

DEPARTMENT OF TRANSPORTATION

**1 INFORMATION COLLECTION
SUPPORTING STATEMENT**

Title: FMVSS Considerations for Vehicles with Automated Driving Systems: Seating Preference Study
OMB Control No. 2127-New

Abstract:¹

The National Highway Traffic Safety Administration (NHTSA) intends to seek OMB approval to conduct four information collections to gather both objective and subjective data regarding occupant/passenger seat preference in Automated Driving System-Dedicated Vehicles (ADS-DVs). Adults ages 18 and older who meet eligibility criteria such as holding a valid driver's license and having used a ride sharing application at least once in the past year will be eligible to respond. Response is voluntary. It is a one-time collection, and eligible volunteers will participate in a single test-track experiment after giving informed consent. Questionnaire data will be collected at the beginning and end of participation for each participant and objective data will be collected during the test-track experiment via the data acquisition systems installed in each study vehicle. NHTSA will receive data and reporting from this collection and intends to publish a report with the findings of this study.

Part A. Justification

1. Explain the circumstances that make the collection of information necessary. Identify any legal and administrative requirements that necessitate the collection. Attach a copy of the appropriate section of each statute and regulation mandating or authorizing the collection of information.

The National Highway Traffic Safety Administration's (NHTSA's) mission is to save lives, prevent injuries, and reduce economic losses resulting from motor vehicle crashes. Several safety outcomes stem from occupant seating preference, which may change in the future as Automated Driving Systems (ADS) change seating configurations and the way people use vehicles. ADS-Dedicated Vehicles (ADS-DVs) are vehicles that lack manually operated driving controls, and therefore do not require a human driver or occupant to drive the vehicle or sit in the left front seat (the "driver's seat" in conventional vehicles). In conventional vehicles, there is the basic assumption that a human will always be in the left front seat while the vehicle is operating because a human driver would be necessary to operate those vehicles. ADS-DVs provide the opportunity for occupants to sit in any seat they choose in the vehicle.

¹ The Abstract must include the following information: (1) whether responding to the collection is mandatory, voluntary, or required to obtain or retain a benefit; (2) a description of the entities who must respond; (3) whether the collection is reporting (indicate if a survey), recordkeeping, and/or disclosure; (4) the frequency of the collection (e.g., bi-annual, annual, monthly, weekly, as needed); (5) a description of the information that would be reported, maintained in records, or disclosed; (6) a description of who would receive the information; (7) if the information collection involves approval by an institutional review board, include a statement to that effect; (8) the purpose of the collection; and (9) if a revision, a description of the revision and the change in burden.

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It is currently unknown where occupants may choose to sit when riding in an ADS-DV. Moreover, new seating configurations for occupants of ADS-DVs may necessitate changes to how and where information is presented to occupants via in-vehicle displays about their responsibilities as occupants (e.g., closing doors, fastening seatbelts, awareness of ride status such as ride in progress, vehicle in motion, remain seated, etc.). Furthermore occupants will need a human-machine interface (HMI) to provide input that they are ready for the ride to begin, or to request that the ride stop. At present, no standardized or otherwise commercially produced HMIs exist for this purpose. Therefore, in order to conduct the research, a prototype HMI will be developed. The two main goals for this study are as follows:

1. Describe the occupant distribution for ADS-DVs (i.e., seating distribution)
2. Use the prototype HMI to evaluate where occupants would choose to initiate a ride in an ADS-DV without a seatbelt.

Seating configuration will affect the location(s) of safety equipment such as airbags, child protection mechanisms such as car-seat mounting brackets, as well as general crashworthiness standards. As noted above, it is not currently known how occupants will choose to sit in an ADS-DV, particularly when there are non-standard seating configurations (e.g., seats that face each other). As such, a data collection effort involving human subjects is required to address this knowledge gap.

