Objective

To develop and simulate, both virtually and potentially also with real eBicycles-in-the-loop, a connected, semi-autonomous sports and recreation application that allows a group of cyclists with varying fitness levels to travel together at a common speed.

Project Details

While much global research is ongoing in the realm of developing and implementing connected, autonomous vehicle technology and applications, only a relatively small portion of this research is dedicated to bicycles in particular. (That is, the majority of the current research around the world is focused on larger motorised vehicles, such as cars.) Thus, while eBicycles featuring connectivity are available on the market, connectivity is currently mainly limited to smartphone integration, 4G/5G connectivity, GPS, heart rate monitors and fitness tracking, and dash cams.

In this summer research project, the student will thus aim to develop and simulate a novel application for groups of cyclists of varying fitness levels, whereby a common target speed for the group to travel at is identified and communicated to all eBicycles in the group; and a control algorithm associated with each individual bike then aims to autonomously provide a boost to any slower rider’s pedalling power via their bike’s electric motor, helping them to achieve the common target speed. (Or, conversely, it may add more resistance to a faster rider’s pedalling.)

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 a desire to learn some basic mathematical control theory during the project.

Additional Information

Applicants may be required to attend an interview.