Faculty of Engineering
Summer Research Program 2022-2023

Project Title: Autonomous Intersection Management for eBicycles

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Objective

To conceptualise, develop, and simulate virtually, an autonomous intersection management (AIM) system for eBicycles, where eBicycles approaching an intersection in a particular direction of travel autonomously speed up or slow down to permit other vehicles or pedestrians travelling in a perpendicular direction to pass through the intersection unhindered.

Project Details

Road intersections cause traffic delays and accidents in transportation systems. Compared to traditional signalised intersection management methods that involve traffic lights, the objective of autonomous intersection management (AIM) is to have intersection crossings be coordinated at the level of individual vehicles, by doing away with traffic signals, and employing V2X connectivity, to maintain safe separation between conflicting vehicle movements.

To date, the majority of AIM research has been focused on managing the movements of larger motorised vehicles, such as cars. In this summer research project, however, the student will aim to conceptualise, develop and simulate an AIM system for eBicycles. AIM for eBicycles presents new challenges; for example, we can consider control algorithms associated with individual bikes that aim to autonomously provide a boost to any slower rider's pedalling power via their bike's electric motor, to help them pass an intersection faster – or, conversely, add more resistance to a faster rider's pedalling power, to slow them down.

Prerequisites

Students should enjoy and have experience at writing code (e.g., Python, Java, Javascript). Students should have excellent written English skills. Students should also have strong mathematical skills and a desire to learn some mathematical control theory during the project.

Additional Information

Applicants may be required to attend an interview.