

Hugo Grall Lucas

ROBOTICS ENGINEER

WORK EXPERIENCE

R&D ENGINEER (100% - 50%)

Lausanne, Switzerland

DISAL, DISTRIBUTED INTELLIGENT SYSTEMS AND ALGORITHMS LABORATORY [↗](#)

Aug. 2020 - Feb. 2021

- ▶ Testing and improving the high-level control algorithm developed during my Master's thesis with a real drone inside a fly arena.
- ▶ Assist students in environmental engineering during the practicals of a Bachelor's course taught by the lab.

ROBOTICS ENGINEER

Villaz-St-Pierre, Switzerland

ROVENSO, AGILE ROBOTS FOR SECURITY AND SAFETY MONITORING OF INDUSTRIAL SITES [↗](#)

Jul. 2020 - Aug. 2020

- ▶ Improvement of the project started during my internship and realization of tests in different case scenarios.
- ▶ Deployment of the server on the internet and access the robot using a 4G key.

MASTER INTERNSHIP

Villaz-St-Pierre, Switzerland

ROVENSO, AGILE ROBOTS FOR SECURITY AND SAFETY MONITORING OF INDUSTRIAL SITES [↗](#)

Sep. 2019 - Feb. 2020

- ▶ Realization of a web server composed of a database, a VPN server and a web interface used for monitoring the robot ROVéo (video live stream, live access to sensor values and management of the logs).
- ▶ Development of the software of a Pan Tilt Zoom (PTZ) camera module, mainly for tuning the two PID's of the motors and for managing the video live streams from the the sensor to the remote end user.
- ▶ **Key Words:** Robot Operating System (ROS) [↗](#), docker [↗](#) and Grafana [↗](#), NodeJS

TEACHING ASSISTANT

Lausanne, Switzerland

SERVICE DE PROMOTION DES SCIENCES (SPS), EPFL

Feb. 2019 - Dec. 2020

- ▶ Teaching children of eleven to thirteen years old about the basis of robotic programming through various activities and coding challenges. The robot used during these courses was the LEGO MINDSTORMS Education EV3. We also realized several videos for moving our course online during the lockdown.

ECOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE, EPFL

Oct. 2018 - Dec. 2018

- ▶ Assist mechanical and microengineering students in first year Bachelor's degree during their electronic laboratories.

TRAINING PROGRAM

Lausanne, Switzerland

ECOLE TECHNIQUE - ECOLE DES MÉTIERS DE LAUSANNE, ETML

3 weeks in August 2016

- ▶ Use of drilling, milling and lathe machines to create various components. A personal project was also realized. (Chess pieces and the board [↗](#))

ACADEMIC PROJECTS

MASTER PROJECT

Performance and Comparison Analysis of Linear Model Predictive Control on Reference Tracking Quadrotors [↗](#)

Full Time

DISTRIBUTED INTELLIGENT SYSTEMS AND ALGORITHMS LABORATORY, DISAL (EPFL)

Feb. 2020 - Jul. 2020

High performance trajectory tracking is a challenging and crucial task for the quadrotor position control. The proposed algorithms are tested and evaluated in two different simulated environments, i.e. MATLAB and Webots. A comparative study is performed between Linear and a Nonlinear Model Predictive Control (MPC) and computational time assessment is realized on the real hardware (Raspberry Pi 4) while the physics is computed on Webots. (Summary [↗](#))

- ▶ **Key Words:** Quadrotors, MATLAB & Simulink, Webots [↗](#), C/C++

SEMESTER PROJECTS

10 hours

Simulations on Webots of a SLAM algorithm designed for the Khepera IV [↗](#)

per week

DISTRIBUTED INTELLIGENT SYSTEMS AND ALGORITHMS LABORATORY, DISAL (EPFL)

Feb. 2019 - Jun. 2019

The purpose of this work was to search and then to implement a SLAM algorithm suitable for a specific multi-robots system. The robot used in this study was the Khepera IV whose computational capacities are limited. An approach exploiting with the five ultrasonic sensors carried by the robot and with its wheels encoders has been tested in simulation on Webots. The final results were compared with those obtained using a standard LIDAR. (Summary [↗](#))


- ▶ **Key Words:** Mobile Robotics, SLAM, Localization, Navigation, Simulation, Webots [↗](#), Khepera IV [↗](#), C/C++

Simulations of upper body movements using MATLAB and OpenSim API

10 hours
per week

BIOROBOTICS LABORATORY, BioRob (EPFL)

Feb. 2018 - Jun. 2018

This work belongs to the FlyJacket  project. The goal was to create a numerical simulation close to the test bed used in reality. The purpose of the experiment was to identify the dynamic models of the human upper body movements caused by the specific forces of the FlyJacket. During the experimentation phase, the torso is moved by a set of cables bounded on motors. The simulation mixed the OpenSim capabilities to model the muscles dynamic and the versatility offered by MATLAB & Simulink to mimic the specific forces generated by the motors through the cables.

► **Key Words:** Dynamic Models, Simulation, OpenSim , MATLAB & Simulink


COURSE PROJECTS

2 hours
per week

Classification of pairs of images containing digits

COURSE : DEEP LEARNING  (EPFL)

Feb. 2019 - May 2019

Design and training of a deep neural network for the classification of pairs of images containing handwritten digits. The dataset used in this work was the MNIST . Different kinds of architectures were tested in order to improve the overall performances of the classifier. This project was carried out by group of three students.

► **Key Words:** Deep Learning, Classification, CNN, MNIST

Development of an Android application for tablet and smartwatch

3 hours
per week

COURSE : LAB ON APP DEVELOPMENT FOR TABLETS AND SMARTPHONES  (EPFL)

Sep. 2018 - Jan. 2019

Creation of a *Just-Dance*-like game running on android tablets and smartwatches. The music and the list of movements to execute are played on the tablet. The smartwatch is used first to gather the data of the accelerometer, then to filter them and finally to send bundles to the tablet. In the end, a classifier is running to determine whether the right movement has been executed at the right time. This project has been carried out by group of three students.

► **Key Words:** Android, Java, Smartwatch, Signal Processing

Multi-robot navigation in cluttered and dynamic environments

2 hours
per week

COURSE : DISTRIBUTED INTELLIGENT SYSTEMS (DIS)  (EPFL)

Sep. 2018 - Dec. 2018

This project aimed to implement a navigation strategy for a multi-robot system formed by a group of e-pucks moving throughout an environment. This environment was composed of an enclosed arena with static obstacles. Each group of robots had to be able 1) to avoid obstacles within the arena while retaining the collective aggregation, and 2) to maintain collective aggregation while two different groups of robots cross each other moving in opposite directions. This project was carried out by group of four students. (Video : [1], [2])

► **Key Words:** Multi-robots, e-pucks , Webots , Flocking, C/C++, IR-Communication


THOR : A smart trash bin designed for the EPFL campus

10 hours
per week

COURSE : PRODUCTS DESIGN AND SYSTEMS ENGINEERING  (EPFL)

Sep. 2017 - Dec. 2017

Design and realization of the prototype of an IoT device. This Project has been carried out by group of six students. The key idea was to develop a mechanical system to crush PET bottles actuating by hand using a lever. Additionally, smart features were implemented such as counting the number of bottles, measuring the filling of the trash bag and displaying relevant information on a screen while sending logs to a remote server. My contribution focused on the design of the mechanical parts with Catia and on the assembly of the prototype.

► **Key Words:** Catia , prototyping, IoT device