Projektförslag för kandidatarbete inom Elektroteknik (E2) EENX15: **Bike Detection and Prediction for Bike-Safety Systems in Vehicles**

**Bakgrund:**

An important part of every autonomous (or semi-autonomous) driving system is to model other (moving and stationary) objects in the road to prevent scenarios which can lead to an accident. Bikes are among the most challenging objects to detect and predict in such environments. They are smaller in size, can move differently than other vehicles in a road, and their accidents can be more catastrophic. This project aims to design and implement a computer vision system to detect, track, and predict the behavior of bikes in real-time to be used in bike-safety systems in vehicles. The results will be used in a research project on bike safety where an autonomous bike is developed with the purpose to imitate real bikers. One goal will be to compare the developed algorithms on real bikers and on the autonomous bike.

**Problembeskrivning**

The objective of this project is to get familiar with vision-based object detection algorithms and enhance them for a reliable and real-time bike detection in roads and autonomous vehicle scenarios.

We will implement and analyze the performance of different hand-crafted and data-driven learned features. State-of-the-art deep learning methods for object detection and classification will also be explored.

Upon successful detection of the bikes we will track them across video frames and will try to predict their position in upcoming frames. This prediction will be used by the in-vehicle safety system for proper decision making to prevent accidents. The prediction of the bike will be done using a dynamic model of the bike.

This project will also include a data collection phase to develop a realistic benchmark dataset of regular and autonomous bikes’ videos to be used to evaluate and compare various methods and algorithms in a practical scenario.

**Målgrupp:** TKAUT, TKMAS, TKELT, TKDAT, TKTFY

**Gruppstorlek:** 3-6 studenter

**Antal grupper:** 1

**Förkunskapskrav:** Linear algebra, probability, and programming. Preferable but not required: Machine Learning, and Artificial Neural Networks.

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