Development of personalized bike speed advice using Virtual Reality Bike simulator

Traffic Dynamics Modelling and Control

Mobility in eXtended Reality

Problem

There is a strong development of car driver support systems, but bike rider's support is a much less far developed and is an emerging field with many innovative ideas. Although there are already some roadside systems that indicate the time to green or time to red for cyclists, these systems do not provide enough information to, for example, speed up to catch the end of green, or slow down to aim for the next green, as the optimal action also depends on personal preferences or capabilities, such as muscle power. In addition, the green and red times of the signals may change dynamically, which makes giving correct time-to-red (or -green) nearly impossible. At TU Delft approaches are under development to give personalized speed advice to cyclists while they are approaching the traffic light. To test these approaches, there is a need for a bike simulator.

Objective

The objective of this MSc project is to develop a controlled test environment where human bike riders can receive personalized speed advice while approaching a traffic light. The Mobility in eXtended Reality lab (MXR) at T&P developed a high-fidelity and low-cost VR bike simulator that can study cyclist behavior when interacting with road infrastructure. The student should design and develop an interface, implement at least one-speed advice approach, and evaluate its performance.

Student profile

This project requires hands-on skills (setting up the simulator), python programming skills, and experimental skills. Knowledge of traffic flow theory, traffic signals, reinforcement learning will also be useful or required. Experience with Unreal or 3D modeling is a plus. If some knowledge is missing, it may also be acquired during the thesis project.

Research group

The supervisory team will consist of:

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Depending on your master, additional members may be added.