27. March 2023
Course: ***34759 – Perception for Autonomous Systems***

Final Project Description

This project targets an autonomous driving scenario under an intelligent autonomous systems perspective. The scenario considers a dynamic environment, where vehicles, pedestrians and other typical urban entities can coexist without risk. Such a dynamic and unstructured environment can result in occlusions in the sensors of the vision-based autonomous driving systems. For this project, detection and tracking of entities of interest is performed with a stereo camera that is fixed on the car, looking forward. Objects in the environment in front of the car need to be tracked in 3D, even if occlusions happen, and be classified in their respective object type.

You are provided with:

- Three data sequencies that contain:
    - **Sequence 1:** Raw stereo pair images (uncalibrated, unrectified) of pedestrians, and cyclists, including ground truth (Bounding boxes, depth).
    - **Sequence 2:** Raw stereo pair images (uncalibrated, unrectified) of pedestrians, cyclists, and cars with occlusion, including ground truth (Bounding boxes, depth).
    - **Sequence 3:** Raw stereo pair images (uncalibrated, unrectified) of pedestrians, cyclists, and cars with occlusion, **without** ground truth.
- Calibration pattern images for the used stereo camera.

Project Goals

- Calibrate and rectify the stereo input.
- Process the input images to detect objects in the environment and track them in 3D, even under occlusions.
- Train a machine learning system that can classify unseen images into the 3 classes (pedestrians, cyclists, and cars) based either on 2D or 3D data.
    - Use the web or/and capture your own images to create your training set. The image **sequences 1 and 2** provided with the project will constitute your validation set and the **sequence 3 your** testing set.

Project Report

Each group of students will submit a report about their Final Project by the end of the course. Submission will take place by uploading on DTU Learn. The report needs to be 10±2 pages and include a link to a video demonstrating the group's main outcomes.
Approval of report (based on a pass/fail evaluation) is mandatory for the group members to participate in the exam. The report will account for 10% of the final grade.

Important Dates

- *27. March 2023*: Announcement from the teachers of the Final Project description.
- *8. May 2023*: Group report hand-in.
- *15. May 2023*: Information about non-qualification for participating in the exam by email to the members of groups with inadequate reports.