The demands on the surface transportation systems in the world are predicted to grow tremendously as the number of vehicles on the roads increases. In order to meet the challenges presented by the increased demand, Intelligent Transportation Systems (ITS) require reliable traffic information to increase efficiency on existing roads and to determine priorities for new road construction. Additionally, many rural areas possess no existing infrastructure for ITS thus leaving gaps in the desired traffic information flow. Given that the majority of ITS data gathering solutions are fixed installations, there exists a need for mobile platforms to collect reliable traffic parameter data. In order to supply the necessary planning information, various techniques have been developed to calculate macroscopic traffic flow parameters such as the volume, occupancy, and speed of traffic. However, as the capabilities of ITS become increasingly complex and the areas it must service grow, the techniques which supply the vital traffic information must also evolve and improve.

We present a mobile generalized technique which allows for the tracking and classification of vehicles by tracking various points of interest on a vehicle. Tracking the various points of interest allows for the composition of those points into 3D geometries which are unique to a given vehicle type. We demonstrate this technique using passive, simulated image based sensor measurements and three separate inertial track formulations. We demonstrate the capability to classify the 3D geometries in multiple transform domains using Euclidean Distance, Maximum Likelihood and Artificial Neural Networks. Additionally, we demonstrate the ability to fuse separate classifiers from multiple transform domains via Bayesian Networks to achieve ensemble classification.

Educational Career:
Bachelor's of Electrical Engineering, BS, 2000, University of Central Florida
Master's of Electrical & Computer Engineering, MS, 2006, University of Florida

Major: Electrical Engineering

Committee in Charge:
Wasfy Mikhael, Chair, Electrical Engineering
Linwood Jones, University of Central Florida
Michael Haralambous, University of Central Florida
George Atia, University of Central Florida
Abhijit Mahalanobis, Lockheed Martin Missiles & Fire Control
Robert Muise, University of Central Florida / Lockheed Martin Missiles & Fire Control

Approved for distribution by Wasfy Mikhael, Committee Chair, on November 3, 2015.

The public is welcome to attend.