The occupants will have very clear responsibilities: (1) closing doors, (2) positioning themselves in a seat and using their restraints, (3) starting the ride, and (4) potentially requesting an early termination (i.e., minimal risk condition stop). The occupants fulfill their responsibilities via the HMI in the vehicle.

Further, 49 U.S.C. 30181, 30182, and 30183² authorize the Secretary of Transportation to conduct research, development, and testing programs, including activities related to new and emerging technologies that impact, or that may impact, motor vehicle safety. This authority has been delegated to NHTSA.³

- 2. Indicate how, by whom, and for what purpose the information is to be used. Except for a new collection, indicate the actual use the agency has made of the information received from the current collection.**

The Virginia Tech Transportation Institute (VTTI) will conduct this study under an Indefinite Delivery Indefinite Quantity (IDIQ) contract with NHTSA. There are three instruments that will be used for the study. The **(1) Eligibility Questionnaire** will be used to identify eligible participants for this study; results from this questionnaire will not be kept or analyzed. Participants will be recruited from the New River Valley (NRV) and surrounding areas in

² [49 USC Subtitle VI, Part A, Chapter 301, Subchapter V: Motor Vehicle Safety Research and Development](http://uscodebeta.house.gov)
<http://uscodebeta.house.gov>

³ [49 CFR Subtitle A, Part 1, Subpart D, Section 1.95: Delegations to the National Highway Traffic Safety Administrator](http://www.gpo.gov). <http://www.gpo.gov>

Virginia. The NRV consists of the counties of Montgomery, Giles, Pulaski, and Floyd. Major towns and cities in the area include Blacksburg, Christiansburg, Radford, and Pulaski. Nearby surrounding areas also include Roanoke (both city & county), VA. Recruitment will be conducted by VTTI personnel who will contact candidate participants by phone, email, or other electronic means utilizing a VTTI-maintained database of participants that have previously participated and/or expressed interest in participating in research studies. VTTI will also recruit participants via social media and/or other advertising methods. Candidate participants will be asked questions about their driving history, previous participation in driving studies, and general health. The general health questions will be used to screen out individuals who may incur harm while participating in a test-track experiment, such as those with back or neck injuries.

Per Virginia Tech requirements, individuals must meet the criteria listed below to be eligible to participate in the study:

1. Must hold and be able to present a valid U.S. driver's license at time of participation.
2. Must be 18 or older.
3. Must be a U.S. citizen or permanent resident (green card holder).
4. Must be willing to provide SSN or Virginia Tech ID #.
5. Must be able to drive an automatic transmission without assistive devices or special equipment.
6. Must have used a ride sharing application at least once in the past year.
7. Must not have participated in a similar study.
8. Must not have more than two driving violations in the past 3 years.
9. Must not have caused an injurious accident within the past 3 years.
10. Must be in good health.
11. Must have normal (or corrected to normal) hearing and vision in both eyes.
12. Eyeglasses must not tint or darken in the sunlight while sitting inside the research vehicle. Must be able to ride without sunglasses.
13. Must be able to fluently read, write, and speak English.
14. Pregnant women will be excluded from the study.
15. Must not be involved/employed in the design, engineering, or development of automotive-related technologies.

Individuals who do not meet the eligibility requirements listed above will be excluded because they may not participate safely in a test-track experiment, or would otherwise introduce too much variability and mask the effects of the independent variables that are the principle focus of the study. Participant criteria will also include that they have used a ride-share application at least once in the last year. We anticipate that participants meeting these criteria are representative of the overall universe of adults aged 18 or over with a valid driver's license who have used a ride-share application within the last year.

Candidates who are selected for the study will participate in a single test-track experiment and will complete two additional questionnaires while participating in the experiment.

During the data collection session at VTTI, the subjects will provide verbal responses to the **(2) Demographic Questionnaire** to be recorded in an electronic survey and reviewed by VTTI personnel. Data collected using the **(2) Demographic Questionnaire** will be used for description of the participant sample (e.g., number of males and females in the dataset, final age range for all participants, and driving experience range for all participants). This is necessary to compare the sample collected to the general driving population.

