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 — *Zurich, Switzerland*

Ph.D. Candidate — *2016 - Present*

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

ETH Zürich — *Zurich, Switzerland*

Master in Robotics, Systems and Control, GPA: 5.55/6.0. — *2012 - 2015*

- Dissertation: Range-Inertial State Estimation for a Tethered Aircraft.

University of Canterbury — *Christchurch, New Zealand*

B.S in Mechatronics (with Honors), GPA: 8.5/9.0. — *2007–2010*

Work Experience

Sauber Motorsport AG. — *Zürich, Switzerland*

Research and Development Intern — *2013*

- 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 a Formula 1 car** during the 2014 season.

Infact Limited, Engineering Design Consultancy — *Christchurch, New Zealand*

Research and Development Engineer — *2010-2012*

- 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.

SteelBro: Container Handeling Solutions — *Christchurch, New Zealand*

Intern — *2009–2010*

- 3 month internship to design 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.

Research Projects

Mixed Reality & AI Lab Zurich — *Zürich, Switzerland*

Visiting Researcher — *2020*

- 6 month visiting researcher position.
- Research on **geometry-based localization** in distance-function-based maps.
- Led to a Robotics and Automation Letters submission. Check out our video.

Autonomous Fire-Fighting at MBZIRC — *Zürich, Switzerland, Abu Dhabi, UAE*

Sub-Team Lead — *2019 - 2020*

- 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.

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.

Localization

2020 **Alexander Millane**, Helen Oleynikova, Christian Lanegger, Jeff Delmerico, Juan Nieto, Roland Siegwart, Marc Pollefeys, and César Cadena. **Freetures: 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.

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.

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

Programming C++ , Matlab/Simulink , Python.

Tooling Git, Linux, Jenkins CI, Robot Operating System (ROS), ARM.

Electronics Electronic Prototyping. PCB design and manufacture. Altium Designer.

Mechanical Mechanical Prototyping. 3D Printing. Solidworks. Fusion 360.

Languages English (native). German (Intermediate/B1).

Leadership & Teaching

Supervisor **18** Masters projects/theses, **6** Bachelor theses.

Teaching Assistant **2 ETH Master's courses:** Perception and Learning for Robotics, and Autonomous Mobile robotics.

Reviewer Various **journals/conferences**, including IROS, ICRA and RAL. **Finalist for Best Review Award** of MFI 2020.