technology, which competes with Uber in Europe and Africa, will roll out a new car-sharing pilot program in the Estonian capital of Tallinn. Bolt will expand the program to other cities if the pilot goes as planned, a similar strategy to the rollout out two years ago of the car sharing company's food delivery service.

ALLIANCE FOR AUTOMOTIVE INNOVATION

The Automated Future – What is at Stake?

Leadership in automotive technology has underpinned a century of U.S. economic growth. Maintaining and enhancing U.S. leadership in automotive innovation and manufacturing is not just about the future of the auto industry – it is about the nation's global competitiveness and economic security. The nations that lead the development and adoption of innovative technologies, such as electrification, connectivity, and automation, will also shape supply chains, define global standards and, potentially, reshape the international marketplace



Foreign competitors are moving quickly to close the gap in U.S. leadership in automated vehicles. In recent months, multiple countries have approved deployments of highly automated vehicles (Level 3 and higher), including the launch of a driverless taxi service by Chinese AV developer, Baidu, in Beijing.

Automation and Automated Vehicles (AVs) are central to this transformative moment for personal mobility.

- **Safety:** The National Highway Traffic Safety Administration (NHTSA) has found that 94 percent of car crashes are attributable to human choice or error. Supplementing or even replacing the human driver with advanced sensors and other technology can dramatically decrease the frequency and severity of these crashes. Unlike conventional human drivers, AVs can't get distracted, drive impaired or fall asleep at the wheel.

- **Societal and Economic Benefits:** AVs and new mobility service models also open the door to countless social and economic opportunities, including
    - increased mobility for older adults and people with disabilities,

  - reducing traffic congestion,
  - reducing emissions,
  - and fostering investment and economic growth.

- With all those benefits, no wonder some predict a potential global market of $8 trillion for AV technologies.[1]

Today, the U.S. is at the forefront of AV innovation and American companies are market leaders in AV development. According to KPMG, the U.S. is home to the headquarters of 420 AV companies, 44 percent of all companies tracked for their annual Autonomous Vehicles Readiness Index.[2] AV companies in the United States are safely testing vehicles in California, Arizona, Nevada, Texas, Florida, Michigan, Pennsylvania and elsewhere, and are making significant investments to carry that forward. **As technologies mature, however, companies need a pathway to scale their development.** That is why a responsible federal framework for the safe development and deployment of AVs in the United States is so important – to preserve U.S. leadership in this life-saving and life-changing technology and ensure U.S. innovations benefit the U.S. public, society, and economy.

> *...automated vehicle technology is coming, its advancing very quickly, it is something that holds a potential to be transformative and I think in many ways policy has not kept up.*
>
> – Secretary Pete Buttigieg, January 21, 2021

While the U.S. is well positioned to continue its long-standing leadership in automotive innovation, we cannot be complacent. Across the globe, nations are backing bold commitments with government investments and supporting policies. As evidenced by experience in other sectors – such as information and communications technologies – as well as the current EV battery supply chain, falling behind global competitors presents long-term risks to U.S. competitiveness and economic security.

Foreign competitors are moving forward with plans to support development of AV technologies. Across Europe, nations are adopting policies supportive of AV testing and development. For example:

- Germany is passing a Level 4 law (amending road safety laws and type approval regulations) on May 28th;

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[1] https://www.cnbc.com/2020/02/05/gms-cruise-values-autonomous-vehicle-industry-at-8-trillion.html

[2] https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/07/2020-autonomous-vehicles-readiness-index.pdf

- The French Council of Ministers passed an ordinance on April 14th to amend road traffic laws to permit AVs, with type approval requirements to follow by September of next year;
- The UK recently legalized ALKS, and it's Law Commissions are actively engaged in consultations on Level 4; and,
- the European Commission has kicked off the process to revise EU-wide type approval for Level 4 and projects it will be done in 2022.

Perhaps the greatest long-term threat to U.S. leadership on AV technologies is China. While currently well behind in the research, testing, and development of these technologies, China is moving swiftly to close the gap with other global leaders in AV innovation.

- Last year, the Chinese government released their national intelligent vehicle strategy. This national strategy was coordinated across 11 governmental departments and reflects a unified national approach to AV development.
    - The plan specifically calls for accelerating AV development, removing regulatory barriers and enhancing direct coordination with industry.
    - The plan also includes specific goals for scaling commercialization of automated vehicles by 2025.

- Companies like Huawei have made clear they intend to pull ahead in the self-driving race, taking advantage of the COVID-induced downturn and leveraging regulatory barriers against us.

- Despite U.S. leadership, Chinese companies are catching up:

    - In collaboration with the Chinese government, a leading Chinese AV developer, AutoX, announced this past December that it would be removing safety drivers and remote assistance operators from its fleet of vehicles in Shenzhen.

    - Just this month, Chinese AV developer Baidu launched a driverless taxi service in Beijing

    - In fact, three of the seven AV developers approved for testing in California are Chinese companies – including Baidu and AutoX

The nations that lead the development of AVs will have the potential to guide the development of international standards, control supply chains, and define international markets. In a technology like automated vehicles, this could have implications far beyond transportation. AVs are directly tied to the development of artificial intelligence systems. As noted in a recent report by CSIS:

> The AV sector is a critical lynchpin to U.S. leadership in Artificial Intelligence (AI). In 2019, the AV industry led all other AI sectors as a destination for global investment. As autonomous vehicles (AVs) move toward commercialization, the regulatory environment

can be a source of advantage. Yet, in the global AV race, Beijing currently holds the regulatory advantage due to its commitment to being a first-mover in AI and AV, giving Chinese companies more freedom to test vehicles and collect valuable data. In order to compete with China, the United States must adopt a regulatory framework that allows space for US companies to continue to gather additional data of their own that can be used to innovate and keep pace with competitors.[3]

The U.S. has an opportunity to advance global leadership in developing these revolutionary technologies and new mobility business models through a national approach that reduces uncertainty and paves the way to long-term success.