Once the **(2) Demographic Questionnaire** is completed, participants will participate in the **(3) Test-Track Experiment** in which they will experience riding in a standard passenger vehicle and two ADS-DVs. Two participants will complete the study during each session. Both participants will ride in the same study vehicle. Each ride will be approximately five minutes. Once the first ride is completed, the participants will summon their next vehicle. The next ride will then be completed by both participants, and the process repeated for the final ride. During all rides, the data acquisition systems will record video and audio inside the vehicle cabin, vehicle data, and kinematic data about the ride. Participants' seat selection, any seat changes during the ride, and seat belt use will be recorded during each ride during the study.

After experiencing all three vehicles, subjects will provide verbal responses to the **(4) Post Experiment Questionnaire** and VTTI personnel will record their responses electronically. The responses to this questionnaire will be used to analyze the perceptions and opinions of ADS-DV technology within the participant sample, as well as to gather any comments regarding their seat preference and seat belt use. This data will be used to determine how and why participants choose seating preferences in ADS-DVs.

In summary, the information to be collected will be used to:

- (a) Screen individuals meeting the eligibility criteria for the study;
- (b) Describe the sample population;
- (c) Measure participants' preference for seating and seat belt use in an ADS-DV; and
- (d) Measure participant opinions of ADS.

3. Describe whether, and to what extent, the collection of information involves the use of automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submission of responses, and the basis for the decision for adopting this means of collection. Also, describe any consideration of using information technology to reduce burden.

Overall the study will use electronic methods when available, including recruitment, questionnaire response collection, and the data acquisition system (DAS) for in-vehicle data. The study requires in-vehicle data collection to be conducted in person, as part of an experiment; however, person-to-person interviews for eligibility assists in completion of data collection and establishing rapport leading into in-person experiments, and person-to-person

collection of post-experiment responses assists in providing greater detail in responses. As such, electronic methods will primarily be for data storage. Specific methods are described below.

VTTI will use electronic methods to put ads online and/or contact potential subjects from the subject pool from previous VTTI studies. The **(1) Eligibility Questionnaire** will be completed primarily via telephone to both ensure completion of responses and establish rapport with potential participants.

The **(2) Demographic Questionnaire** and **(4) Post Experiment Questionnaire** will use Qualtrics survey software to record responses. All responses will be collected in-person by VTTI personnel who will ask the questions verbally while recording participant responses using the survey software. Survey research states that face-to-face surveys receive better response rates and quality of data.

In-vehicle data collection during the **(3) Test-Track Experiment** is electronic via the DAS.

4. Describe efforts to identify duplication. Show specifically why any similar information already available cannot be used or modified for use for the purposes described in Item 2 above.

This is a one-time collection and is only applicable to the study described above. The information collected by the **(1) Eligibility Questionnaire, (2) Demographic Questionnaire, (3) Test-Track Experiment and (4) Post Experiment Questionnaire** is specific to the particular individuals who will be participating in this study. Similar information collected from other individuals is not applicable. The agency is not aware of any other sources of this information.

5. If the collection of information involves small businesses or other small entities, describe the methods used to minimize burden.

This collection of information involves individuals and does not involve small businesses or other small entities.

6. Describe the consequence to Federal program or policy activities if the collection is not conducted or is conducted less frequently, as well as any technical or legal obstacles to reducing burden.

ADS technology is rapidly developing, and current FMVSS and/or NHTSA guidance may need to be adapted to ensure this technology is deployed safely. Many of NHTSA's FMVSS focus on particular seating positions and thus, changes in seating preferences could impact those FMVSS. This study will provide NHTSA information about the seating preferences of occupants in vehicles that do not require a human driver in the left front seat thus providing essential information about safety countermeasures and equipment. Additionally, the study

will identify possible issues with the ADS technology from its users, such as overall trust in these systems, that can be further investigated in future studies. Additionally, the post-experiment surveys will provide NHTSA guidance on how to address any issues to improve seat belt compliance in driverless vehicles equipped with ADS, as well as crashworthiness standards for rear and/or non-forward facing seats. No other existing data sources exist to address these issues, consequentially without collecting the information NHTSA will not have data for guidance.

