



Driverless Hardware

Green Innovation meets performance

Our Project

Formula Electric Belgium is a team of engineering students who build a **Formula-Student racecar** to compete in international competitions. We design and build a brand-new car every year and compete with other teams in multiple worldwide competitions during the summer months. Formula Student is by far the biggest **engineering competition** in the world and continues to grow. From next year on, we will be competing in both the **electrical** and **driverless** competition. You can join the project during one or two years by applying for the '**Postgraduate in Innovation and Entrepreneurship in Engineering**'.

Tasks

As a driverless engineer you will work with onboard sensors to create a virtual environment of the track, in the aim to localize the race car, and then control its trajectory. An autonomous system is therefore composed of three main algorithms: **Track Landmarks Detection**, **Car Localization** and **Landmarks Mapping**, and **Car Control**.

The estimation of the cone position and their color detection are performed by the sensors fusion of a **LiDAR** and **cameras**. The LiDAR outputs raw cloud of points providing an accurate estimation of the surroundings 3D localization. The cameras provide raw images to an **Image Processing** algorithm (YOLO) which performs the cone filtering and the cone color detection.

To localize the race car and map the landmarks, the **Simultaneous Localization and Mapping (SLAM)** algorithm accumulates on the one hand data coming from the cone detection algorithms, and on the other hand velocity, heading and car position measurements from an **INS/GNSS sensor**. It is working simultaneously with a **Data Association** process stating whether a cone detected by the sensors is a newly detected cone, or a cone already mapped in the virtual environment.

The **Trajectory-Planning** algorithm computes a reference trajectory, the middle of track, based on the virtual environment built. The **Model Predictive Contouring Control** makes the tradeoff between maximizing the speed on the track and following the reference trajectory, based on a theoretical model of the race car. This algorithm provides the steering wheel, throttle and brake commands to the race car.

A **Wireless-Telemetry system** is implemented on the race car and provides a real time access to the sensor data and algorithm states to a remote laptop.

We are looking for two **software engineers**, one **hardware engineer** and one **mechanical engineer** to compose the next Driverless department.

Hardware engineer will be responsible for the embedded systems of the autonomous race car. You will also work on the integration of the software algorithms into the embedded system of the race car, including the telemetry system.

Profile

- Team Player
- Eager to learn new technologies
- Communicative
- Basic knowledge of electronics

Returns

- A unique engineering experience
- Developing your hard- and soft-skills in a company-like environment
- Work with the newest technologies and innovative companies
- Work in a team with a network of well over 120 partners
- A summer season packed with competitions all over Europe
- An experience of a life-time!

Up for the challenge?



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