> *As the potential for deployment on public roads approaches, the successful transition and adoption of AVs, which will be dependent on scaled development, in both China and the United States will hinge on more than this initial approach around testing. China's top-down policy implementation, direct support for development, and close involvement by the central government could provide it with an edge in AV development. Coherent regulatory frameworks supported by a national interest in becoming an "AI leader" may foster a more innovation-friendly regulatory environment in China. In contrast, regulatory fragmentation in the United States might slow deployment (CSIS)*

That is why last year we released the *Policy Roadmap to Advance Automated Vehicle Innovation.*

The Roadmap outlines the auto industry's AV policy priorities and includes fourteen specific recommendations that can be implemented by federal policymakers over the next four years to facilitate the testing and deployment of AVs at scale. These recommendations are focused on reforming regulations, harmonizing policies, and laying the foundation to achieve longer-term objectives – including expanding the number of exemptions that DOT can provide on a case case-by by-case basis--with safety oversight and full enforcement powers--which can then provide the data necessary to support future Federal Motor Vehicle Safety Standards for AVs.

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[3] https://www.csis.org/analysis/ai-strategies-and-autonomous-vehicles-development



April 20, 2021 **Press Release**

Auto Innovators Releases Plan to Advance Safety at the Speed of Innovation

Washington, DC – April 20, 2021 – The Alliance for Automotive Innovation (Auto Innovators) today announced recommendations to modernize the New Car Assessment Program (https://www.autosinnovate.org/ncap) (NCAP), the program that the National Highway Traffic Safety Administration (NHTSA) uses to convey safety information to consumers. The Auto Innovators plan includes ways NHTSA can "kick start" NCAP immediately.

Currently, NCAP rates the crashworthiness of cars, but does not rate advanced crash avoidance technologies like automatic emergency braking or lane departure warning.

"This plan is a set of recommended actions NHTSA can take today to modernize NCAP and ensure the long-term success of the program," said Auto Innovators President and CEO John Bozzella. "Although NCAP has inspired similar programs around the world to measure vehicle safety, it has not been updated in a decade. It's important to stay in sync with global standards and the pace of innovations in car and truck safety that benefit consumers and the traveling public."

"Auto Innovators welcomes federal leadership in taking immediate action to evaluate and rate modern automotive safety technologies – such as forward collision warning, pedestrian automatic emergency braking, lane departure warning, and high beam assist advancements – to ensure the U.S. can remain a global leader in automotive safety innovation."

The "*Plan to Advance Safety at the Speed of Innovation*" provides five process recommendations to unlock NCAP's full potential. Implementing the five recommendations will result in a modernized NCAP program that will harness powerful market forces to drive investment, development, and deployment of advanced safety technologies and performance. The five recommendations encompass:

- Establishing mid- to long-range NCAP opportunity roadmaps
- Annual stakeholder engagement
- Consistent and harmonized program updates
- Program review and evaluation
- Prioritizing rulemaking to remove existing regulatory barriers

Read the full plan here (https://www.autosinnovate.org/about/advocacy/NCAP%20PDF%204-19-21.pdf).

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(http://twitter.com/intent/tweet?text=Auto Innovators Releases Plan to Advance Safety at the Speed of Innovation%20https://www.autosinnovate.org/posts/press-release/plan-to-advance-safety-at-speed-of-innovation%20via%20@autosinnovate)

May 18, 2021

The Honorable Jan Schakowsky
Chairwoman
Subcommittee on Consumer Protection
and Commerce
U.S. House of Representatives
Washington, DC 20515

The Honorable Gus Bilirakis
Ranking Member
Subcommittee on Consumer Protection
and Commerce
U.S. House of Representatives
Washington, DC 20515

The U.S. Chamber of Commerce's Technology Engagement Center (C_TEC) respectfully submits the following statement for the record for the Consumer Protection and Commerce Subcommittee's hearing titled "Promises and Perils: the Potential of Automobile Technologies."

Our nation's future economic success, growth, and economic competitiveness depends on a thriving and innovative private sector. Every company is a tech company and data-driven innovation is the foundation of businesses across the country. The automobile sector is no different, and the private sector is leading the way on advancing new technologies to increase motor vehicle safety and security, and enhance Americans' mobility options.

In particular, automated vehicles (AV) is a significant and transformative automobile technology, impacting industry sectors ranging from insurance to trucking while providing enormous benefits to consumers and the public at large. We strongly support this Committee's efforts to gain a greater understanding of automobile technologies such as AVs and collaborate towards a bipartisan solution to ensure the safe development, testing, and deployment of AVs.

The introduction of AV will bring several important benefits. First, the most critical benefit is the potential for the technology to reduce traffic fatalities. According to the National Highway Traffic Safety Administration (NHTSA), 36,096 Americans lost their lives in 2019 due to motor vehicle crashes, 94% of which were caused by human error. Second, AVs will empower more Americans to be mobile. Currently, more than six million Americans have a disability impairing their ability to obtain the transportation they need to get to work, shop, and travel. AVs are expected to empower two million Americans with disabilities to become employed as well save $9 billion in healthcare costs from reducing missed medical appointments stemming from transportation challenges. Finally, the economic potential of automated vehicles is substantial. It is estimated that the annual U.S. customer and public benefits from full AV deployment will reach $796 billion by 2050.

