PRISM: AI-Powered Platform for Real-time Intelligence in Shared Mobility

Vision Statement: "What if we could make transportation intelligence shared infrastructure — a living, continuously updated digital context layer that bridges every vehicle, roadside system, and operator so that every decision across the mobility ecosystem is guided by the same real-time picture of the world?"

Applicant Type: Entity/Organization

Team Lead: The University of Tennessee at Chattanooga (UTC)

Institution(s): UTC, University of Tennessee Oak Ridge Innovation Institute (UT-ORII), ITS America, Audi and the Volkswagen Group, and WSP

Team Members: **UTC** - Mina Sartipi (PI), Austin Harris, Mohamed Fadul, Huu Nguyen, Gazi Akgun, Yasir Hassan; **UT-ORII -** Maged Shoman; **ITS America** - Laura Chace, Laura Chace, Timothy Drake, Carlos Alban; **WSP** - Jim Misener; **Audi and the Volkswagen Group of America** - Brad Stertz

Topic Area(s): Driver Assistance, Human-Centered Autonomous Systems, AV and related system-level technologies, including benchmarking tools, AI-enabled infrastructure detection and classification tools for data from wide-area sensor networks

Abstract: America's roads are getting smarter, but the data they generate are not yet shared. Autonomous vehicles (AVs) rely on onboard sensors with limited range and maps that can be weeks out of date. Road agencies and operators (called Infrastructure Owners and Operators (IOOs)) receive data from many sensor systems that remain fragmented and disconnected. AV deployments currently operate under narrow conditions, leading to reactive rather than proactive incident management and unrealized safety and efficiency potential. PRISM aims to bridge this gap by creating a shared transportation intelligence platform that continuously collects and delivers real-time, predictive road condition data to both AVs and IOOs, transforming transportation intelligence into a shared resource instead of a siloed capability. PRISM operates through four connected layers. A sensing and connectivity layer gathers data from roadside cameras, connected vehicles, traffic signals, and weather feeds via direct vehicle-to-infrastructure (V2X) communication and existing 4G/5G cellular networks. A dynamic digital twin engine — running on Multi-access Edge Computing (MEC) nodes near the roadside — fuses this data into a continuously updated virtual model of the roadway, refreshed in under one second. An AI prediction layer transforms this live model into actionable intelligence: hazard detection, lane closures, traffic slowdowns, and recommended control actions. A universal service and interoperability layer delivers the right information to the right user — low-latency updates to AVs in under 60 milliseconds and predictive operational dashboards to IOO traffic management centers — without requiring changes to existing vehicle or infrastructure systems. For AVs, PRISM extends situational awareness beyond onboard sensor range, enabling safer operation across a wider range of conditions and expanding the Operational Design Domain. For IOOs, it replaces fragmented, reactive monitoring with integrated, predictive corridor awareness that supports proactive incident management and cross-jurisdictional coordination. Because all users draw from the same platform, the system's value grows as more vehicles and sensors connect. The 24-month project will be developed and tested on the MLK Smart Corridor at UTC — an instrumented testbed with existing roadside sensing, MEC infrastructure, and connected vehicle integration. Five technical tasks span sensing/V2X, digital twin development, predictive AI, service and interoperability, and full-system pilot, with Go/No-Go decision points at months 12 and 18. Total estimated project cost: $2,396,000 (Y1: $1,298,000; Y2: $1,098,000).PRISM will be commercialized through a Platform-as-a-Service (PaaS) spin-off entity, initially targeting state DOTs and municipalities, then expanding to AV manufacturers and fleet operators. Its software-defined architecture is compatible with commodity edge hardware and existing cellular MEC, enabling deployment without costly hardware replacement.