Connected Vehicle to Vehicle-to-Infrastructure Support of Active Traffic Management

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Current Situation

Active transportation management (ATM) gives agencies the ability to improve the efficiency and safety of roadways through real-time traffic management and control using a variety of technologies. One promising emerging technology that can support ATM is connected vehicles (CVs). CVs can communicate with each other and with transportation infrastructure. Transportation agencies can select from several vehicle-to-infrastructure applications of CV to improve the mobility and safety of the transportation systems. Implementation of such applications in Florida has begun.

This CV is equipped with an app that talks to road infrastructure to help drivers make safer left turns.

Research Objectives

Florida International University researchers investigated CV applications that can be used to support ATM functions for urban streets. They also studied how CV technologies can meet ATM goals and methods to determine when they are the best choice to do so.

Project Activities

The researchers reviewed the literature related to ATM planning, CV applications, and CV initiatives and deployments for urban streets. They documented the required ATM functions and both non-CV and CV-based applications that can support those functions. They then documented the performance of the non-CV and CV applications in providing the required functions based on review of literature.

To guide agencies about including ATM and CV in the design process, the researchers outlined a systems engineering approach that begins with the development of a concept of operations, or ConOps. The researchers developed an example ConOps for the inclusion of CV in urban street ATM that included the stakeholders associated with the deployment; the nature and justification of the required changes; an overview of the system and its hardware and software components; a method for assessing system impacts and selecting between alternatives; and a vision of the system after CV-based implementation.

The researchers applied the method developed to select between alternatives to a segment of SR-924 in Miami. In this application, the researchers used the Florida ITS Evaluation Tool (FITSEVAL), which can estimate the mobility, reliability, and safety impacts of advanced strategies on system performance and perform return-on-investment estimates and multi-criteria decision analysis.

The researchers also demonstrated the use of simulation to assess signalized left-turn assist, a CV application. This application has the potential to reduce crashes by giving left-turners guidance about gaps in traffic that are suitable for a turn. In addition to the range of methods the researchers developed for evaluating CV applications before deployment, they also presented a guide for post-deployment evaluation.

Project Benefits

Effective design tools and clear guidance for using them can ensure that the right technologies are put in place to make Florida roads safer and more efficient.

For more information, please see www.fdot.gov/research/.