

Lucas WÄLTI

PhD Student, DISAL, EPFL
Robotics Engineer, EPFL M.Sc. in Robotics



[linkedin.com/in/lucas-waelti-30046b185](https://www.linkedin.com/in/lucas-waelti-30046b185) github.com/LucasWaelti gitlab.com/LucasWaelti
(+41)78 318 75 89 @lucas.waelti@gmail.com Lausanne, Switzerland

PERSONAL INFORMATION

PhD student at the Distributed Intelligent Systems and Algorithms Laboratory (DISAL), supervised by Prof. Alcherio Martinoli. My research focuses on the inspection of infrastructural assets with multiple autonomous UAVs, applied to steel infrastructures. My research interests include autonomous robotics, navigation, perception, multi-robot systems, embedded systems, simulation, and machine learning. [DISAL contact page](#).

SKILLS

Knowledge in	Robotics, Unmanned Aerial Vehicles (UAVs), Simulation, Robot Operating System (ROS), System Control, Kalman Filter, Embedded Systems, Deep Learning, Deep Reinforcement Learning, Computer Vision, Particle Swarm Optimization, 3D CAD
Programming	C/C++, Python, bash, Matlab, Java, Assembly (basics)
Simulation	Robot modeling and control: Webots, Gazebo
Software/Tools	Linux (Ubuntu), Windows, git, Webots, ROS, PX4, PyTorch, Pandas, Matlab, Docker, FreeCAD, 3D printing

PROFESSIONAL EXPERIENCE

Now December 2021	PhD student, DISTRIBUTED INTELLIGENT SYSTEMS AND ALGORITHMS LABORATORY, EPFL, Switzerland Research topic: <i>Distributed Robotic Inspection of Infrastructural Assets</i> . Thesis director: Prof. Alcherio Martinoli The application of autonomous UAVs for the inspection of steel infrastructures is investigated, with a focus on the navigation challenges. This use-case requires the combination of adequate state estimation, object detection, path planning and disturbance detection methods, on top of a multi-robot coordination scheme. Practical experiments are typically carried out with the Starling MAV , produced by ModalAI, Inc.
November 2021 October 2020	R&D Engineer, DISTRIBUTED INTELLIGENT SYSTEMS AND ALGORITHMS LABORATORY, EPFL, Switzerland Full time engineer working in the continuity of my master thesis. Hired as a scientific assistant to further develop the autonomous inspection functionalities of the drone for elevator shafts. The improvements include the embedding of supplementary sensors (such as range finders over I ² C) and various updates in navigation functionalities. ROS C/C++ Python Webots docker embedded systems yocto PX4
August 2020 February 2020	Master Thesis, SCHINDLER NEW TECHNOLOGIES OFFICE, Switzerland Master Thesis in the industry. Implementation of an autonomous drone for elevator shafts inspection. More details about the project in the "PROJECTS" section. Illustrative video: https://youtu.be/6SZQSIVCu-U ROS C/C++ Python Webots docker embedded systems yocto PX4
May 2018 January 2018	Military Service, SWISS AIR FORCES, Switzerland Formation in the context of the mandatory military service as a <i>soldier</i> and <i>mechanic</i> on fighter aircrafts F/A-18 Hornet C/D.
December 2017 October 2017	Engineering Internship, CYBERBOTICS, Switzerland Adaptation of a virtual bipedal robot trained using deep reinforcement learning (cf. DeepLoco). The virtual robot first had to be modeled in Webots. The original controller had to be then adapted to work in the Webots simulation environment. C/C++ Webots

LANGUAGES

French	Mother tongue
English	Fluent, C1-C2
German	Good level, C1

DIPLOMAS

- Master of Science M.Sc. in Robotics, EPFL, 2020
- Bachelor of Science B.Sc. in Microengineering, EPFL, 2017
- Baccalaureate, Gymnasium Auguste Piccard, 2014
- Goethe-Zertifikat C1, Goethe-Institut e.V., 2014

EDUCATION

- 2018 - 2020 Master degree at EPFL. Faculty : Robotics.
- 2016 - 2017 Erasmus year at TUM (Technische Universität München), Technical University of Munich, third and last year of the bachelor degree. Faculty : Electrical Engineering and Information Technology.
- 2014 - 2016 Bachelor degree at EPFL (Ecole Polytechnique Fédérale de Lausanne), first and second year. Faculty: Microengineering.
- 2011 - 2014 Bilingual Maturity (French/German)

PAST ACADEMICAL PROJECTS

Navigation Strategies for Autonomous Quadcopters in Elevator Shafts – MASTER THESIS, 2020

The project was done at Schindler's New Technologies office and was supervised by Prof. Dr. Colin Jones and Raphael Bitzi (technical project leader at Schindler New Technologies, raphael.bitzi@schindler.com). Schindler initiated this project to gain expertise in the field of UAVs and their application to inspection tasks, specifically for fully autonomous use cases. A development quadcopter produced by ModalAI was selected for this project and autonomous navigation algorithms were developed to have the drone perform fully autonomous inspection missions within the company's elevator shafts. A drone model was created in simulation (leveraging Webots) to support the development of the control and navigation algorithms.

> *Obtained grade* : **6 / 6**

ROS C/C++ Python Webots docker embedded systems yocto

Automatic Design of Behavioral Arbitrators for Khepera IV Robots: a Comparison Between Deep Reinforcement Learning and Particle Swarm Optimization for the Training of Artificial Neural Networks – SEMESTER PROJECT, 2020

The project was done at the DISAL Laboratory at EPFL under the supervision of Prof. Dr. Alcherio Martinoli. The goal of the project was to identify a suitable algorithm to train a behavioral arbitrator to leverage a set of basic behaviors to accomplish a given task. The chosen arbitrator topology was Artificial Neural Networks and was trained using Deep Reinforcement Learning techniques as well as Particle Swarm Optimization.

Project overview: https://disalw3.epfl.ch/teaching/student_projects/ay_2019-20/ws/DISAL-SP133_summary.pdf

A demonstration on how deep reinforcement learning can be implemented in Webots was derived from this project and can be found here: https://github.com/LucasWaelti/RL_Webots

> *Obtained grade* : **6 / 6**

C/C++ Python PyTorch Webots Deep Reinforcement Learning Particle Swarm Optimization

Simulation and Control of a Robotized Wheelchair Able to Cross Difficult Terrains – SEMESTER PROJECT, 2019

The project was done at the BioRob Laboratory at EPFL under the supervision of Prof. Dr. Auke Ijspeert.

The robotic wheelchair model had to be created in Webots and had to be interfaced with the original controller of the concept's inventor Mr. C. Cazali. The goal of the project was to evaluate the the stability and the control of the system and provide efficient tools for further research and development.

> *Obtained grade* : **5.75 / 6**

Python Webots