

# Alexander Millane

ROBOTIC PERCEPTION ENGINEER · PHD STUDENT

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## Summary

Hey, I'm Alex. I'm a soon-to-graduate Ph.D. student in the [Autonomous Systems Lab](#) at [ETH Zürich](#), in Switzerland. My Ph.D. is focused on 3D map-building for rotary-wing UAVs, and more generally on representations for mapping large-scale environments, on computationally constrained platforms. I am currently spending the final part of my Ph.D. as a visiting scientist in the [Microsoft Mixed Reality & AI Zurich Lab](#).

## Education

### ETH Zürich

PH.D. CANDIDATE

- Dissertation: Consistent, Scalable, Large-Scale Mapping for MAVs using Distance Functions.

*Zürich, Switzerland*

2016 - Present

### ETH Zürich

MASTER IN ROBOTICS, SYSTEMS AND CONTROL, GPA: 5.55/6.0

*Zürich, Switzerland*

2012 - 2015

### University of Canterbury

B.S IN MECHATRONICS (WITH HONORS), GPA: 8.5/9.0

*Christchurch, New Zealand*

2007-2010

## Work Experience

### Sauber Motorsport AG.

RESEARCH AND DEVELOPMENT INTERN

- An eight month internship as a member of the electronics design team for Sauber's 2014 Formula 1 race car.
- Creation of a **simulation model** of an electro-hydraulic brake-by-wire system.
- Model-based **controller design**.
- Implementation of real-time, safety and performance-critical **control code** which was **deployed to the a Formula 1 car** during the 2014 season.

*Zürich, Switzerland*

2013

### Infact Limited, Engineering Design Consultancy

RESEARCH AND DEVELOPMENT ENGINEER

- Development of an acoustic wood testing tool and integration into a hydraulic, heavy vehicle.
- **Digital electronics** design, **embedded software** development, **signal processing** and extensive prototyping and testing.
- Running **operational trials** at forestry sites located in New Zealand, Australia and the United States.

*Christchurch, New Zealand*

2010-2012

### SteelBro: Container Handling Solutions

INTERN

- 3 month internship.
- Designed a **networked IMU** (Inertial Measurement Unit) which helped prevent truck roll-over.
- ARM embedded software, digital electronics, and PCB design.
- Making the sensor in-house was projected to save SteelBro **\$564,000** during its first 5 years of implementation.

*Christchurch, New Zealand*

2009-2010

## Research Projects

### Mixed Reality & AI Lab Zurich

VISITING RESEARCHER

- 6 month visiting researcher position.
- Research on **geometry-based localization** in distance-function-based maps.
- Check out our [video](#).

*Zürich, Switzerland*

2020

### Autonomous Fire-Fighting at MBZIRC

SUB-TEAM LEAD

- Designed a system for autonomously finding fires in multi-story buildings as part of the MBZIRC 2020 international robotics competition.
- The mission is completed by a **collaborating robotic team**, consisting of a hexacopter and a tricopter. The approach exploits the **mapping** and **precise control** capabilities of each of the vehicles respectively.
- **Led a team** of masters students to design the hardware-software system.
- Check out our [video](#).

*Zürich, Switzerland, Abu Dhabi, UAE*

2019 - 2020

## Thermal Mapping at ARCHE (Advanced Robotic Capabilities for Hazardous Environment) *Wangen an der Aare, Switzerland*

TEAM MEMBER

2018

- In this work we showed a UAV building **3D thermal maps**, localizing within these maps, and autonomously navigating through narrow spaces to find potential injured people using a thermal camera.
- We demonstrated the system to military search and rescue personnel at a search and rescue training site in Switzerland.
- Check out our [video](#).

## Leica CTI

*Zürich, Switzerland*

ENGINEER

2015

- Designed an autonomous facade inspection system with industry partner (**Hexagon/Leica Geosystems**)
- **Sensor-fusion** of measurements from laser tracking system and on-board visual-inertial state estimation. Creation of **autonomous inspection** paths on complex facades.

## Selected Publications

A full list of publications may be found my [google scholar page](#) or is available upon request.

### DENSE MAPPING

- 2019 **Alexander Millane\***, Victor Reijgwart\*, Helen Oleynikova, Roland Siegwart, Cesar Cadena, and Juan Nieto, **Voxgraph: Globally Consistent, Volumetric Mapping using Signed Distance Function Submaps**. IEEE Robotics and Automation Letters, 2019. [paper](#). [video](#).
- 2018 **Alexander Millane**, Zachary Taylor, Helen Oleynikova, Juan Nieto, Roland Siegwart, and César Cadena. **C-blox: A Scalable and Consistent TSDF-Based Dense Mapping Approach**. International Conference on Intelligent Robots and Systems (IROS), 2018. [paper](#).

### LOCALIZATION

- 2020 **Alexander Millane**, Helen Oleynikova, Christian Lanegger, Jeff Delmerico, Juan Nieto, Roland Siegwart, Marc Pollefeys, and César Cadena. **Freasures: Localization in Signed Distance Function Maps**. IEEE Robotics and Automation Letters, 2020, (submitted). [paper](#). [video](#).
- 2019 **Alexander Millane**, Helen Oleynikova, Juan Nieto, Roland Siegwart, and César Cadena. **Free-Space Features: Global Localization in 2D Laser SLAM Using Distance Function Maps**. International Conference on Intelligent Robots and Systems (IROS), 2019. [paper](#).

## Honors & Awards

- 2014 **European semi-finalists**, OneStart Startup Competition *London, UK*
- 2014 **Impact Hub Prize**, Hack Zurich *Zürich, Switzerland*
- 2010 **First in class placing**, Bachelor of Engineering in Mechatronics. *Christchurch, NZ*
- 2008 **CS McCully Scholarship**, Performance in first year Bachelor of Engineering. *Christchurch, NZ*
- 2008 **Madam Tiong Guok Hua Prize**, Highest GPA first year of Bachelor of Engineering. *Christchurch, NZ*
- 2006 **NCEA Physics Scholarship**, Final high-school exams. *Christchurch, NZ*

## Skills

<b>Programming</b>	C++ , Matlab/Simulink , Python
<b>Tooling</b>	Git, Linux, Jenkins CI, Robot Operating System (ROS), ARM
<b>Electronics</b>	Electronic Prototyping. PCB design and manufacture. Altium Designer.
<b>Mechanical</b>	Mechanical Prototyping. 3D Printing. Solidworks. Fusion 360.
<b>Languages</b>	English (native). German (Intermediate/B1).

## Leadership & Teaching

<b>Supervisor</b>	18 Masters projects/theses, 6 Bachelor theses.
<b>Teaching Assistant</b>	2 ETH Master's courses: Perception and Learning for Robotics, and Autonomous Mobile robotics.
<b>Reviewer</b>	Various <b>journals/conferences</b> , including IROS, ICRA and RAL. <b>Finalist for Best Review Award</b> of MFI 2020.