UNIVERSITY TRANSPORTATION CENTER
RESEARCH BRIEF

Developing a Portable Data Acquisition System to Study Road User Behavior

Vinod Vasudevan, PhD

Background

Capturing detailed road user behavior is critical in planning and designing a safe transportation infrastructure. Traditionally, transportation researchers use data from sensors such as loop detectors, video detectors, Bluetooth sensors, and radar sensors to gather and analyze macroscopic traffic data. Probe vehicles are also used to capture macroscopic data on traffic streams such as speed, flow, and density. However, its inability to measure distances effectively is a significant drawback for different transportation application that requires micro-level vehicle-by-vehicle trajectories. One way to address these limitations by using a portable data acquisition system (PDAQS), assembled on a vehicle. Sensors such as Light Detection and Ranging (LiDAR) can obtain high-resolution traffic data in real-time. LiDAR sensors can scan 360° three-dimensional surrounding objects and collect coordinates of each object in its scanned range at a high frequency with accuracy sufficient for CAV applications. A LiDAR combined with video cameras, GPS, and an on-board diagnostics sensor will provide high quality data that has tremendous potential in traffic research.

Research Project

The development of PDAQS involves two steps: setting up the hardware and developing software programs to extract useful data. As the first step, the sensors need to be put together to develop the hardware setup of the PDAQS. All these sensors need power to operate. A battery and power distributor will be used to serve this purpose. Finally, a laptop computer and (or a data integrator) will collect all the data on the same timestamp for efficient post-processing.

In the second step, software programs will be developed to extract useful data. The instruments can capture objects 360° around the vehicle. The relative coordinates of all objects detected by the instrumented vehicle can be extracted using the sensors. Using the relative position coordinates, the trajectory and relative speeds of these objects can be traced. Not all the objects detected by the instrumented vehicle may be of equal significance for transportation application (e.g., detail and locations of the roadside vegetation). Therefore, the emphasis will be on the accurate extraction of useful data related to dynamic objects, such as various road users, including pedestrians.

ABOUT THE AUTHORS

The research team consisted of Vinod Vasudevan of the University of Alaska.

ABOUT THE FUNDERS

This research was funded by the Pacific Northwest Transportation Consortium, with additional support from the University of Alaska.

EXPECTED DATE OF COMPLETION

August 2022

FOR MORE INFORMATION

http://depts.washington.edu/pactrans/research/projects/developing-a-portable-data-acquisition-system-to-study-road-user-behavior/