

# UTC Spotlight

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## METRANS Partners with City of Long Beach to Launch ITS Test Bed

The National Metropolitan Transportation Center (METRANS) Tier 1 University Transportation Center is bringing next-generation micro-sensor technology toward real-world implementation through an innovative partnership with the City of Long Beach Public Works Department and California State University, Long Beach (CSULB).

Since 2012, METRANS has worked to develop a micro-wireless sensing system to be implanted underneath the pavement of roadways to detect and classify vehicles. METRANS has received grants from the DENSO Foundation for Smart Sensing technology education and training, and from the California Department of Transportation (Caltrans) to design a smaller, more efficient way to monitor and classify freeway and road traffic.

Traditionally, vehicle detection sensors underneath roads use inefficient sensing systems like inductive loops to collect real time traffic data. These sensors are much larger and more expensive to use and have caused transportation agencies to spend millions of tax dollars to install and maintain these systems.

types of sedans from each other. The sensor can also detect bikes, scooters, and other modes of transport. The device was initially tested with battery-powered remote-control cars.

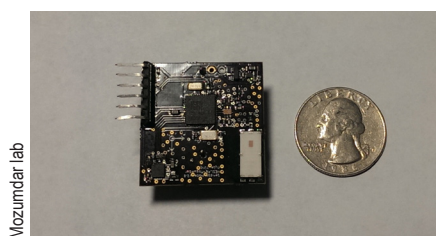


Figure 2. Smart road sensor node

The sensor works by measuring the amount of variation in the magnetic field based on the direction of the magnetization and electric current.

Through machine learning techniques, the researchers are able to train the sensor to identify different classifications of vehicles.

Upon completion of the initial research project, the team secured a real-world testbed. The CSULB Center for International Trade and Transportation's (CITT) Director of Research and Workforce Development worked closely with the Deputy Director of Public Works for the City of Long Beach and METRANS to implement this research. The City

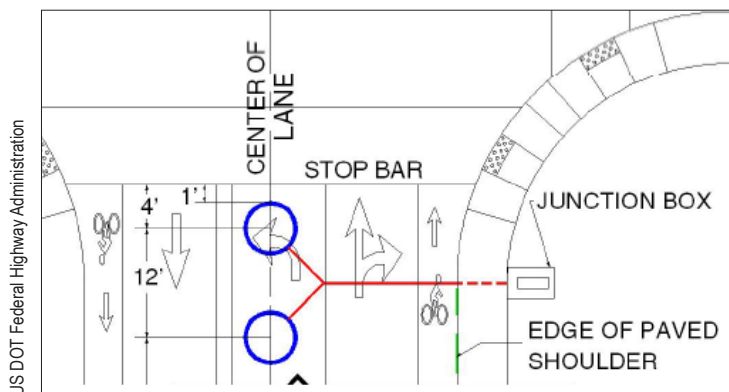


Figure 1. Traditional loop detector schematic

The research project team has designed a wireless, quarter-sized, remote sensor that uses machine learning to identify the types of vehicles passing by. Not only can the sensor distinguish trucks from sedans, it can distinguish different

