Large-Scale Simulations

• Extending connected powertrain concepts on different types of powertrains and automation levels, and understanding the impact of intelligent infrastructure





that even a small population of eco-vehicles positively influences the energy consumption of all vehicles in a corridor, including ordinary, non-connected players

Eco-Driving Mobile Application

- Driver advisory Android application for Eco-Driving
- Uses live traffic signal information over cellular LTE network (DSRC capable)



Southwest Research Institute⁺ is a premier independent, nonprofit research and development organization. With eleven technical divisions, we offer multidisciplinary services leveraging advanced science and applied technologies. Since 1947, we have provided solutions for some of the world's most challenging scientific and engineering problems.



Our solutions leverage connected vehicles and powertrain engineering, spanning speed/route optimization, and applied research/testing.

Connected powertrain technology uses onboard sensing and external connectivity via V2V, V2I, and V2X technologies to improve fuel efficiency and performance in conventional internal combustion engines, and electric and hybrid vehicles.

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NEXTCAR

Powering the Future: 30% Energy Savings with Connected and Automated Vehicles



The **R&D 100** award-winning Eco-Driving technology is a suite of on-vehicle algorithms that optimize energy consumption over both short and long horizons.

SwRI Drive-By-Wire System

- Custom drive-by-wire (DBW) controller developed for integrating a conventional vehicle with autonomous vehicle (AV) sense and compute components
- Simulates stock signals to generate requested actions, including accelerator, brake, and steer control
- Dedicated CAN interface to AV stack



Accelerator Pedal Mapping



Vehicle Testing Methods

Connected and Automated Vehicle Dynamometer

- Ego vehicle interacts with traffic in a dynamic and reactive traffic simulator in real time
- Development vehicle mounted on dynamometer



Virtual Traffic Enabled Track Testing

- Real-time traffic simulator integrated with SwRI L4 vehicle in a digital twin
- L4 or driver-in-the-loop testing for richer test scenarios
- Validation of algorithms in a variety of test scenarios



Emissions Controls

- Eco-driving fuel benefits were demonstrated on production and low NO_x (2031+ HD-FTP compliance) class 8 truck systems
- Studies have confirmed that the eco-driving technology can meet future emission targets
- New strategies are being developed to improve emission control performance by using V2X information and better managing competing systems



TP BSNO_x Results for Low NO_x Configuration



Low NO_x at Outlet Temperature