While the United States currently remains the leader in developing AV technology, American leadership is not guaranteed and is faces challenges by our economic competitors. By 2025, China plans that 30% of all cars sold in China will have some level of automation and is projected to emerge as the largest market for self-driving vehicles at $500 billion by 2030. Also, Europe is not far behind. According to KPMG's 2020 Autonomous Vehicles Readiness Index, six of the top 10 ranked countries are in Europe.

To ensure continued U.S. global leadership in AV technology, C_TEC strongly encourages Congress to enact legislation to facilitate safe AV development and deployment. In the 115th Congress, the House of Representatives unanimously passed H.R. 3388, the SELF DRIVE Act, which would establish a safe and effective regulatory framework for AVs. At the time, C_TEC applauded the Committee's bipartisan approach to the SELF DRIVE Act, and we encourage the Committee to continue to advance AV legislation on a bipartisan basis.

As Congress continues the process to develop AV legislation, C_TEC believes that Congress should address the following issues.

- First, preemption is a critical concern for the business community. A single, nationwide framework would promote a consistent set of regulations across the country to provide regulatory certainly to innovators and to effectively facilitate interstate commerce. However, while a nationwide standard is important, C_TEC recognizes that state and local governments should retain existing authority to regulate areas such as automobile dealers, insurance, and local traffic laws.

- Second, legislation should ensure a stakeholder and technology-neutral approach. This approach encompasses both passenger and commercial automated vehicles and provides a level playing field for all industry stakeholders engaging in the testing and development of automated vehicles.

- Third, the modernization of motor vehicle regulations will be required to accommodate advances in AV technology. Any regulations should be performance-based, technology-neutral, flexible, and promote safety. In addition, Congress should raise the existing cap and duration on the Department of Transportation's existing exemption authority to safely facilitate new and innovative motor vehicle designs.

While C_TEC believes that these policy solutions will create a regulatory environment to further enable widespread AV deployment, Congress should avoid adopting policy proposals that would inadvertently hinder innovation and impede the benefits provided by AVs. In particular, lawmakers should be cautious of policies that limit the federal government's exclusive authority over the design, performance, and construction of motor vehicles, impose overly-prescriptive regulatory burdens, and expand legal liability.

The United States must not cede its competitive edge in the AV revolution, and limit the ability for this technology to save lives and increase mobility for millions of Americans. To ensure continued global leadership in AVs, Congress should advance bipartisan legislation to enable the safe development, testing, and deployment of AVs. C_TEC stands ready to work with the Committee and its members to further AV adoption.

Sincerely,

U.S. Chamber Technology Engagement Center (C_TEC)

SELF-DRIVING COALITION FOR SAFER STREETS

U.S. Must Maintain Global Leadership on AVs

American leadership on autonomous vehicles (AVs) cannot be taken for granted as foreign competitors threaten our global competitiveness and national security. The U.S. risks losing our technological and automotive leadership in the AV industry, which is a global market opportunity worth an estimated $8 trillion. America's leadership role is integral to securing the economic growth, job creation and many safety and societal benefits offered by AVs.

China On Our Heels

China's government is investing heavily in developing autonomous vehicles as part of its strategy to overtake and replace foreign market leaders.

- The Chinese government has made AV development a top priority, including AVs in the Made in China 2025 strategic initiative encouraging local governments to open roads for testing. Shanghai's government plans to invest $15 billion into AV research and development over the next 10 years.
- AutoX, backed by Alibaba, announced fully autonomous taxis on public roads in Shenzhen in December 2020
- Baidu is charging passengers for rides on fully autonomous taxis in Beijing -- one of the first paid autonomous vehicle services available in the world. The Apollo Go Robotaxi service is planned to be part of China's 2022 Winter Olympics.
- Many other Chinese companies are investing in AV technology and testing, including Huawei, Pony.ai, WeRide.ai, Didi Chuxing and Momenta. These companies are also attracting investment from other countries around the world.
- Of the seven companies permitted to test fully driverless vehicles in California, 3 are Chinese.
- Many of these companies started in Silicon Valley, relying on American talent and investment.

Other Foreign Countries In Strong Competition

Singapore is ranked #1 in the world, with an autonomous commuter bus available to residents for a small fee, US$4.3 million in government investment and testing permitted widely.

Germany is on course to pass a legislative package that amends the national road traffic law and creates an approval framework for L4+ capable vehicles on May 28th. Germany set a target date of 2022 for their regular operation. Mobileye is already testing vehicles in Munich, and Volkswagen and Argo AI have announced they intend to commence on-road testing in Munich later this year.

The UK just passed a law legalizing ALKS (SAE Level 3), and the UK Law Commissions are actively seeking input from stakeholders about amending UK law to allow L4+ deployment. Moreover, the UK government touted that AVs could generate £41.7 billion and 40,000 skilled jobs by 2035 for the UK.

- Taking an active role in a policy framework to support automated vehicles, the UK government has invested £200 million into British AV startups. AV testing is already underway across the country with backing from the UK government, universities, technology companies and research institutions.

The French Council of Ministers passed an ordinance on April 14th amending the French road traffic law to allow L4+ deployment. Further, France has indicated it will implement its own L4+ type approval requirements by September 2022 if the EU hasn't done so already.

Japan enacted a Road Transport Vehicle law in 2020 recognizing AVs and establishing an inspection regime and permit system.

The European Commission is actively seeking input from stakeholders to amend a type approval system for L4+ vehicles across the EU, with an ambitious timeline for 2022. Other foreign countries like the Netherlands, Norway, Finland, South Korea and the UAE also continue to make significant strides on AVs.

The American automobile and technology industries will continue to develop, test and eventually deploy autonomous vehicles. However, as other foreign governments give a leg up to their own industries, the U.S. risks falling behind on this transformative technology. To protect our leadership against China and other competitors, the U.S. needs a supportive policy framework to unlock more opportunities for American companies to test and deploy AVs safely and carefully.



