Dr Mielle Malcolm

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Education

PhD in Computer Science
Fakultetsgatan 1, Örebro, Sweden

Örebro University, Sweden
Mar 2015 - Oct 2019

- Title—Helping robots help us: Using prior information for localization, navigation, and human-robot interaction
- Supervisors: Dr. Martin Magnusson and Prof. Achim J. Lilienthal
- `https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1345270&dswid=-7503`

Master of Engineering (MSc) in Robotics
4 place Jussieu, Paris, France

Polytech Paris Sorbonne
Sep 2011 - Oct 2014

Preparation for Engineering School
Marseille, France

Université de Provence Aix-Marseille I
Sep 2009 - Aug 2011

Work Experience

Team Lead
EPFL Innovation Park, Switzerland

Schindler
Jan 2022 - present

- Leading research on computer science, multi-modal sensor fusion, and robotics with a focus on built environment sustainability and worker safety.
- Secured 2 Innosuisse grants as Principal Investigator.
- Supervised 18 Master students (6 thesis + 12 internships).
- Project management (Agile methodology), hiring, and budget management.

R&D Software Engineer
St-Sulpice, Switzerland

Bluebotics
July 2020 - Nov 2021

- Designed and implemented novel algorithms for real-time motion detection in 2D laser scans.
- Implemented features that improved the installation time from multiple days to a couple of hours.
- Agile project management, code review, and software architecture.

Research Supervision

PhD STUDENTS

Chenghao Xu
Switzerland

EPFL
Jan 2024 - today

- Subject: Neural rendering and building characteristics estimation for building retrofit.
- Co-director of the thesis with Prof. Olga Fink

Shuo Sun
Sweden

Örebro University
June 2023 - today

- Subject: Efficient mapping for mobile robots.
- Co-supervisor with Dr Martin Magnusson and Prof. Achim J. Lilienthal.

Master thesis   *Switzerland*

Schindler and EPFL   *Jan 2022 - today*
- Supervisor for 6 Master thesis
- Outcomes: 3 patents, 1 publication, 2 publications in revision/preparation, 1 dataset, and 1 prize.

Internships   *Switzerland*

Schindler   *Jan 2022 - today*
- Supervisor for 12 internships
- Outcomes: 3 patents, 2 publications in preparation.

Teaching

Guest lecture   *ETH, Zurich, Switzerland*

Machine learning for industrial application   *2024*
- Presented recent advances in machine learning for building retrofitting and mapping.

Teaching assistant   *Örebro university, Örebro, Sweden*

Mathematics and Introduction to Python   *2016 - 2018*
- TA for the labs and grading of the exams.

Tutor   *Completude, Paris, France*

Physics and chemistry   *2012 - 2013*
- Tutored high school students in physics and chemistry

Collaborations

EPFL   *Lausanne, Switzerland*
- Prof. Olga Fink—co-PI of the INSULATED grant (Innosuisse) and co-director of the associated PhD thesis.
- Dr Anisoara Ionescu—co-PI of the Safety Coach grant (Innosuisse).

Örebro University   *Örebro, Sweden*
- Dr. Martin Magnusson—co-supervising PhD Student Shuo Sun.

Technical University of Munich   *Munich. Germany*
- Prof. Achim J. Lilienthal —co-supervisor PhD Student Shuo Sun.

HEIG-VD   *Neuchatel, Switzerland*
- Prof. Andres Perez Uribe—co-PI of the Safety Coach grant (Innosuisse).

Achievements

2017	**Best student paper award**, IEEE International Symposium on Safety, Security and Rescue Robotics (SSRR)	*Shanghai, China*

Scientific Outreach

- **ECCV 2024 Workshop**: ThermoNeRF presented at "Beyond conventional cameras" workshop.
- **IMC 2024**: Session chair.
- **IMC 2023**: Invited speaker for a talk on AI and building renovation.
- **ICINCO 2022**: Oral presentation of TEAM.
- **ICRA 2018**: Poster presentation of MAORIS.
- **SSRR 2017**: Oral presentation of the Auto-Complete Graph—best student paper award.
- **IROS 2017**: Poster presentation of the Auto-Complete Graph.
- **SSRR 2016**: Oral presentation.

Externally funded projects

INSULATED
Switzerland

Innosuisse
Jan 2024 - Jan 2027

- Integrated solution for lean and abridged thermal evaluation with digital twins (INSULATED). This project aims to enhance the precision of building thermal insulation assessments and streamline the process to save time and reduce costs. Research focus: machine learning, 3D reconstruction, and multi-modal sensor fusion.
- Website: `https://www.aramis.admin.ch/Grunddaten/?ProjectID=53471`
- Principal investigators: Dr Malcolm Mielle and Prof Olga Fink (EPFL).
- Partners: Schindler and EPFL
- Amount: 317'814.00CHF
- My contribution: initial idea, draft of the proposal (research and business plan), finding collaborators.

