

# Revolve NTNU: Robust, Fast and Lightweight Environment Perception for Autonomous Race Car

April 2020

## Objective

This project is related to the Revolve student project aiming at building an autonomous race car. Its purpose is to explore methods of furthering the utility of the stereo camera system used in the current vehicle, either as a fusion of LiDaR and camera, or as a pure stereo camera configuration.

The goal is to contribute an important component to the next generation vehicle, where weight, sensor form-factor and computing power must be heavily optimised to enable the fastest and most robust driving in both manual and autonomous mode.

Using a stereo camera for autonomous or highly automated driving is one of the standard approaches in leading edge industrial autonomous driving (AD) research. This is due to the richness of information that can be obtained from cameras, including semantic interpretation of scenes.

In this project, latest achievements in the field of 'classical' (=non-neural) as well as Deep Learning based image interpretation are to be investigated and a selection of techniques apparently best suited for a lightweight implementation of Visual SLAM, or Visual Semantic SLAM, on a powerful, yet compact platform with limited energy consumption is to be designed, implemented and evaluated.

The project is meant as an exploratory action aiming already at the next but one generation of the Revolve autonomous racing car. The existing autonomous race car may be available as a test platform.

## **Responsibility**

The student is responsible for designing and implementing an autonomous software module for camera detection, intended to run on the car in 2021 or beyond, and that can contribute to a better performing car through efficient and robust processing.

## **Environment**

Revolve is a hands on, practical experience providing a great environment for testing and validation of your effort. You will work closely with an ambitious and goal-oriented team, and gives a unique opportunity to meet like-minded and talented students who can help you write a great Master's thesis while performing research for an autonomous race car.

For more information, see: [www.revolve.no/masteroppgave-for-revolve-ntnu](http://www.revolve.no/masteroppgave-for-revolve-ntnu)