May 11, 2021

The Honorable Maria Cantwell
Chair
United States Senate Committee on
Commerce, Science, & Transportation
511 Hart Senate Office Building
Washington, DC 20510

The Honorable Roger Wicker
Ranking Member
United States Senate Committee on
Commerce, Science, & Transportation
555 Dirksen Senate Office Building
Washington, DC 20510

Dear Chair Cantwell and Ranking Member Wicker:

The National Federation of the Blind, the nation's transformative civil rights organization of the blind, supports and endorses the amendment to the Endless Frontier Act filed with the committee by Senator Thune on May 10, 2021. Specifically, we support the portions of the amendment that will create an exemption classification for manufacturers who provide transportation access for people with disabilities and prohibit discriminatory licensing practices for highly automated vehicles.

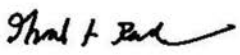
Subsection (d)(2)(C) of the amendment would create an exemption category under the federal motor vehicle safety standards located in Section 30113 of title 49 United States Code that would "provide transportation access for individuals with disabilities, including non-visual access for individuals who are blind or visually impaired." This addition to the law will provide the incentive needed for automobile manufacturers to ensure that the unique requirements for Americans with disabilities to be able to operate automated vehicles are considered in the early stages of development.

Subsection (e)(3) of the amendment would mandate that a state "may not issue a motor vehicle operator's license for the operation or use of a highly automated vehicle in a manner that discriminates on the basis of disability." This will ensure that current requirements necessary to obtain a driver's license, like a vision test, will not be required in order to operate or use a highly automated vehicle. We are pleased to see this subsection included in the

amendment because highly automated vehicles will pilot themselves (SAE Level 4 and Level 5), making a vision requirement arbitrary and discriminatory.

Highly automated vehicles have the potential to revolutionize the transportation landscape, especially for individuals with disabilities. However, those same individuals with disabilities who stand to gain the most from the creation and proliferation of highly automated vehicles could be left out of this new frontier if specific actions are not taken. Senator Thune's amendment to the Endless Frontier Act is an important step to ensure that America's journey toward automotive automation is fully inclusive of those who will benefit most.

Sincerely,



Mark A. Riccobono, President
National Federation of the Blind

National Federation of the Blind
Mark Riccobono, *President* | 200 East Wells Street *at Jernigan Place* Baltimore, MD 21230 | 410 659 9314 | www.nfb.org

Attachment—Additional Questions for the Record

Subcommittee on Consumer Protection and Commerce
Hearing on
"Promises and Perils: The Potential of Automobile Technologies."
May 18, 2021

Mr. Jason Levine, Executive Director, Center for Auto Safety

The Honorable Janice D. Schakowsky (D-IL)

1. **During the hearing there was a lot of discussion about the potential for automated vehicle technologies to address car crash deaths and injuries, yet most of these technologies remain in the development stage. What steps could Congress take now to both accelerate the safe deployment of these lifesaving technologies and improve vehicle safety in the near future?**

This Subcommittee, as well as Congress at large, have a unique opportunity to level the playing field for motor vehicle safety today and in the future. Sooner, rather than later, Congress will take on the vital task of writing our nation's first autonomous vehicle law. When it does, for the first time, Congress can help cultivate technological innovation in a way that provides safety for everyone on the road regardless of whether they are a driver, passenger, or pedestrian and no matter their income. To begin with, it is time for the National Highway Traffic Safety Administration (NHTSA) to write performance standards for existing vehicle safety technology and it is long past time for those technologies to become mandatory equipment on new vehicles.

Advanced driver assistance systems (ADAS) - from automatic emergency braking (AEB) to lane keeping assist features, to driver monitoring systems and adaptive driving beam technology - have tremendous potential to save lives. However, until now NHTSA has done little to introduce minimum performance standards to ensure that each of these features work effectively to prevent crashes. Without minimum standards to ensure proper function of these features, and little appetite to recall faulty performers producing clearly unsafe outcomes, as we have seen in our work to recall faulty AEB systems, NHTSA continues to display minimal interest in ensuring these features work, whether through its enforcement or rulemaking authorities, which only accelerates the need for minimum performance standards.

Far too often in recent years, NHTSA has chosen to rely on its consumer information program, the New Car Assessment Program (NCAP), to incentivize manufacturers to keep up with the pack in vehicle safety. Unfortunately, if the pack is not held to a minimum standard of function, keeping up with it provides little benefit to consumers, and zero assurance that any particular ADAS system will function as intended or advertised. Congress can do more by insisting that NHTSA update the NCAP program for the first time over a decade to ensure consumers have a way to assess ADAS performance. Additionally, requiring the agency to set minimum

performance standards for ADAS technologies would provide a baseline from which NCAP can assess ADAS performance. One prominent form of ADAS, driver monitoring systems, have great potential to reduce drunk, drowsy, or distracted driving, provided that the technology works properly, as could be incentivized by NCAP ratings. Mandating that these technologies be deployed fleetwide, and not simply deployed in luxury automobiles, will ensure maximum safety gains in the future.

By some estimates, combining features such as driver monitoring systems, automatic emergency braking and lane keeping assistance systems to combat impaired driving (drunk, drugged, drowsy, and distracted) could help to dramatically mitigate 10,000, or more, crash deaths every year.

In addition to the potential to saving tens of thousands of lives, a side benefit of wide deployment of ADAS will be public comfort with the type of technology that will eventually become the foundation of driverless vehicles. Moreover, the data gathered from such vehicles, in combination with data collected from all automated test vehicles, can be used to craft reasonable regulations that set minimum thresholds for safety to better protect consumers and ensure a robust marketplace.

