October 17, 2025

ELECTRONIC SUBMISSION

Attn: DOT-OST-2025-1029

Shaz Umer
Director of Strategic Initiatives
Office of the Assistant Secretary for Research and Technology
U.S. Department of Transportation

Re: Request for Information—Research Ideas to Support Nationwide Automated Vehicle (AV) Deployment. Docket ID. No. DOT-OST-2025-1029

Dear Mr. Umer:

On August 18, 2025, the U.S. Department of Transportation (DOT), acting through the Office of the Assistant Secretary for Research and Technology (OST-R), published a Request for Information (RFI) to solicit "Research Ideas to Support Nationwide Automated Vehicle (AV) Deployment." Through this RFI, OST-R indicates that it seeks information from the public, industry, infrastructure owners and operators, and other stakeholders to inform coordinated national research supporting Automated Driving Systems (ADS) transportation technology deployment, and realizing safe, efficient operations for our Nation's roadways. It is encouraging to see OST-R prioritize research in this critical area, and with appreciation for the opportunity to contribute, I would like to share the following suggestions as important research priorities to make AV deployment more reliable, safe, and secure, as necessary to support eventual deployment and gain broad public acceptance for this innovative and promising technology.

Suggested Priorities for OST-R Research

OST-R is a leader in American transportation research, overseeing over $1 billion in research funds in different modes of transportation. There have been transformative developments in transportation technology in recent decades, and the Federal Government retains an important role in ensuring that, throughout these changes, the U.S. transportation system remains safe, resilient, modern, and secure. In this vein, I propose three areas of research in particular. First, because approximately 40,000 people are killed on the roads each year,[1] and millions are injured,[2] the government has an interest in keeping drivers safe from traffic accidents.

[1] Nat'l Hwy Traffic Safety Admin. (2025). Early Estimate of Motor Vehicle Traffic Fatalities in 2024 (Report No. DOT HS 813 710).
[2] *E.g.*, Nat'l Hwy Traffic Safety Admin. (2024). Summary of Motor Vehicle Traffic Crashes (Report No. DOT HS 813 643).

Automation has been shown to lower accident rates[3] and increase economic productivity, and research in this area should be a priority.

Second, foreign actors are increasingly attempting to disrupt the systems that Americans use on the roads, in the air, and on the seas for positioning, navigation, and timing by hacking and spoofing the Global Positioning System (GPS).[4] In addition, GPS is often disrupted due to urban configurations, such as tall buildings and underground roadways, and sparse coverage in rural areas. The Federal government provides GPS free of charge, and has an interest in research to protect GPS and test backup systems, and to install these backup systems in government transportation systems and make sure that they are available for purchase outside government.

Third, Chinese spying from electronic components[5][6] and batteries[7] has been documented, and the Chinese Communist Party announced plans to disrupt the flow of critical minerals to America. The Federal government should ensure that America can eventually transition to transportation equipment and components that are made domestically or by U.S. allies. This is a worthwhile area of research for national security reasons.

I. Automation

One major question is whether President Trump will continue his prior support for AVs and advanced driver assisted systems that can result in extensive progress over the next decade, or whether overly burdensome reporting requirements slow progress. The answer will determine whether America will regain its leadership in AV technology and stay ahead of China.

During President Trump's first term, the Transportation Department encouraged AVs to be developed safely and integrated into America's transportation system, unlocking billions in private investment and priming the development of new companies such as Nuro[8] and Waymo.[9] DOT's regulations promoted automated cars, buses, trucks, and trains. Voluntary

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[3] Nat'l Hwy Traffic Safety Admin. (2017). Automated Driving Systems 2.0: A Vision for Safety (Report No. DOT HS 812 442).