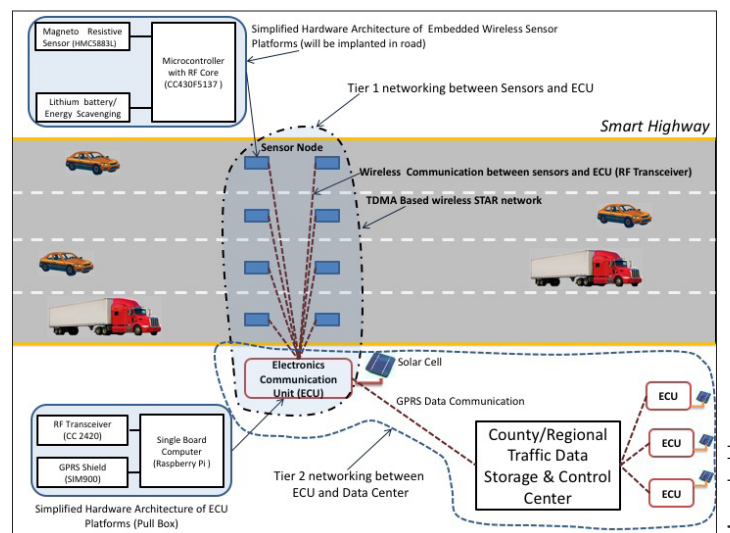


Figure 3. Proposed solution for smart road system

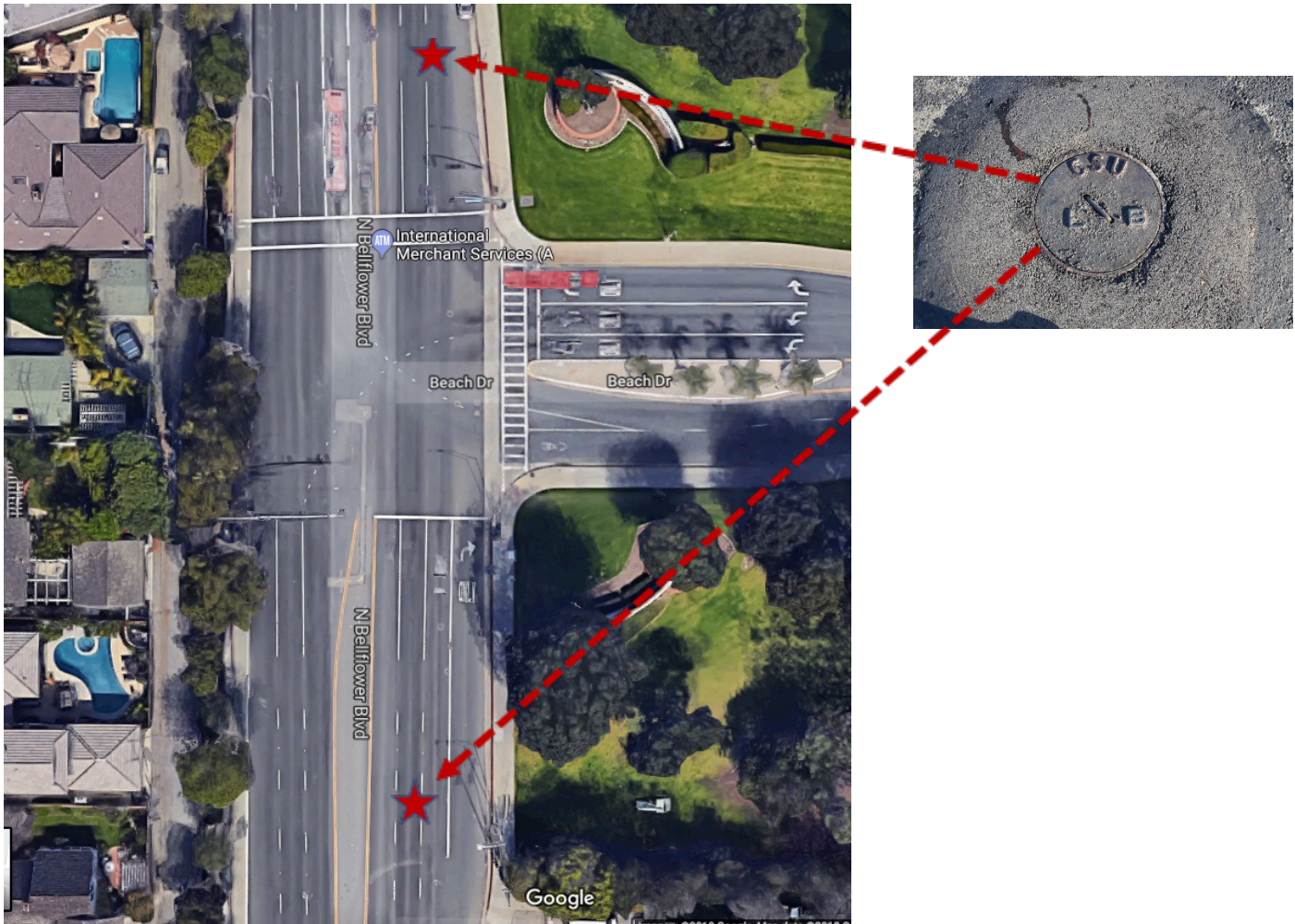


Figure 4. Real-world test bed for smart road sensor.

of Long Beach embedded sensors in a public road near the university to allow the researchers to test their system. This action will significantly enhance the researchers' ability to collect, test, and modify the designed sensor node for smart roads.

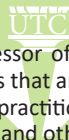
The civic partnership between the City of Long Beach and METRANS is an approach that could be replicated by other cities to develop, test, and ultimately implement new intelligent systems technologies. The smart road system could

potentially replace traditional inductive loop systems. Moving this research into a real-world testbed is an important step toward full implementation.

The project team's research on wireless sensor networks is published in numerous journals such as ACM Transactions on Embedded Computing Systems (TECS), IEEE Sensors Journal, and International Journal on Smart Sensing and Intelligent Systems.

### About This Project

The project PI, Dr. Mohammad Mozumdar, is an Associate Professor of Electrical Engineering at CSULB. His research on wireless sensor networks seeks to reduce costs and enhance the outdated systems that are used to collect traffic data. In addition to publishing in numerous journals, he has been an invited presenter at various academic and practitioner conferences. METRANS is a partnership between the University of Southern California (USC) and CSULB. More information on this and other METRANS research can be found at: <https://metrans.org/>



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