

Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Real-Time Map-Matching for Cyclist-in-the-Loop Simulation

Supervisor(s): Wynita Griggs

Department: Electrical and Computer Systems Engineering

Email: wynita.griggs@monash.edu

Website profile of project supervisor: <https://www.monash.edu/engineering/wynitagriggs>

Objective

The aim of this project is to develop, implement and evaluate a real-time map-matching module for a cyclist-in-the-loop simulation tool, where the map-matching will be performed using a Hidden Markov Model (HMM)-based algorithm.

Project Details

When performing vehicle-in-the-loop simulation (that is, when a real vehicle, such as a car or bicycle, is embedded into an emulation of a larger road traffic scenario, which is typically running on a computer), it is usually important that the real vehicle's location is accurately depicted on the emulation's map of the road network. Accurate location depiction is not always straightforward, however, given that GPS measurements can be noisy. For this reason, algorithms ensuring good map-matching are important; and Hidden Markov Model (HMM)-based algorithms are a popular choice in the map-matching community; see, for instance, C. Y. Goh, J. Dauwels, N. Mitrovic, M. T. Asif, A. Oran and P. Jaillet, "Online map-matching based on Hidden Markov model for real-time traffic sensing applications," *2012 15th International IEEE Conference on Intelligent Transportation Systems*, Anchorage, AK, USA, 2012, pp. 776-781.

Prerequisites

This project involves some coding (development of a map-matching module for an existing vehicle-in-the-loop simulation tool) as well as some mathematics (an introduction to Hidden Markov Models). Therefore, the successful student should enjoy and have experience at writing code (e.g., Python, Java, Javascript) and have completed ECE2191 (or equivalent).

Additional Information

Applicants may be required to attend an interview.