UTC Project Information	
Project Title	Connected-Vehicle Traffic Signal System Modeling Platform
University	University of Idaho
Principal Investigator	Robert Heckendorn
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Funding Source(s) and Amounts Provided (by each agency or organization)	University of Washington PacTrans $50,000 University of Idaho $ 50,000
Total Project Cost	$100,000
Agency ID or Contract Number	69A3551747110
Start and End Dates	August 16, 2019-August 15, 2021
Brief Description of Research Project	This project aims to design and develop a connected vehicle modeling platform to model the operations of traffic signal system in a connected-vehicle environment. The proposed modeling platform has two components. The first is driver simulator with connected vehicle testing capabilities in which Signal Phasing and Timing (SPaT) messages are communicated from the simulator to the driver through a communication interface. This will allow researchers to test driver response to Spat messages and provide a full assessment of their potential benefits. It will also allow for the testing of different human-infrastructure interfaces in the highly automated connected-vehicle environment. The second modeling component is a connected-vehicle software-in-the-loop microscopic simulation model. In the proposed model from the VISSIM simulation model, will be transformed to a virtual Road Side Unit (RSU) through a Basic Safety Message (BSM) interface. The virtual RSU will transfer the BSM data to a signal timing optimizer processor that is connected to an actual traffic controller. The actual controller will provide the signal status data to VISSIM. This hardware-in-the-loop connected vehicle modeling environment will allow researchers to test different connected vehicle traffic control algorithms using actual traffic control hardware.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The project developed a fully functioning Connected Vehicle Traffic control algorithm Testing Software (CoVeTTware). The exchange of information between the VISSIM simulation model and CoVeTTware is performed in real-time. CoVeTTware retrieves the information of vehicles at intersections from VISSIM and generates the Basic Safety Messages (BSMs) of the vehicles in real-time, according to the SAE J2735 standard. The signal information is then used by CoVeTTware to generate the Signal Phasing and Timing (SPAT) messages communicated to drivers, according to the SAE J2735 standard. The modeling tool provide a platform for researchers and practitioners to model connected vehicle operations at signalized intersections using a reliable software-in-the-loop environment.
Impacts/Benefits of Implementation (actual, or anticipated)	The developed software-in-the-loop modeling environment will allow researchers and transportation system operators to optimize and accurately assess the potential benefits of signalized intersections connected vehicle operations implementation projects. The anticipated benefits include an accurate cost benefit assessment of connected vehicle implementation projects at signalized intersections and improved traffic operations at signalized intersection approaches.
Web Links • Reports • Project Website	