- 7. Explain any special circumstances that would cause an information collection to be conducted in a manner:**
- a. requiring respondents to report information to the agency more often than quarterly;**
 - b. requiring respondents to prepare a written response to a collection of information in fewer than 30 days after receipt of it;**
 - c. requiring respondents to submit more than an original and two copies of any document;**
 - d. requiring respondents to retain records, other than health, medical, government contract, grant-in-aid, or tax records, for more than three years;**
 - e. in connection with a statistical survey, that is not designed to produce valid and reliable results that can be generalized to the universe of study;**
 - f. requiring the use of a statistical data classification that has not been reviewed and approved by OMB;**
 - g. that includes a pledge of confidentiality that is not supported by authority established in statute or regulation, that is not supported by disclosure and data security policies that are consistent with the pledge, or which unnecessarily impedes sharing of data with other agencies for compatible confidential use; or**
 - h. requiring respondents to submit proprietary trade secrets, or other confidential information unless the agency can demonstrate that it has instituted procedures to protect the information's confidentiality to the extent permitted by law.**

There are no special circumstances that would cause this collection to be collected in a manner inconsistent with 5 CFR 1320.5(d)(2).

- 8. If applicable, provide a copy and identify the date and page number of publication in the Federal Register of the agency's notice, required by 5 CFR 1320.8(d), soliciting comments on the information collection prior to submission to OMB. Summarize public comments received in response to that notice and describe actions taken by the agency in response to the comments. Specifically address comments received on cost and hour burden. Describe efforts to consult with persons outside the agency to obtain their views.**

NHTSA published a notice in the Federal Register with a 60-day public comment period to announce this proposed information collection on March 7, 2022 (87 FR 12772). NHTSA received one comment on the notice. The comment did not address the information collection request or the seating preference study and instead commented on other issues regarding motor vehicle safety. In addition to seeking comment on 60-day notice, NHTSA and the research team have publicized this study for a number of years across industry and consumer events. NHTSA has socialized this study through various means including discussion in the public-facing Annual Modal Research Plan FY2022-2023, discussion during the NHTSA Research Portfolio Fall 2022 public meeting, inclusion in a presentation at the 2021 SAE Government Industry Meeting, and discussion with industry stakeholders through individual meetings and association groups. Feedback regarding the study was positive and supportive and assistive in refinement of the study including the human machine interaction design and presentation.

9. Explain any decision to provide any payment or gift to respondents, other than remuneration of contractors or grantees.

Respondents that make it past the eligibility screening are paid for their time participating in the study. Participants will receive \$90 based on full participation, at the end of the study. Individuals who withdraw prior to completion of the study will still be paid \$90. The compensation is based on rates that VTTI has paid participants in past research studies sponsored by the U.S. Department of Transportation. The entirety of participation in the study while on-site at the facility is estimated at 2 hours. Two hours of participation at the mean Virginia hourly rate for labor of \$29.97 totals \$59.94 and the \$90 compensation accounts for additional time and costs for transportation and preparation. The compensation helps ensure participants will be timely and cooperative during the course of the experiment but is not an over-compensation deemed coercive to participate in the study.

10. Describe any assurance of confidentiality provided to respondents and the basis for the assurance in statute, regulation, or agency policy. If the collection requires a systems of records notice (SORN) or privacy impact assessment (PIA), those should be cited and described here.

VTTI will provide each participant with an informed consent form which explains that VTTI and NHTSA will maintain the confidentiality of all personally identifying data and information collected in connection with this study to the extent provided by law.