While any autonomous vehicle (AV) law should certainly require performance standards, expansive data collection, and a gated certification regime, it must also include cybersecurity standards, vision tests, updated occupant protection standards, and pedestrian and other vulnerable road user protection standards, while maintaining current state, local, and common law rights and authorities. It is vital that an AV law does not preempt protections provided by state and local rules of the road regarding the operation of vehicles on their streets. There is no doubt that access to courts, for innocent victims killed by an experiment for which they did not volunteer, will remain the final consumer protection backstop in a potentially lengthy unregulated environment.

Finally, as it remains likely that AV companies will treat contracts involving automated technology like software or smartphone agreements, binding arbitration must be forbidden in direct-to-consumer contracts. A generation of legal precedent and consumer understandings regarding the legal relationship between a vehicle manufacturer and the end user may not have been perfect, but it has generally prevented vehicle manufacturers from attempting to bind end users into giving up their rights to seek civil justice. To do away with such a protection based on legalese buried in small print will neither engender trust in the AV industry nor will it encourage the type of transparency that is needed to keep large corporations incentivized to do the right thing.

2. The United States pioneered the concept of sharing vehicle crash data with consumers to allow the market to drive safety decisions with the New Car Assessment Program in 1980. As I understand it, that program has not been updated in over a decade. How important is it to make sure NCAP remains up to date and what should the next version of NCAP contain to allow consumers to determine which vehicles are the best for them and their families?

The New Car Assessment Program ("NCAP" or "5 Star Crash Rating") is arguably the greatest market-based, nonregulatory safety program in automotive history. Until NCAP, the concept of the public having access to crash information about vehicles by make and model did not exist. Today, consumers expect to have detailed information about the performance of their new vehicle when it comes to safety. NCAP proved that safety does sell. Unfortunately, because the program has not been updated in over a decade, what manufacturers are currently advertising when they claim a Five Star rating is an impression of safety, instead of the real thing.

Today, almost every single new vehicle rated by NCAP receives a top safety rating. This is not because all of the vehicles are equally safe, it is because they are all being scored on ratings that have not been updated since 2010. It is self-evident that if 98% of cars achieve superior ratings, it is impossible to distinguish between them in any significant way. Updating NCAP is essential to ensure consumers have access to relevant and useful safety information, allowing them to make informed decisions while also pushing auto manufactures to pursue innovation in safety technology. Currently, virtually every car in the NCAP system receives 4 or 5 stars, rendering NCAP ineffective for consumers who hope to make an informed decision about the safety of a vehicle.

There are many areas where NCAP can be improved, including by following some of the recommendations issued by the National Transportation Safety Board (NTSB) in 2018. The NTSB issued eight safety recommendations to NHTSA addressing the need to include performance-based standards for vehicle headlight systems, development of performance test criteria for vehicle designs that reduce pedestrian injuries, and incorporation of pedestrian safety systems into NCAP, including pedestrian collision avoidance systems and other more passive safety systems.

Specifically, pedestrian safety is a pressing issue that NHTSA must address, and NCAP must play a key role in NHTSA's consumer outreach. In 2020, despite a 13% reduction in vehicle miles travelled, pedestrian deaths on public roads hit a critical and historic figure of 6,721, which averages to one crash-related pedestrian death every 80 minutes. Additionally, an estimated 173,000 pedestrians were treated in emergency departments for non-fatal crash-related injuries in 2020. These tragedies could be dramatically reduced by incentivizing automakers to include more protective pedestrian safety features in new cars, and NCAP can be an effective means to assist in accomplishing this important task.

Currently, the US NCAP has no rankings or information available regarding emerging technology to protect vulnerable road users, whether that be pedestrian crash avoidance features or pedestrian protective designs built into hoods and bumpers on some new vehicles. However, Pedestrian Safety is factored into the rating given by The European New Car Assessment Programme ("Euro NCAP"). Euro NCAP has recognized this need and includes in its vehicle ratings both ADAS technologies and automobile design features that protect pedestrians and minimize injury and death in an accident.

In addition to the NTSB's safety recommendations, numerous ADAS safety features are not rated in NCAP and therefore information regarding their impact on a vehicles safety is not readily available to consumers. Having NCAP include information on features such as AEB, Lane Departure Warning, Forward Collision Warning, Blind Spot Detection, Cross Traffic Warning, Rear AEB, Smart Headlights, Driver Monitoring Systems, and Advanced Automatic Crash Notification will not only save lives now but is a critical part of the development of future automated vehicle systems that could work hand in glove with human drivers.

Furthermore, NCAP must be improved to protect occupants of all sizes and ages, no matter what vehicle position they occupy. The current tests and crash dummies simply do not account for the size of Americans, nor do they allow for enhanced analysis that could provide better ratings for use by the elderly, women, and passengers of larger or smaller sizes than currently represented. Additionally, NCAP provides very little in the way of safety ratings for occupants, particularly those in rear seats. As more Americans travel by rideshare, and with an eye towards a future where many predict we will all be relegated to occupants, protection in all seating positions has clearly becomes a more pressing task. NCAP could lead the way by ensuring that consumers are able to distinguish vehicles that offer advanced protection for occupants in the rear seats, from those that do not.

