ELECTRICAL & COMPUTER ENGINEERING **RESEARCH SEMINAR** **Spring 2018**

# Inertial Measurement Units as Traffic Flow Sensors: Autocalibration, Trajectory Estimation and Context Detection


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**Abstract**

Most probe vehicle data is generated using satellite navigation systems such as the GPS, GLONASS or Galileo systems. However, because of their high cost, relatively high position uncertainty in cities, and low sampling rate, a large quantity of satellite positioning data is required to estimate traffic conditions accurately. To address this issue, we introduce a new type of traffic monitoring system based on inexpensive Inertial Measurement Units (IMUs) as probe sensors. IMUs as traffic probes pose unique challenges in that they need to be precisely calibrated, do not generate absolute position measurements, and their position estimates are subject to accumulating errors. In this article, we address each of these challenges and demonstrate that IMUs can reliably be used as traffic probes. After discussing the sensing technique, we present an implementation of this system using a custom-designed hardware platform, and validate the system with experimental data.


**Biography**

Christian Claudel is an assistant professor of Civil, Architectural and Environmental Engineering at the University of Texas, Austin. He received the PhD degree in Electrical Engineering and Computer Sciences from UC Berkeley in 2010, and the MS degree in Plasma Physics from Ecole Normale Superieure de Lyon, France, in 2004. He received the Leon Chua Award from UC Berkeley in 2010 for outstanding achievement in an area of nonlinear sciences. His research interests include the control and estimation of distributed parameter systems, traffic sensing systems, wireless sensor networks and unmanned aerial vehicles.