11. Provide additional justification for any questions of a sensitive nature, such as sexual behavior and attitudes, religious beliefs, and other matters that are commonly considered private. This justification should include the reasons why the agency considers the questions necessary, the specific uses to be made of the information, the explanation to be given to persons from whom the information is requested, and any steps to be taken to obtain their consent.

The questionnaires do not contain questions related to matters that are commonly considered sensitive or private. The questions focus on demographic information; drivers' trust in ADS-DV technologies; perceived benefits or issues; and attitude towards the ADS-DV technologies that they encounter as part of the experiment.

12. Provide estimates of the hour burden of the collection of information on the respondents and estimates of the annualized labor cost to respondents associated with that hour burden.

The study approach consists of a single data collection session in order to obtain objective and subjective information about occupant seat preference in ADS-DVs. An expected total of up to 100 participants will be recruited to participate in the study. The study approach consists of test-track experiments and questionnaires to collect objective and subjective data.

The study sample will collect data from an equal number of male and female drivers to evaluate whether there are differences between male and female drivers. The screening questionnaire will ask potential participants to self-identify their gender and includes gender because this research is designed to evaluate differences in behavior across demographics. Participants who identify as non-binary will not be excluded in the study, but comparative analysis between non-binary and male or female drivers is not expected to be possible with the target sample size. It is estimated that 200 responses will be needed in order to identify 100 eligible participants. The eligibility questionnaire has a maximum of 28 questions and NHTSA estimates it will take approximately 20 minutes to complete. Therefore, NHTSA estimates the total time associated with completing eligibility-questionnaire interviews to be 67 hours (200 responses \times 20 minutes = 4,000 minutes = 66.67 hours or 67, rounded).

The remainder of the study will take place on-site. Study Intake, (reading study information sheet and obtaining participant consent, general study instruction) is expected to take 10 minutes to complete. Each of the 100 participants will need to go through the Study Intake. Both the demographic and post-experiment questionnaires will have a maximum of 20 questions and NHTSA estimates that it will take each eligible participant 10 minutes to complete the demographic questionnaire and 10 minutes to complete the post-experiment questionnaire. Study participation (e.g., riding in study vehicles on the test track) is expected to take 90 minutes. Therefore, NHTSA estimates the total burden for Study Intake to be 17 hours (100 responses \times 10 minutes = 1,000 min = 16.67 hours or 17, rounded), Demographic Questionnaire to be 17 hours (100 responses \times 10 minutes = 1,000 minutes = 16.67 hours or 17, rounded), and The Post-Experiment questionnaire to be 17 hours (100 responses \times 10 minutes = 1,000 minutes = 16.67 hours or 17, rounded). The total burden hours for study participation are calculated to be 150 hours (100 responses \times 90 minutes = 9,000 minutes = 150 hours).

Total opportunity costs were calculated using the mean hourly rate of \$29.97 for all occupations in Virginia.⁴

Please note that the estimates for time to complete study intake, surveys, and study participation were established based on previous experience of VTTI personnel in executing previous test track studies, administering similar questionnaires, the total number of questions, the type of questions asked (e.g., multiple choice, open ended responses) and represents the estimated maximum time that might be needed to complete each survey. Surveys were also reviewed by the research team whose completion times are within the burden times presented in Table 1. Accordingly, NHTSA estimates the total burden hours for this information collection to be 268 hours and estimates the total opportunity cost associated with those hours to be \$8,034.00. Data collection is expected to take less than one year, so the total burden hours and the total opportunity costs are the same as the annual burden hours and annual opportunity costs.

Table 1 shows the estimated burden hours and associated opportunity costs for this information collection, which accounts for the maximum number of expected responses and drop-outs.