3. **While Congress can pass laws regarding vehicle safety, implementation of these laws is usually delegated to the Department of Transportation and the National Highway Traffic Safety Administration (NHTSA). Unfortunately, NHTSA has fallen behind in fulfilling some Congressional mandates. How should NHTSA balance their existing requirements with future Congressional obligations? What can Congress do to assist in this task?**

Amongst the most important actions Congress can take to help NHTSA oversee advanced auto safety technologies, and improve vehicle safety overall, is to provide the agency with adequate funding. Over the last 40 years, while the number of vehicles on the road and the number of drivers have both doubled, America's only federal safety agency with rulemaking and enforcement authority has seen its vehicle safety appropriations (adjusted for inflation) drop as much as forty percent. The Rulemaking, Enforcement, and Research and Analysis departments at NHTSA, which have been directly responsible for vehicle crashworthiness and other safety standards that have saved hundreds of thousands of lives since NHTSA's founding five decades ago, remain significantly underfunded. Such chronic underfunding only encourages the cynical

and reoccurring narrative that NHTSA is incapable of overseeing the safe development of advanced vehicle technology, and ultimately the driverless vehicle industry, due to a lack of resources.

Additionally, Congress could assist NHTSA by mandating it take steps to improve vehicle safety when the agency has failed to use its existing authority. As described above, requiring an update to NCAP would benefit all consumers, and those manufacturers who want to compete to have the safest vehicle in the showroom and on the road. Also, requiring NHTSA to update its seatback safety standard (FMVSS 207), which has remained the same since 1967, would prevent the horrific deaths and life-altering injuries often caused by a parent being thrust backward over their collapsed seat at such a speed and force as to kill or paralyze their own child during a rear end collision. These incidents represent a well-known problem to both the industry and the agency that remains unresolved to this day, despite recent a NHTSA study documenting changes to FMVSS 207 that would reduce seat back dynamic rotation and prevent injury to rear passengers. Included in the data analysis was a figure that shocks the conscience: an estimated cost of less than $4.63 per automatic seat ($1.94 for manual seats) to make the adjustments that could prevent many of these life-altering injuries from taking place. It is time Congress steps in and mandates the needed safety upgrade.

Furthermore, by exercising legitimate oversight into the agency's failure to complete existing mandates, Congress could ensure that the rule of law is respected and the will of the people is heard. For example, multiple NHTSA rulemakings remain in limbo years after Congressional deadlines have passed. These include a whistleblower rule to ensure that vehicle manufacturer employees are able to come forward with defect information, a rule to provide recall notices to consumers electronically, a rule to help prevent children from being unbelted in rear seats, and a rule to establish side impact requirements to protect children in child restraints. Congress must ensure that NHTSA promptly acts on these and other items on the agency's long list of overdue rulemakings.

The Honorable Bobby L. Rush (D-IL)

1. **Mr. Levine, the Federal Trade Commission just released a report that criticized commercial practices that restricts auto repair options for consumers. For many Americans, their vehicles are the largest assets they have, and they rely on their cars to get them to work and to the supermarket. The report was approved by all 4 sitting Commissioners, Democrats and Republicans, and calls for legislation to expand repair and maintenance options for consumers. I am currently drafting such a bill. Are you familiar with the report? What is your opinion of the findings?**

The Federal Trade Commission Report, "Nixing the Fix: An FTC Report to Congress on Repair Restrictions," was issued in May 2021, in response to a Congressional directive requiring the Commission examine anticompetitive practices related to repair markets. We have reviewed the Report, focusing our attention on the areas related to auto repair. With an estimated 280 million registered passenger motor vehicles on American roads, there is plenty of repair work to go around.

The Center for Auto Safety was founded in 1970 to stand as an advocate for consumer safety and consumer protection when it comes to motor vehicle related issues. Vehicle safety is often dependent upon vehicle maintenance and repair. Historically speaking, competition for consumer business in the vehicle repair field has led to a greater consumer choice and better prices. Moreover, it has long been the Center's position that such competition is an excellent incentive to ensure the quality of repairs at both independent and manufacturer licensed repair shops.

Therefore, assuring consumers have access to reliable mechanics and the opportunity to choose which mechanics will service their vehicle is an important element of vehicle safety. Historically speaking, competition for consumer business in the vehicle repair field has led to a greater consumer choice and better prices. Moreover, it has long been the Center's position that such competition is an excellent incentive to ensure the quality of repairs at both independent and manufacturer licensed repair shops.

As a general matter, we agree with the Commission's unanimous conclusion that repair restrictions are rarely adequately justified and believe that consumer choice is beneficial to the safety of every driver, passenger, and pedestrian on the road. More specifically:

With respect to telematics: Automakers exert unreasonable control over telematic information collected from vehicles – this includes performance and status information necessary to perform proper repairs and maintenance. As vehicles continue to require more software (and software updates) and possess more computer systems the average vehicle has 50+ electronic control units, each with its own processor, access to this data is critical for independent repair shops in order to effectively repair the vehicle. Most relevant repair data is available on the open-source CAN bus, but this access is not guaranteed, and OEMs are

currently free to use proprietary protocols that would completely lock out access to everyone except those included under their proprietary umbrella. Even when ECU status is available, OEMs may restrict access to critical ECUs, main processors, or software to drive business to their own licensed repair centers. While the CAN bus protocol for ECU communication and programming is widely used, it is not universal. OEM use of proprietary data bus architectures that are not readily accessible by independents and individuals erects yet another barrier to economical repairs.

Currently, OEMs are free to use proprietary network protocols in their vehicles and engage in what amounts to a monopolistic practice in order to prevent independents from even diagnosing problems. Only the open-source CAN bus data is ordinarily available to independent repair shops. Deviation from the CAN bus without providing alternative data access to independents and owners is another expensive barrier to repairs, again disenfranchising owners, independents, and people of limited means who are often uniquely dependent on their vehicles for employment, child care, and the necessities of life. OEMs that do not use a CAN bus should provide alternative low-cost access to individuals and independent businesses to encourage maintenance visibility and proper repairs. These barriers, limited access to data and restricted access to software/hardware components needed to diagnose and repair vehicles, may put independent shops in the untenable position of attempting to diagnose vehicle problems, or perform maintenance, without a full set of vehicle data on which to base their conclusions, putting both motorists and independent businesses at risk. It also places an extra burden on component suppliers who would lose the ability to sell their products to independent repair shops, unfairly restricting consumer choice as well.

