U.S. Department of Transportation
Office of the Secretary of Transportation

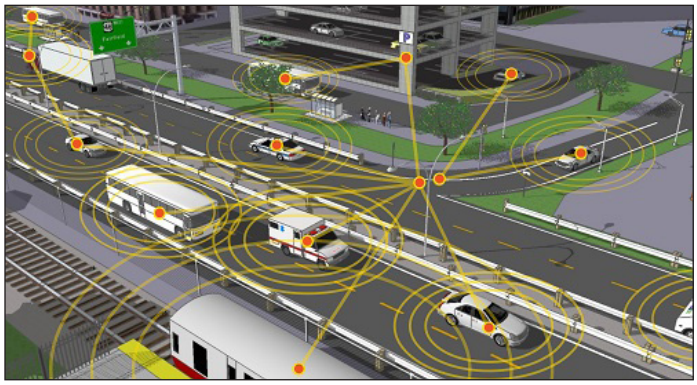
UTC Spotlight

University Transportation Centers Program

This month: Morgan State University | July 2017 No. 112

What's a Connected Vehicle Worth to You?

Connected vehicles (CVs) work by communicating with each other and the roadway infrastructure via dedicated short-range communication. They are expected to eventually reduce non-impaired driver crashes by 80 percent, which will also significantly reduce traffic congestion. But—unlike airbags and anti-lock brakes, which only need to be in that car to protect the driver—for maximum safety benefits, more drivers must buy connected vehicles.



Wireless communications will allow connectivity between all modes.

What will lead people to choose them and just how much are they willing to pay?

Researchers at Morgan State University in Baltimore, Maryland, spent 4 years researching driver's acceptance of and willingness to pay for CVs through a simulation of purchasing decisions. The study, *Measuring User Acceptance of and Willingness-To-Pay for CVI Technology*, was funded by a grant from the U.S. Department of Transportation through the Connected Vehicle/Infrastructure University Transportation Center (UTC) at Virginia Tech. It was completed in the fall of 2016.

"The driving paradigm is shifting," said Hyeon-Shic Shin, Ph.D., one of the study's authors. "Since the invention of the first car, drivers have been the sole decision makers, but CV technology will allow vehicles to take over that role. Already, we have cars on the market that will brake when a distracted driver fails to do so."

As connected vehicle technology advances rapidly, it's important to determine how and why people choose that technology to achieve and even incentivize widespread adoption of CVs.

"Autonomous vehicles are garnering a great deal of attention, but connected vehicles could provide a helpful intermediate step to full autonomy," said Andrew Farkas, Ph.D., one of the study's authors and director of the National Transportation Center at Morgan State and the recently funded Urban Mobility & Equity Center UTC at Morgan.

The study gave drivers brief descriptions and pictures of five attributes—Collision Package, Driver Assistance Package, Enhanced Safety Package, Roadway Information Package, and Travel Assistance Package—that included nine safety features and two mobility factors. They were also given realistic pricing information; price estimates were based on modifying the existing technology prices of leading auto manufacturers with vehicle-to-vehicle and vehicle-to-infrastructure features, requirements, and enhancements with sensors.

Please select the attributes you'd most likely include in your next vehicle. For each feature, selec your preferred level.

Attribute	Select Feature	Cost for Feature
Collision Package	Front & Side Collision Warning (+ $900)	$ 900
Driver Assistance Package	N/A	$ 0
Enhanced Safety Package	Do Not Pass Warning (+ $300)	$ 300
Roadway Information Package		$ 500
Travel Assistance Package		$ 500
	Total	$ 2,200

Select Feature
N/A
Do Not Pass Warning (+ $300)
Pedestrian & Cyclist Alert (+ $750)
Do Not Pass Warning, Pedestrian & Cyclist Alert (+ $1,000)

Drivers were asked to configure their preferred attributes.

The drivers were then asked to "build their own" preferred bundle of attributes.

Researchers did not find a significant difference in men's and women's willingness to pay, but they did find different preferences. Women were more concerned with safety, fuel consumption, and environmental impact as well as reliability. Men favored exterior design, motor power, status, and driving comfort.

Price was found to be the most important factor, and of all the CV technology attributes, "Collision Package" had the highest importance score, followed by "Travel Assistance Package." With the collision package, buyers could choose from among front, side, front and side, and all-around

Word cloud of benefits of connected vehicles.

collision warnings, while the travel assistance package options included real-time travel planning and route optimization, a parking spot locator, or both.

Individuals between 40 and 49 were willing to pay the highest amount for CV technology, $2,297, followed by those 30 to 39, $2,276. Those older than 60 and younger than 30 were only willing to pay $1,966.

"Young people are often the earliest adopters of new technology, such as smartphones, but it might be the middle-aged drivers with more purchasing power who first buy CVs," Dr. Shin noted.

Drivers with less than a bachelor's degree were willing to pay more, and, interestingly, the willingness to pay decreased with education attainment and age, which implies a general resistance to change with technology among mature drivers. Middle-income households were willing to pay the most, $2,255. Those who were knowledgeable about CV technology were willing to pay 10.9 percent more than those who had no knowledge of CVs, $2,253 vs. $2,032.

The study provided guidance for what a CV deployment plan should address. Price is one of the most important determinants, and a pricing policy to assist low-income people would help realize the full benefits of CV technology quickly. Education and outreach need to target older drivers, especially women over 50. Women are more interested in safety but are less informed about CV technology. The women in the study who were more informed were willing to pay more.

The complete study, "Measuring User Acceptance of and Willingness-To-Pay for CVI Technology" is available at http://www.morgan.edu/school_of_engineering/research_centers/national_transportation_center/research/completed_projects.html.

About This Project

This study was conducted under the Connected Vehicle/Infrastructure University Transportation Center at Virginia Polytechnic Institute and State University, directed by Thomas Dingus, Ph.D. Consortium members are Morgan State University, Virginia Tech Transportation Institute, and the University of Virginia. Study authors are Morgan faculty Hyeon-Shic Shin, Ph.D., assistant professor in City & Regional Planning; Michael Callow, Ph.D., professor in the Department of Business Administration; Andrew Farkas, Ph.D. , professor and Director of the National Transportation Center and the Urban Mobility and Equity Center; Young-Jae Lee, Ph.D. , associate professor in the Department of Transportation & Urban Infrastructure Studies; and Seyedehsan Dadvar, Ph.D. student, Department of Transportation & Urban Infrastructure Studies.

RD-T-170622-001

Printed on paper containing recycled post consumer waste paper.