Table 1: Estimated Burden Hours and Opportunity Costs

| Instrument⁵ | No. of Respondents | Frequency Of Response | Time (min.) | Opportunity Cost/Hour | Opportunity Cost Per Response. | Total Burden Hours | Total Opportunity Cost (Cost/Resp × No. Respondents) |
|-------------------------------|---------------------------|------------------------------|--------------------|------------------------------|---------------------------------------|---------------------------|---|
| Eligibility Questionnaire | 200 | 1 | 20 | \$29.97 | \$9.99 | 67 | \$2,008.00 |
| Study Intake | 100 | 1 | 10 | \$29.97 | \$5.00 | 17 | \$510.00 |
| Demographic questionnaire | 100 | 1 | 10 | \$29.97 | \$5.00 | 17 | \$510.00 |
| Study Participation | 100 | 1 | 90 | \$29.97 | \$44.96 | 150 | \$4,496.00 |
| Post-Experiment Questionnaire | 100 | 1 | 10 | \$29.97 | \$5.00 | 17 | \$510.00 |
| Total | | | | | | 268 Hours | \$8,034.00 |

13. Provide an estimate of the total annual cost burden to respondents or record keepers resulting from the collection of information. Do not include the cost of any hour burden already reflected in the response provided in question 12.

The only cost burdens respondents will incur are costs related to travel to and from the study

⁴ May 2021 Occupational Employment and Wage Estimates, Bureau of Labor Statistics. http://www.bls.gov/oes/current/oes_va.htm (accessed May 11, 2022).

⁵ All instruments used in this collection are for reporting.

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location. The costs are minimal and are expected to be offset by the honorarium that will be provided to all research participants.

14. Provide estimates of annualized costs to the Federal government. Provide a description of the method used to estimate cost, which should include quantification of hours, operational expenses (such as equipment, overhead, printing, and support staff), and any other expense that would not have been incurred without this collection of information.

The full costs of this information collection are included in a contract awarded to VTTI. The total cost for the 34-month project is \$1,562,025. This total cost estimate includes the labor of the research personnel, equipment and materials, analysis and report preparation, and participant compensation.

Table 2: Costs to the Federal Government

| Seating Preference | | |
|----------------------|---------------------|---|
| Item | Cost | Comments |
| Labor | \$ 819,565 | ADS-DV vehicle hardware changes, ADS control development, research planning, HMI development (sub-study), recruitment and running participants, data analysis, briefing and Seating Preference study final report |
| Equipment | \$ 5,000 | Remote minimal risk condition equipment |
| Materials | \$ 92,100 | DAS, cameras, materials to convert two vehicles into ADS-DV looking concepts (e.g., remove steering wheel and repair area) |
| Contractual Services | \$ 59,712 | Smart Road time, fuel, participant compensation |
| Indirect Cost | \$ 585,648 | |
| Total Cost | \$ 1,562,025 | |

The total cost for the 34-month project is \$1,562,025, and the approximate annualized cost to the Federal Government is \$551,303.

15. Explain the reasons for any program changes or adjustments reported on the burden worksheet. If this is a new collection, the program change will be entire burden cost and number of burden hours reported in response to questions 12 and 13. If this is a renewal or reinstatement, the change is the difference between the new burden estimates and the burden estimates from the last OMB approval.

This new collection is expected to add a burden of 268 hours and \$0.

16. For collections of information whose results will be published, outline plans for tabulation and publication. Address any complex analytical techniques that will be used. Provide the time schedule for the entire project, including beginning and ending dates of the collection of information, completion of report, publication dates, and other actions as applicable.

NHTSA intends to publish a report with the findings of this study. An exact publication date has not been established but would likely occur within 12 months after the completion of the research project. The report will provide aggregate results and no personal information will be published, nor will the findings be linked to any individuals.

17. If seeking approval to not display the expiration date for OMB approval of the information collection, explain the reasons that the display would be inappropriate.

NHTSA is not seeking such approval. Expiration dates will be displayed after the Paperwork Reduction Act Statement at the top of each document.

18. Explain each exception to the topics of the certification statement identified in "Certification for Paperwork Reduction Act Submissions." The required certifications can be found at 5 CFR 1320.9.

There are no exceptions.