At the Center, we have frequently seen the tragic results of unrepaired or improperly repaired vehicles, and believe that the negative safety impacts of limiting independent repair access to needed vehicle data and components must be part of the conversation, in addition to the economic benefit of ensuring that consumers are free to choose their place of repair.

With respect to Parts - Original Equipment Manufacturers (OEMs) have long held a virtual monopoly in the area of repair parts that has served to restrict consumer choice and increase prices for repair. Not only does current law allow OEMs to restrict access to and availability of repair parts, but a perhaps more pressing issue is that in the context of modern cars, OEMs possess an unreasonable level of control over an increasingly more important part of the vehicle – software and data systems – and who may access them.

In order to properly perform repairs and maintenance on consumer vehicles, independent repair shops (and consumers) must have the ability to access manufacturer service and diagnostic software, hardware, official service information or other tools necessary for an OEM repair. OEMs are continually issuing service bulletins and other updates to their dealer repair facilities to ensure that safe and proper repairs are made to consumer vehicles, and

access to these bulletins has historically also been limited, to the detriment of consumers seeking honest repairs.

Further, extending the current restrictive model to the modern context where vehicle repairs are as likely to be a software update as a physical part creates an environment where consumers have only one place to go – the dealer service facility – to continue operating their vehicle safely and efficiently both during and after the warranty period.

For example, most vehicle designs rely on the CAN bus for communication among the multiple electronic control units and main computer in a vehicle. The CAN bus in its native form is intrinsically insecure. No regulations exist that require OEMs to either develop or avail themselves of available technology to harden the CAN bus. This is a much graver cybersecurity exposure than presented by independent repairs which rely on the same suppliers as the OEM for replacement parts. What is most important when it comes to maintaining the cybersecurity of vehicles is for manufacturers to harden their attack surfaces, including such seemingly benign components as wireless tire pressure sensors, and isolating their vehicle control systems from infotainment and data gathering systems, to enable any qualified individual who wishes to repair the vehicle (including consumers) to do so in a way that minimizes the risks of cyber tampering and quarantines any actual instance of a breach. NHTSA must write cybersecurity standards for new vehicles that require both defensive strategies and offensive test and verification considerations when it comes to external threats. After all cybersecurity threats do not start at the repair shop and do not stop at the dealership door.

Finally, the Center recognizes the value of repairs being undertaken by experienced and qualified mechanics in the automobile field. However, we have yet to see objective data demonstrating that such experience and qualified repairs can justifiably be limited to OEM franchised dealership repair facilities instead of allowing consumers to benefit from competition.

2. **Mr. Levine, the FTC's report states that "the burden of repair restrictions may fall more heavily on communities of color and lower-income communities. Many Black-owned small businesses are in the repair and maintenance industries, and difficulties facing small businesses can disproportionately affect small businesses owned by people of color." My bill will allow independent repair shops to repair and maintain cars in their own communities. Do you have any thoughts on this aspect of the FTC report?**

As you note in the question above, for many Americans, their personal motor vehicle is the most expensive purchase they will ever make. Therefore, keeping their vehicle in good service, for both utilitarian and financial reasons, is extraordinarily important. Having access to a local repair shop not only provides convenience (and thus a greater likelihood of vehicles being regularly serviced) it can help to encourage regular repairs based on a relationship of

trust with a local, independently owned, merchant. As the FTC Report details, restricting repairs exclusively to larger, manufacturer licensed facilities can have a deleterious effect on small businesses which can have a significant impact on smaller communities. Presuming the accuracy of the FTC's data, such restrictions could have a disparate impact on communities of color and lower income communities which historically have relied upon small, locally owned businesses. Keeping vehicles in safe condition, and fully repaired, is vital to the safety of everyone on the road. With over 100 Americans being killed every day by vehicle crashes any steps that can be taken to ensure that vehicles are being repaired is important for safety. The right to repair will mean little without convenient access to vendors who can provide such service based on a relationship of quality and trust.

The Honorable Lori Trahan (D-MA)

1. **I represent Massachusetts, the first state to pass automobile right to repair in 2012. As we move towards a world with more connected vehicles, the importance of data protection and cybersecurity increases. And while this is true, we have seen large companies use privacy and cybersecurity as an excuse to increase repair restrictions. Fortunately, the FTC recently released a comprehensive report examining repair markets.**

   The report found that, "[t]he record contains no empirical evidence to suggest that independent repair shops are more or less likely than authorized repair shops to compromise or misuse customer data. Furthermore, although access to certain embedded software could introduce new security risks, repair advocates note that they only seek diagnostics and firmware patches." Do you agree with these conclusions? Why is ensuring that independent repair shops can maintain vehicles important for public safety?

As a general matter, we agree with the Commission's unanimous conclusion that repair restrictions are rarely adequately justified and believe that consumer choice is beneficial to the safety of every driver, passenger, and pedestrian on the road.

The Center for Auto Safety was founded in 1970 to stand as an advocate for consumer safety and consumer protection when it comes to motor vehicle related issues. Vehicle safety is often dependent upon vehicle maintenance and repair. Therefore, assuring consumers have access to reliable mechanics and the opportunity to choose which mechanics will service their vehicle is an important element of vehicle safety. Historically speaking, competition for consumer business in the vehicle repair field has led to a greater consumer choice and better prices. Moreover, it has long been the Center's position that such competition is an excellent incentive to ensure the quality of repairs at both independent and manufacturer licensed repair shops. At the Center, we have frequently seen the tragic results of unrepaired or improperly repaired vehicles, and there can be negative safety impacts of limiting

independent repair access to needed vehicle data and components, to say nothing of the economic benefit of ensuring that consumers are free to choose their place of repair.