[4] Diana Furchtgott-Roth, "The West is Terrifyingly Vulnerable to Chinese Hacking of GPS," Heritage Foundation *Commentary*, April 10, 2025. https://www.heritage.org/china/commentary/the-west-terrifyingly-vulnerable-chinese-hacking-gps

[5] *E.g.*, Mcfarlane, S. (May 14, 2025). Rogue communication devices found in Chinese solar power inverters. Reuters. https://www.reuters.com/sustainability/climate-energy/ghost-machine-rogue-communication-devices-found-chinese-inverters-2025-05-14/

[6] *E.g.*, Cybersecurity and Infrastructure Security Agency (September 3, 2025). Countering Chinese State-Sponsored Actors Compromise of Networks Worldwide to Feed Global Espionage System (Cybersecurity Advisory | AA25-239A). https://www.cisa.gov/news-events/cybersecurity-advisories/aa25-239a

[7] House of Representatives Select Committee on the CCP (June 7, 2024). Moolenaar, Lawmakers Introduce Bill to Ban DHS from Procuring Batteries Manufactured by Six PRC-Aligned Companies. https://selectcommitteeontheccp.house.gov/media/press-releases/moolenaar-lawmakers-introduce-bill-ban-dhs-procuring-batteries-manufactured

[8] Nuro. https://www.nuro.ai

[9] Waymo. https://www.waymo.com

guidelines encouraged safe deployment. This progress slowed during President Biden's term as concerns about labor displacement eclipsed the need for technological advancement. The National Highway Traffic Safety Administration (NHTSA) even imposed complex reporting requirements to discourage new technology.[10] Any new research, and the collection of any new datasets, needs to ensure that such data collection occurs in as painless and undemanding a manner as feasible, so as to foster private sector innovation, and to encourage such innovation to occur of its own accord, even independent of DOT direction.

DOT has an interest in AV research for two reasons. First, automation increases the productivity of the economy and international competitiveness. Second, automation protects the health and safety of the public.

The World Robotics 2025 Report by the International Federation of Robotics shows that China represented 54 percent of global robotic deployments in 2024.[11] These robots are automating China's factories in the electrical/electronics industry, the automotive industry, and the metal and machinery industry.[12] All these products are used in transportation, and America has a national security interest in keeping up with China.

There are numerous examples where transportation automation can lead to increases in productivity. With a driverless vehicle, a plumber could do administrative work as he drives to the next job. Automation could alleviate the perennial shortage of truck drivers. [13] Driverless fire trucks and ambulances could reduce trip times to homes where people are in danger from fires or medical emergencies. On farms, automated tractors could make life easier for farmers by weeding and seeding or by fetching forgotten equipment.

AVs promise to be safer than vehicles with drivers and can help reduce deaths and injuries on the road.[14] As the population ages, it is even more important to give older drivers alternatives so they can preserve mobility and stay independent without risk to themselves or others. Going driverless is an excellent option.

As well as being safer on the road, some vulnerable populations might prefer not to ride with an unknown driver. Although the rate of assault as a share of Uber rides is fractions of one

[10] Nat'l Hwy. Traffic Safety Admin. (2023). Second Amended General Standing Order 2021-01.
[11] Int'l Federation of Robotics. (2025, September 25). Global Robot Demand in Factories Doubles Over 10 Years [Press release]. https://ifr.org/ifr-press-releases/news/global-robot-demand-in-factories-doubles-over-10-years
[12] Int'l Federation of Robotics. (2025, September 25). China Tops World Record of 2 Million Factory Robots [Press release]. https://ifr.org/downloads/press_docs/2025-09-25-IFR_press_release_China_in_English.pdf
[13] Am. Trucking Ass'ns. (2019, July 23). ATA Releases Updated Driver Shortage Report and Forecast [Press release]. https://www.trucking.org/news-insights/ata-releases-updated-driver-shortage-report-and-forecast
[14] Kusano, K.D., Scanlon, J., Chen, Y.H., McMurry, T.L., Gode, T., & Victor, T. (2025). Comparison of Waymo Rider-Only crash rates by crash type to human benchmarks at 56.7 million miles. *Traffic Injury Prevention*, 1-13. https://doi.org/10.1080/15389588.2025.2499887

percent,[15] some are concerned that teenagers should not be riding with strangers. Automated vehicles are a solution to this problem. The private sector is successfully commercializing vehicles at increasing levels of automation. Referring to the NHTSA levels of safety automation,[16] many new cars are now commercially available at SAE Level 2, which indicates partial automation at which the car is able to offer continuous assistance to the driver in terms of acceleration, breaking, and steering. The most prominently available systems in American car companies include Ford's BlueCruise,[17] GM's Super Cruise,[18] and Tesla's Autopilot.[19]

