

ABOUT EXPLORATORY ADVANCED RESEARCH (EAR)

EAR focuses on longer term, higher risk, higher potential research and leverages cutting-edge science and technology to meet the needs of our Nation's highway transportation system.

Organizations and researchers may face uncertainties in research approaches and outcomes. However, these challenges can lead to innovative research techniques, instruments, and processes that propel future advanced and applied research projects.

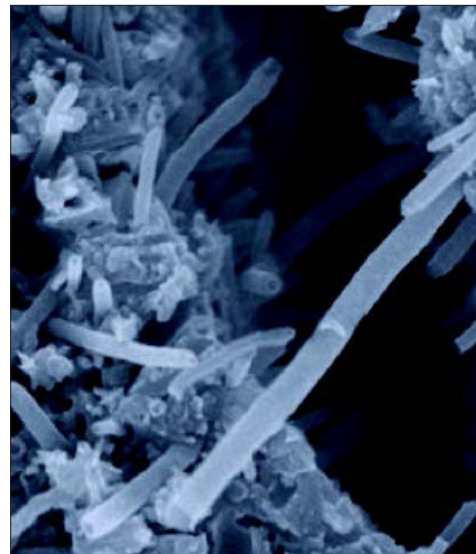


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GETTING INVOLVED WITH THE EAR PROGRAM

The EAR Program's work leverages a broad range of expertise through its traditional (e.g., researchers in public agencies) and nontraditional (e.g., investigators in private industry) stakeholders. Since 2006, the EAR Program has engaged stakeholders through the following activities:

- Identifying and evaluating topics as part of meetings and scanning trips.
- Reviewing proposals and projects. More than 250 experts have provided assessments of proposals, ongoing projects, and possible new topics. Most reviewers are from U.S. academic institutions, State and local DOTs, Federal agencies outside of FHWA, private companies, and international academic institutions.
- Conducting research. The EAR Program awarded 108 research projects on 59 different topics between 2007 and 2023. The research awards include work by multidisciplinary teams at 84 academic institutions, 58 private companies, 14 State and local agencies, 10 Federal laboratories, and 10 foreign institutions.



Source: FHWA.⁵

EXPLORATORY ADVANCED RESEARCH



LEARN MORE

For more information, visit the [EAR Program website](https://highways.dot.gov/research/research-programs/exploratory-advanced-research/exploratory-advanced-research-overview) for information on research solicitations, updates on ongoing research, links to published materials, summaries of past EAR Program events, and details on upcoming events.⁷

⁷ FHWA. n.d. "Exploratory Advanced Research Overview" (web page). <https://highways.dot.gov/research/research-programs/exploratory-advanced-research/exploratory-advanced-research-overview>, last accessed October 20, 2023.

VISIT THE EAR PROGRAM WEBSITE



<https://highways.dot.gov/research/research-programs/exploratory-advanced-research/exploratory-advanced-research-overview>

EXPLORATORY ADVANCED RESEARCH PROGRAM



U.S. Department of Transportation
Federal Highway Administration

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U.S. Department of Transportation
Federal Highway Administration

ABOUT THE FEDERAL HIGHWAY ADMINISTRATION (FHWA) EAR PROGRAM

Federal legislation established FHWA's EAR Program to support breakthrough research that has the potential to dramatically improve various aspects of the Nation's transportation systems. FHWA's EAR Program ensures broad scientific participation and extensive coverage of advanced ideas and new technologies through three key processes:

- Engaging stakeholders in the evaluation of potential research topics and implementation of research results.
- Conducting extensive initial-stage investigations. The EAR Program has supported scanning trips and meetings involving hundreds of national and international experts to incorporate the most advanced science and engineering in its projects.
- Organizing expert panels to ensure the technical quality of EAR Program-sponsored research and accelerate the distribution of results. Panels include Federal, State, academic, and international scientific and engineering experts vetted to avoid conflicts of interest. The panels frequently include members from multiple disciplines to ensure that cross-applications and novel research approaches are fully assessed.



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EAR PROGRAM RESULTS

As a proponent of applying ideas across traditional research fields to stimulate new problem-solving approaches, the EAR Program strives to develop partnerships with the public and private sectors. Through 13 solicitations since 2007, the EAR Program has awarded 108 projects involving both government and academic researchers, 15 of which are ongoing. These projects represent the investment of more than \$100 million in FHWA funds and more than \$30 million in matching funds.