2. **Additionally, the report found that, "replacing a part on a device with an identical OEM part or functionally equivalent aftermarket part is unlikely to create a cybersecurity risk…. the record supports arguments that consumers and independent repair shops would be equally capable of minimizing cybersecurity risks, as are authorized repairers." As technology changes, do you think we can achieve the goals of safety and cybersecurity, while maintaining competition in repair markets?**

As a threshold matter, the Center takes the position that NHTSA should, either of their own accord or because the agency is required by statute, provide minimum cybersecurity performance requirements for automakers and suppliers to enable validation of design approaches that assure long-term cybersecurity effectiveness and vehicle safety throughout a connected vehicle's life cycle.

It may never be possible to implement 100% effective prophylactic cybersecurity measures, thus NHTSA should endeavor to promote full life cycle vehicle cybersecurity. In order to assure sufficient information for post-incident forensic analysis and the ability to share lessons learned with the entire connected vehicle community, including the public, a robust data set will be required. NHTSA should mandate that vehicle software, logic-bearing devices, sensors, and data processing equipment configuration are embedded in vehicle data records in the event of a successful attack causing a life-threatening or deadly incident.

NHTSA should be determining the needed scope and means of cyber testing to enhance public safety and enabling the auto industry to realistically validate their cybersecurity designs, ensure that capabilities have been validated, and make certain that validation results are available to the public. The results of cybersecurity testing and validation should be incorporated into the information available to consumers to assist their evaluation of various modern vehicle offerings.

The argument that such NHTSA capabilities do not currently exist does not absolve NHTSA of its legal duty to act in the face of clear threats to vehicular safety. The need to address connected vehicle cybersecurity is new and NHTSA's response to that need must also be entirely new.

Yet, as the FTC noted, "the record contains no empirical evidence to suggest that independent repair shops are more or less likely than authorized repair shops to compromise or misuse customer data." And, as the question notes, the FTC concludes "[w]ith appropriate parts and repair information, the record supports arguments that consumers and independent repair shops would be equally capable of minimizing cybersecurity risks as are authorized

repairers." The reverse is also true of course, authorized repairers and independent repair shops are equally capable of creating a cybersecurity risk.

Until such standards and steps are taken by NHTSA, however, without much evidence it is often posited that restricting the right to repair will somehow improve cybersecurity for consumers in passenger vehicles. For example, most vehicle designs rely on the CAN bus for communication among the multiple electronic control units and main computer in a vehicle. The CAN bus in its native form is intrinsically insecure. No regulations exist that require OEMs to either develop or avail themselves of available technology to harden the CAN bus. This is a much graver cybersecurity exposure than presented by independent repairs which rely on the same suppliers as the OEM for replacement parts. What is most important when it comes to maintaining the cybersecurity of vehicles is for manufacturers to harden their attack surfaces, including such seemingly benign components as wireless tire pressure sensors, and isolating their vehicle control systems from infotainment and data gathering systems, to enable any qualified individual who wishes to repair the vehicle (including consumers) to do so in a way that minimizes the risks of cyber tampering and quarantines any actual instance of a breach. NHTSA must write cybersecurity standards for new vehicles that require both defensive strategies and offensive test and verification considerations when it comes to external threats. After all cybersecurity threats do not start at the repair shop and do not stop at the dealership door.

Attachment—Additional Questions for the Record

Subcommittee on Consumer Protection and Commerce
Hearing on
"Promises and Perils: The Potential of Automobile Technologies."
May 18, 2021

Mr. Greg Regan, President, Transportation Trades Department, AFL-CIO

The Honorable Lizzie Fletcher (D-TX)

1. Mr. Regan, as more and more human drivers share the road with automated vehicles, what are the safety concerns for our transit workers who will be sharing that space?

RESPONSE:
First, thank you for the question and I am happy to have the opportunity to respond.

As highlighted in my testimony, we have already seen hundreds of incidents involving automated vehicles that are operating on public roadways in a pilot-testing environment, as well as with commercially available passenger vehicles with automated systems such as Tesla's autopilot feature. In both cases, there have been a number of high-profile deaths, including a pedestrian who was killed by Uber's AV test vehicle in Phoenix, and 11 deaths linked to Tesla vehicles.

For four years, the Trump administration abdicated their responsibility to provide strong, federal oversight over automated vehicles as they are tested and deployed on America's streets. Our comments to the Trump administration DOT highlighting those concerns are linked in my testimony. We have also joined calls for strong safety oversight in the Advocates for Highway & Auto Safety's Joint AV Tenets.

The risks to all road users, including transit and other over the road passenger vehicles, are clear. An AV behaving erratically because of software or human intervention failures puts all road users at risk. While we have seen non-lethal accidents at slow speeds involving AVs and commercial vehicles, it may only be a matter of time before a similar incident happens at higher speeds with a passenger bus carrying 40-80 people. Such an incident not only endangers transit workers, but also passengers, and all road users around a larger, heavier, vehicle like a transit bus or commercial truck.

We understand that AVs may one day be able to reduce traffic deaths and make all road users safer, but the promise of safety in the long-term must not come at the risk to public

safety in the near term. Deploying AV passenger and commercial vehicles must therefore come with the strong safety and workforce protections outlined in my testimony.

I thank you again for this question and for providing me with the opportunity to respond.

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