

Input from ARPAE NEXTCAR Program Awardee's Team

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We provide our input drawn from our experience working with the Advanced Research Project Agency-Energy's (ARPAE) tNext-Generation Energy Technologies for Connected and Automated On-Road Vehicles (NEXTCAR) program. Our project is one of the 11 NEXTCAR projects and focuses on developing the control technologies that can aim to improve the efficiency of a 2016 Audi A3 e-tron by at least 20% using connected and automated vehicle technologies.

We are technologically-oriented researchers and that we are responding to a subset of the questions where we feel qualified to offer an opinion

Question 1. What potential factors should be considered in designing the structure of a pilot program that would enable the Agency to facilitate, monitor and learn from on-road research through the safe testing and eventual deployment of vehicles with high and full driving automation and associated equipment?

Response: It is important for a pilot program to also consider metrics that could help us understand the social behavior of drivers, operators (for autonomous vehicles), and travelers interacting with these systems.

Other potential factors that should be considered are related to: 1) the level of automation of vehicles participated in this program and planned to be deployed in public traffic and 2) selection of a small town for ultimate deployment.

Question 2. If NHTSA were to create a pilot program, how long would there be a need for such a program? What number of vehicles should be involved? Should NHTSA encourage the conducting of research projects in multiple locations with different weather conditions, topographical features, traffic densities, etc.?

Response: It would be useful to include diverse transportation systems and modes, e.g., connected and automated vehicles (CAVs), electric vehicles, public transit, and shared mobility. Indeed, research projects should take place in multiple locations with different weather conditions, with distinct demographics and unique transportation dynamics such as temporally volatile traffic congestion, significant pedestrian and bicycle activity, and high transit ridership.

Question 6. What vehicle design elements might replace existing required safety equipment and/or otherwise enhance vehicle safety under reasonably anticipated operating conditions?

Response: An external human-machine interface (e.g., display and/or indicator lights) can be added for a better interaction with pedestrian and bicycles.

Question 9. What type and amount of data should participants be expected to share with NHTSA and/or with the public for the safe testing of vehicles with high and full driving automation and how frequently should the sharing occur?

Response: The following shared information from other vehicles or infrastructure would be necessary:

1. Speed of each vehicle to realize the speed profile across the roadways.
2. Acceleration/braking of vehicles to predict how the real speed profile across the roadways will be altered over the next short time horizon.
3. Drivers' response to various disturbances so that the controller in the vehicle uses this information to learn the difference between the actual vehicle speed and the anticipated speed as indicated by the roadways' speed profile. For example, the driver might exhibit aggressive acceleration, or braking, to meet the speed limits.

Question 10. In the design of a pilot program, how should NHTSA address the following issues data storage and transmission?

Response: There should be two parallel and appropriately interacting storage levels: 1) a cloud-based, and 2) a vehicle-based level.

Question 12. Are there any additional critical areas to consider in the design of a safe pilot program for the testing and deployment of vehicles with high and full driving automation?

Response: Opportunities to use safety as an enabler for improving transportation efficiency. For example, by enhancing safety with CAVs can aim increase their market penetration at a high pace. The latter will aim at realizing the potential benefits related to energy due to CAVs

Question 13. Which of the following matters should NHTSA consider requiring parties that wish to participate in the pilot program to address in their applications?

Response: Sharing of data and finding across participants. Sufficient primary testing in tracks before deployment to public traffic.