In the United States, we have only just begun to see SAE Level 3 vehicles, with conditional automation available in limited parts of the country through the Mercedes-Benz Drive Pilot system.[20] SAE Level 4 vehicles, with high automation, are available on an even more limited basis, such as through Waymo's autonomous taxi services, available in select cities.[21]

Yet even as the private sector consolidates its progress at SAE Levels 2 and possibly 3, through increasing commercialization, it will be necessary to normalize automation at Levels 4 and 5 to unlock the most dramatic of these benefits. The private sector can largely be trusted to consolidate the gains that it has already been making, and it is appropriate that the risk to any such research be borne by the parties that stand to gain the most profit from successful outcomes. OST-R's greatest potential value is to direct its efforts at unlocking SAE Levels 4 and 5 until the path to commercialization exists at these levels.

II. Ensuring Navigation Systems Are Free from Interference

Protecting global navigation satellite systems from interference from regimes such as China, Russia, and Iran is more important than ever. Disruptions would pose an immense economic and national security threat, potentially costing trillions of dollars and dwarfing any market disruptions from tariffs. For example, one incident of GPS interference disrupted operations at Denver International and Centennial Airports over a 33.5-hour period in January of 2022,[22] and Russia is increasingly disrupting GPS signals in Europe.

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[15] Uber. (2021-22). U.S. Safety Report. https://uber.app.box.com/s/lea3xzb70bp2wxe3k3dgk2ghcyr687x3?uclick_id=062c770d-5c65-415c-a355-4444e6e013bf

[16] Nat'l Hwy. Traffic Safety Admin. (2022). Levels of Automation. https://www.nhtsa.gov/sites/nhtsa.gov/files/2022-05/Level-of-Automation-052522-tag.pdf

[17] Ford Motor Co. BlueCruise is Hands-Free Highway Driving. https://www.ford.com/technology/bluecruise

[18] Gold, A. (2025). Best Tech 2025: Why We Trust GM's Super Cruise Driver Assistance System to Take the Wheel. MotorTrend. https://www.motortrend.com/news/best-tech-2025-gm-super-cruise-driver-assistance

[19] Tesla. Autopilot. https://www.tesla.com/support/autopilot

[20] Mercedes-Benz USA. DRIVE PILOT. https://www.mbusa.com/en/owners/manuals/drive-pilot

[21] *Supra*, n.9.

[22] Cybersecurity and Infrastructure Security Agency (Dec. 2022). Global Positioning System (GPS) Interference. CISA Insights. https://www.cisa.gov/sites/default/files/publications/CISA-Insights_GPS-Interference_508.pdf

Global navigation satellite systems are free services that send positioning, timing, and navigation systems to phones, banks, and other electric utilities. America has the Global Positioning System, Europe has Galileo, and China has Bei Dou. These vulnerable systems depend on satellites, which can be damaged by electromagnetic storms or military attacks. Even with the satellites intact, hacking incidents proliferate, using inexpensive, easily available hardware.

Congress has directed DOT to install a backup to GPS,[23] albeit without allocating sufficient funds to do so. In addition, President Trump in his first term assigned government departments the task of assessing the resilience of their GPS systems through Executive Order 13905.[24] This Executive Order remained in force under President Joe Biden.

China[25] and Russia[26] have shown that they have the capacity to take down Western satellites. University of Texas student Zach Clements has traced GPS manipulation to Iran.[27] Even with the satellites intact, hacking incidents proliferate, using inexpensive, easily available hardware.

