RESEARCH
PROJECT CAPSULE [15-2SA]
August 2015
TECHNOLOGY TRANSFER PROGRAM

Development of a Simulation Test Bed for Connected Vehicles using the LSU Driving Simulator

JUST THE FACTS:

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24 months

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Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

POINTS OF INTEREST:

Problem Addressed / Objective of Research / Methodology Used Implementation Potential

PROBLEM

The development and deployment of a fully connected transportation system has received special attention from USDOT and stakeholders in the last few years, with research being conducted in the area of connected vehicle technology.

Connected vehicles, as shown in Figure 1, rely on vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication. V2V offers dynamic wireless exchange of data between vehicles (e.g., real-time speed, position, and location) for safety and operational improvement. V2I offers wireless exchange of critical safety and operational data between vehicles and the highway infrastructure.

Research on connected vehicles relies on the use of test beds to address potential problems associated with the development and deployment of V2V and V2I technologies. Along with physical platforms for test beds, simulation-based test beds can also be used. With the availability of the LSU driving simulator, the development of a simulation-based test bed for connected vehicles in Louisiana is possible.

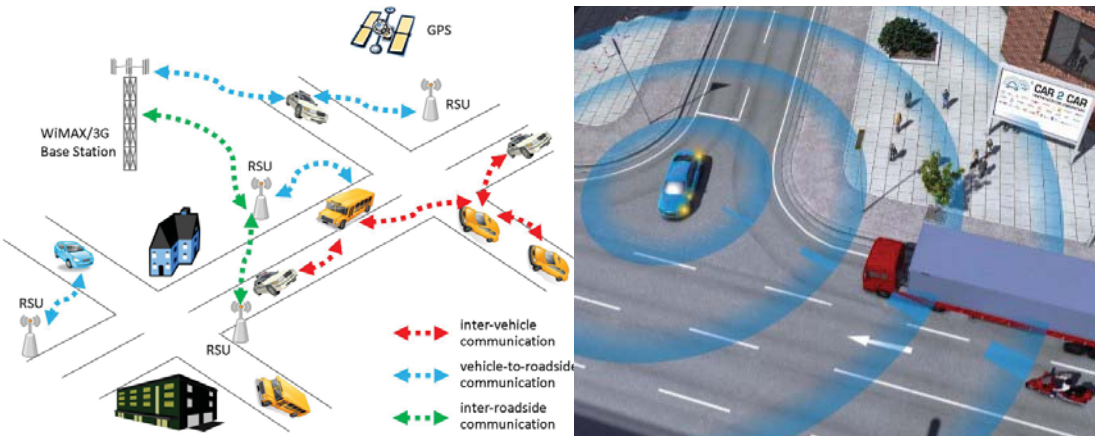

Figure 1
Connected vehicle technology

OBJECTIVE

The main focus of this study is to develop a simulation-based test bed for connected vehicles research in the areas of operations and safety. The specific objectives are to develop a connected vehicle simulation-based test bed using a driving simulator; create some safety-related and emergency-related applications in the driving simulator environment; and test the impacts and benefits of each specific application on drivers' behavior.

METHODOLOGY

An initial research task includes performing a literature review for the purpose of gaining state-of-the-art knowledge on various applications of connected vehicle technology. Different applications will be assessed to exclude those that do not require communication between vehicles and to select those that can be studied with the driving simulator.

The research team will develop a virtual scenario for the driving simulator, including signalized intersections, situations that require vehicles ahead to brake, and other potential incident zones. The team will also create a driving simulator vehicle type that will represent connected vehicles.

Another research task will be to develop procedures for gathering real-time data from the connected vehicles in the ambient traffic for relay to the driver of the simulator. Licensed drivers from multiple age groups will be recruited to drive the simulator, and experiments will be conducted on their driving behavior and performance.

A comparative analysis will be conducted on specific parameters representing driver behavior and performance with and without connected vehicle applications. Final results of the analysis will be used to build conclusions about the impacts and benefits of connected vehicle technology on driving behavior.

IMPLEMENTATION POTENTIAL

Even after this research is complete, several questions will remain to be answered prior to full implementation of connected vehicle technology in Louisiana, such as effectiveness of the selected applications, evaluation of benefits, and inventory of required infrastructure, among others.