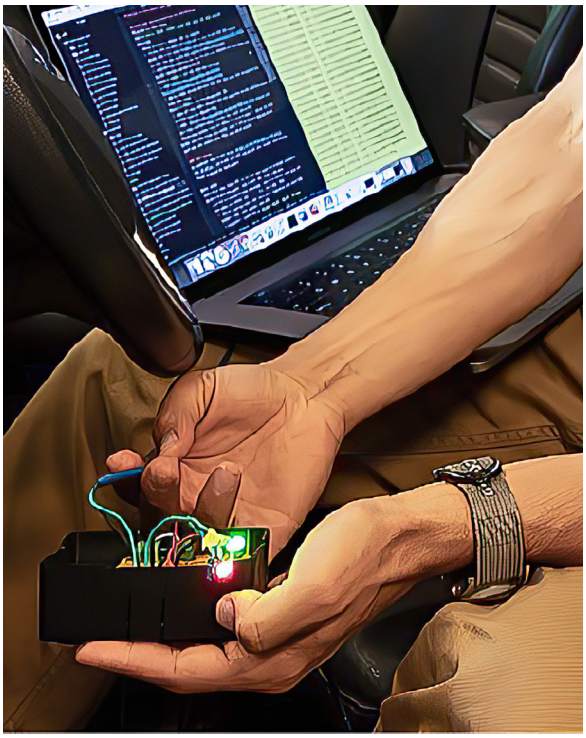
CAN-D: Controller Area Network Decoder

Problem: Vehicles have essentially become computer networks, with the efficiency, performance, safety, and security of the vehicle dependent on communication among its parts. The various components in a car are connected using a specialized real-time communication bus called Controller Area Network (CAN). Monitoring and improving the efficiency, performance, safety, and security of vehicles depends on understanding traffic on the CAN bus, but each manufacturer, each new model, and each additional feature added to the vehicle changes the structure of messages on the CAN bus.

Solution: ORNL's Controller Area Network Decoder (CAN-D) technology applies machine learning to quickly understand the structure of messages on the CAN bus to enable downstream technologies to understand them. This innovation creates an ecosystem of monitoring that allows for improvement of vehicle performance, efficiency, safety, and security. CAN-D is designed to be used in vehicles across manufacturers.



Impact: CAN-D enables an ecosystem of technologies that interact with each other on the CAN bus in real time, creating opportunities for enhanced performance, efficiency, safety, and security of vehicles on the road regardless of manufacturer.

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Dr. Prowell is a senior cyber security scientist in the Cyber Resilience and Intelligence Division. He also serves as the program manager for ORNL's Cybersecurity for Energy Delivery Systems Program. His research focuses on exploiting physical sensors and properties to detect and prevent intrusion and on deep semantic analysis of compiled software. Dr. Prowell's work on a system for deep analysis of compiled software led to development of the Hyperion system, which received a 2015 R&D 100 award and two awards for technology transfer.

Intellectual Property

"ACTT: Automotive Controller Area Network (CAN) Tokenization and Translation," Invention Reference Number 201804299; US Patent Application 17/117,535, December 10, 2020; non-provisional patent application in preparation

"Universally Applicable Signal-Based Controller Area Network (CAN) Intrusion Detection System," Invention Reference Number 202004640; US Patent Application Number 63/178,586, April 23, 2021; non-provisional patent application in preparation

Publications

- M. E. Verma, R. A. Bridges, J. J. Sosnowski, S. C. Hollifield, and M. D. Iannacone, "CAN-D: A Modular Four-Step Pipeline for Comprehensively Decoding Controller Area Network Data," *IEEE Trans. Veh. Technol.*, 2021. DOI: 10.1109/TVT.2021.3092354.

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