The Coast Guard collects reports[28] of gaps in GPS coverage throughout the world. Examples in 2025 include ships in Finland, the Gulf of Oman, the United Arab Emirates, and Los Angeles.[29] In August, the plane carrying European Union Commissioner Ursula von der Leyen lost GPS as it was landing in Bulgaria. Russia was suspected of jamming GPS to the plane, which landed using paper maps.[30] In March 2024, a plane carrying Grant Shapps, then the Secretary of Defence of the UK, was subjected to spoofing (false signals substituted for real signals) when it was flying close to Kaliningrad, near Poland and Lithuania.[31]

Multiple technologies are available that could be used in the absence of GPS signals, including terrestrial radio signals, fiber networks for timing, low earth orbit satellites for encrypted signals, and Wi-Fi and cell signals for localization. The Transportation Department has been testing these technologies over the past year. For instance, Tern AI,[32] on whose advisory board I serve,

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[23] The Frank LoBiondo Coast Guard Authorization Act of 2018 (P.L. 115-282; December 4, 2018) at Sec. 514, "Backup National Timing System," also known as the National Timing Resilience and Security Act of 2018."
[24] Exec. Order No. 13905, "Strengthening National Resilience Through Responsible Use of Positioning, Navigation, and Timing Services," 85 CFR 9359.
[25] David, L. (2021, Nov. 17). "China's Anti-Satellite Test: Worrisome Debris Cloud Circles Earth." Space.com. https://www.space.com/3415-china-anti-satellite-test-worrisome-debris-cloud-circles-earth.html
[26] U.S. Space Command Public Affairs Office. (2021, Nov. 15). "Russian direct-ascent anti-satellite missile test creates significant, long-lasting space debris" [Press release]. https://www.spacecom.mil/Newsroom/News/Article-Display/Article/2842957/russian-direct-ascent-anti-satellite-missile-test-creates-significant-long-last/
[27] Niles, R. (2023, Nov. 28). "GPS Spoofing Signals Traced to Iran." Aviation News. https://avweb.com/aviation-news/gps-spoofing-signals-traced-to-tehran/
[28] U.S. Coast Guard. *GPS User Issue Detection & Evaluation (GUIDE) Tool*. https://www.navcen.uscg.gov/guide-tool
[29] *Id.*
[30] *E.g.*, Davies, M., & Vernon, W. (2025, September 1). "EU Chief von der Leyen's plane hit by suspected Russian GPS jamming." BBC. https://www.bbc.com/news/articles/c9d07z1439zo
[31] *E.g.*, Shevchenko, V. (2024, May 2). "Russia blamed for GPS interference affecting flights in Europe." BBC. https://www.bbc.com/news/articles/cne900k4wvjo
[32] Tern AI. https://www.tern.ai

is a new mapping system that operates without spectrum, beacons, or subscriptions, and provides GPS backup for vehicles for a one-time low fee. Investigating how these, or other, GPS alternatives and complements could be used by AVs would be critical to making any nationwide use of ADS more secure.

The best way to protect GPS and satellite systems is to protect the spectrum, toughen the receivers that receive signals, and have multiple sources of positioning, navigation and timing for verification. In addition, investigating usable alternatives is a critical element of resiliency, for any circumstances in which GPS may fail, whether due to misfortune or malign actors.

The stakes are high. Americans use millions of GPS receivers in cellphones, commercial trucks and buses, and railroads. Cars have navigation systems. Ships, planes and drones use GPS for navigation. Trucks use GPS not only for location services but also for electronic logging devices, which show information such as whether drivers have been driving for too long or are getting sleepy. Emergency responders use GPS rather than maps to locate accident sites and transport patients to hospitals. You don't want to be waiting for fire engines or ambulances when GPS is hacked or disrupted, particularly in an automated context that lacks a human driver who may be able to, in an emergency, travel without technological mapping or navigation aids.

Businesses also rely on GPS. Tractors reduce agricultural costs by pinpointing precise places to plant seeds and spread water and fertilizers. Builders use GPS to do the same with nails and studs. Surveyors use GPS for measurements that are out of their line of sight, especially in waterways. Electric power plants rely on this technology to synchronize generators and distribute energy to the grid.

The global cost of GPS interference is too high for world governments to wait for it to fail, and the cost would only grow in the context of a world powered by ADS. This is an area where like-minded governments can and should work together to develop reliable backups, both for economic and military security.