The EAR Program bridges basic research (e.g., National Science Foundation grant-funded academic work) and applied research (e.g., State department of transportation (DOT)-funded studies). Research may improve the understanding of phenomena that can accelerate or allow for new lines of applied research. For example, investigators for an EAR Program-funded project are studying methods for automating video data analysis that enhance understanding of driver behavior to increase roadway safety and mobility.²

¹ FHWA. 2021. *Improving the Compatibility of Waste*. Publication No. FHWA-HRT-21-084. Washington, DC: FHWA. <https://www.fhwa.dot.gov/publications/research/ear/21084/21084.pdf>, last accessed November 8, 2023.

² FHWA. 2022. *The Role of Artificial Intelligence and Machine Learning in Federally Supported Surface Transportation 2022 Updates*. Publication No. FHWA-HRT-22-026. Washington, DC: FHWA. <https://www.fhwa.dot.gov/publications/research/ear/22026/22026.pdf>, last accessed November 2, 2023.



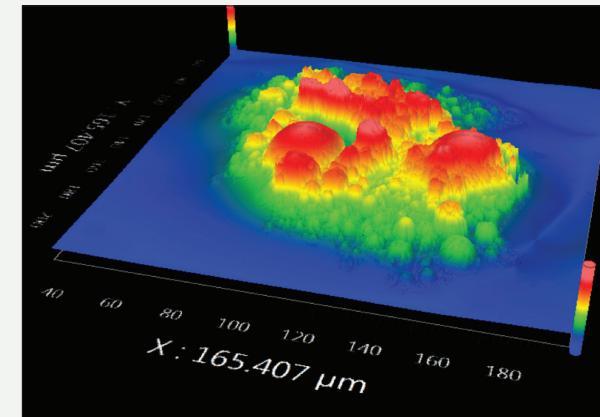
Source: FHWA.³

In addition to sponsoring EAR Program projects that advance the development of highway infrastructure and operations, the EAR Program is committed to the following practices:

- **Cross-fertilization:** Research may include the application of scientific and technological discoveries in fields unrelated to transportation. For example, a project titled Applications of Knowledge Discovery in Massive Transportation Data: The Development of a Transportation Research Informatics Platform employed data-analytic methods developed for financial and commercial retail industries to integrate and analyze disparate data sources, such as traditional structured crash data, with social media and sensor data.⁴
- **Disseminating new findings:** Each EAR Program-sponsored project includes a poststudy transition plan to disseminate new findings and assess the

³ FHWA. 2020. *Preparing Our Nation's Roadways for Advanced Vehicle Technologies*. Publication No. FHWA-HRT-20-049. Washington, DC: FHWA. <https://www.fhwa.dot.gov/publications/research/ear/20049/20049.pdf>, last accessed November 8, 2023.

⁴ FHWA. 2018. *Knowledge Discovery in Massive Transportation Datasets*. Publication No. FHWA-HRT-17-117. Washington, DC: FHWA. <https://www.fhwa.dot.gov/publications/research/ear/17117/17117.pdf>, last accessed October 20, 2023.



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potential for continued research. When a project's findings appear worthy of further investigation, the EAR Program identifies appropriate activities to engage interested stakeholders. For example, promising new technologies developed in an EAR Program-sponsored project may inspire FHWA, State DOTs, Transportation Research Board cooperative research programs, or stakeholders in private industries to conduct further applied research. These other research projects may lead to unexpected findings or clarifications about questions and approaches, in turn leading to further investigation and discovery through the EAR Program.

- **Building research capacity:** The EAR Program supports the Research Associateship Program, which provides postdoctoral and senior scientists and engineers with opportunities to research projects that complement ongoing EAR Program studies.⁶

⁵ FHWA. 2022. *Cultivating Materials Science Research to Benefit Surface Transportation 2022 Update*. Publication No. FHWA-HRT-22-025. Washington, DC: FHWA. <https://www.fhwa.dot.gov/publications/research/ear/22025/22025.pdf>, last accessed November 8, 2023.

⁶ FHWA. 2021. *Exploratory Advanced Research Program Research Associates Program 2021*. Publication No. FHWA-HRT-22-024. Washington, DC: FHWA. <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-01/HRT-22024.pdf>, last accessed October 20, 2023.