28. March 2022
Course: ***31392 – Perception for Autonomous Systems***

Final Project Description

This project targets a quality control scenario under an Industry 4.0 perspective. The scenario considers a dynamic environment, where automation equipment, robots and humans can coexist without fences and dedicated cells. Such a dynamic and unstructured environment can result in occlusions of the visual quality control system. For this project, quality control is performed with a stereo camera that is fixed in the environment, overlooking a conveyor. Objects on the conveyor need to be tracked in 3D, even if occlusions happen, and be classified in their respective object type.

You are provided with:

- Two datasets that contain:
  - Raw stereo pair images (uncalibrated, unrectified) of objects on a conveyor.
  - Raw stereo pair images (uncalibrated, unrectified) of objects on a conveyor with occlusion.

  Both datasets include multiple images of objects as they travel on the conveyor. The datasets contain images of 3 objects classes (cups, books and boxes).
- Calibration pattern images for the used stereo camera camera.

Project Goals

- Calibrate and rectify the stereo input.
- Process the input images to detect objects on the conveyor and track them in 3D, even under occlusions.
- Train a machine learning system that can classify unseen images into the 3 classes (cups, books and boxes) based either on 2D or 3D data.
  - Use the web or/and capture your own images to create your training set. The image datasets provided with the project will constitute 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

- *28. March 2022* : Announcement from the teachers of the Final Project description.
- *09. May 2022* : Group report hand-in.
- *11. May 2022* : Information about non-qualification for participating in the exam by email to the members of groups with inadequate reports.