III. National Security Need for American Equipment

For too long, America has been sleepwalking into a dangerous dependency on Chinese technology in the transportation area, ranging from batteries to electric vehicles to drones. This is a major concern for national security, economic resilience, and the ability to stand firm in the face of geopolitical tensions. The stakes are high enough to justify use of government research funds, particularly given the national security context that falls squarely within Federal government's scope of responsibility.

Chinese-made equipment, particularly those embedded with sensitive components, pose a dual threat. First, they can serve as conduits for data collection, quietly siphoning information from

American infrastructure, and even potentially creating vulnerabilities to sabotage.[33] Second, in the event of a conflict, such as over Taiwan, China could simply flip the switch, and cut off battery supplies, crippling everything from our energy grid to our defense systems.

This is what Chinese battery maker Dongguan Poweramp Technology Ltd. did to drone company Skydio on the instructions of the Chinese Communist Party. In October 2024[34] Beijing banned[35] the export of batteries to Skydio after Skydio sold drones to Taiwan's National Fire Agency, which were critical to civilian safety.

Critical minerals such as lithium, graphite, iron, and phosphate can be sourced in the United States, including lithium from North Carolina, Nevada, and Arkansas; iron from Minnesota and North Dakota; and phosphate from Florida and Louisiana. There is no need to rely on cobalt from the Congo or nickel from Indonesia and Russia, and no need to play supply chain roulette with autocratic regimes.

Lithium iron phosphate (LFP) batteries are not just for cars. They power data centers, grid-scale energy storage, electric vehicle charging stations, and homes. They are also vital for defense applications, from aerial drones to underwater vehicles. Yet despite the construction of multiple LFP gigafactories by Tesla, Ford, GM, LG, and Samsung, one critical piece remains missing: the cathode active material (CAM), which is still made in China.

There are companies in the U.S., such as Sparkz,[36] which are currently making Lithium-ion batteries with a fully U.S.-based supply chain including the sourcing of the raw materials. A possible approach for accelerating domestic content with a requirement of more than 85 percent domestic content by 2027 would involve a cross-agency collaboration (FAA, DOD, and DOE) and allow for a seamless transition to U.S.-made batteries. Ideally, this cross-agency collaborative effort working with the private sector (drone companies and battery manufacturers) would set up a phased approach whereby field pilots of drones and U.S.-made batteries satisfying the domestic content requirements are conducted with an accelerated timeline with well-defined milestones and deliverables. More research in this area is needed.

With the One Big Beautiful Bill Act removing incentives for Chinese equipment and helping the domestic market through the 45X advanced manufacturing production credit, Congress has provided both funding and incentives for industry to wean themselves off from these Chinese

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[33] Office of the Director of National Intelligence (2025). Annual Threat Assessment of the U.S. Intelligence Community at pp. 11-12. [Unclassified].
https://www.dni.gov/files/ODNI/documents/assessments/ATA-2025-Unclassified-Report.pdf

[34] Kesteloo, H. (2025, Apr. 16). "U.S. Drone Makers Struggle to Break Free from Chinese Parts Dependency." Drone XL.
https://dronexl.co/2025/04/16/us-drone-makers-struggle-to-break-free-from-china/

[35] Bry, A. (2024, Oct. 30). "China's Sanctions on Skydio." Skydio Blog.
https://www.skydio.com/blog/chinas-sanctions-on-skydio

[36] Sparkz Inc. https://sparkz.energy/

handcuffs.[37] Yet additional research is still needed in order to complete the quest for ACs to achieve true supply chain independence.

The Chinese Communist Party controls the critical mineral supply chain, and this month has threatened disruptions. It is both an economic risk and a national security threat to allow China to maintain this control. American companies must reorient towards domestic suppliers, the sooner the better, and research from the Department of Transportation can aid the process.

Respectfully Submitted,

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[37] Diana Furchtgott-Roth and Andrew Hale, "Extricating America from Its Chinese Handcuffs," Heritage Foundation *Special Report* No. 297, September 26, 2024
https://www.heritage.org/sites/default/files/2024-09/SR297.pdf

[38] These comments represent my personal views and do not represent the views of The Heritage Foundation, Sparkz Inc., or Tern AI Inc.