Safety Coach
Switzerland

Innosuisse
Jan 2025 - Jan 2027

- AI-based companion leveraging wearable and wireless sensors to improve safety on construction sites. Research focus: machine learning, time-serie data, multi-modal sensor fusion, and human-robot interaction.
- Principal investigators: Dr Malcolm Mielle, Dr Ionescu Anisoara (EPFL), Prof Andres Perez-Uribe (HEIG-VD).
- Partners: Schindler, EPFL, and HEIG-VD.
- Amount: 269'334.60CHF
- My contribution: initial idea, draft of the proposal (research and business plan), finding collaborators.

Research Output

JOURNAL ARTICLES

URSIM: Unique Regions for Sketch Map Interpretation and Matching
Malcolm Mielle, Martin Magnusson, Achim Lilienthal
Robotics p. 43. 2019, DOI: `10.3390/robotics8020043`

The Auto-Complete Graph: Merging and Mutual Correction of Sensor and Prior Maps for SLAM
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
Robotics p. 40. 2019, DOI: `10.3390/robotics8020040`

CONFERENCE PROCEEDINGS

3QFP: Efficient neural implicit surface reconstruction using Tri-Quadtrees and Fourier feature Positional encoding
Shuo Sun, Malcolm Mielle, Achim J. Lilienthal, Martin Magnusson
2024 IEEE International Conference on Robotics and Automation (ICRA), 2024, Yokohama, Japan
URL: `http://arxiv.org/abs/2401.07164`

High-Fidelity SLAM Using Gaussian Splatting with Rendering-Guided Densification and Regularized Optimization
Shuo Sun, Malcolm Mielle, Achim J. Lilienthal, Martin Magnusson
2024 IEEE International Conference on Intelligent Robots and Systems (IROS), 2024, Abu Dhabi, UAE
URL: `http://arxiv.org/abs/2403.12535`

TEAM: A Parameter-Free Algorithm to Teach Collaborative Robots Motions from User Demonstrations:
Lorenzo Panchetti, Jianhao Zheng, Mohamed Bouri, Malcolm Mielle
Proceedings of the 20th International Conference on Informatics in Control, Automation and Robotics, 2023, Rome, Italy
DOI: `10.5220/0012159700003543`

A comparative analysis of radar and lidar sensing for localization and mapping
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2019 European Conference on Mobile Robots (ECMR), 2019, Prague, Czech Republic
DOI: `10.1109/ECMR.2019.8870345`

A Method to Segment Maps from Different Modalities Using Free Space Layout MAORIS: Map of Ripples Segmentation
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2018 IEEE International Conference on Robotics and Automation (ICRA), 2018, Brisbane, QLD
DOI: `10.1109/ICRA.2018.8461128`

SLAM auto-complete: Completing a robot map using an emergency map
Malcolm Mielle, Martin Magnusson, Henrik Andreasson, Achim J. Lilienthal
2017 IEEE International Symposium on Safety, Security and Rescue Robotics (SSRR), 2017, Shanghai, China
DOI: `10.1109/SSRR.2017.8088137`

Using sketch-maps for robot navigation: Interpretation and matching
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2016 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), 2016, Lausanne, Switzerland
DOI: `10.1109/SSRR.2016.7784307`

SUBMITTED

Thermoxels: a Voxel-based Method to Generate Simulation-Ready 3D Thermal Models
Etienne Chassaing, Juliette Parchet, Florent Forest, Olga Fink, Malcolm Mielle
submitted to cisbat 2025

ThermoNeRF: Multimodal Neural Radiance Fields for Thermal Novel View Synthesis
Mariam Hassan, Florent Forest, Olga Fink, Malcolm Mielle
presented at ECCV 2024 workshop and submitted to Advanced Engineering Informatics, .
URL: `http://arxiv.org/abs/2403.12154`

Exploiting Semantic Scene Reconstruction for Estimating Building Envelope Characteristics
Chenghao Xu, Malcolm Mielle, Antoine Laborde, Ali Waseem, Florent Forest, Olga Fink
in revision for Building and Environment, 2024, .
URL: `https://arxiv.org/abs/2410.22383`

PATENTS

Method of Doing Maintenance on an Elevator
Nicola Ischia, Christian Studer, Lorenzo Panchetti, Shuhan He, Jianhao Zheng, Malcolm Mielle
2024, URL: `https://patents.google.com/patent/WO2024037884A1/en?inventor=Malcolm+Mielle`

Collaborative Robot for Carrying out a Service Task in an Elevator Shaft and Method for Operating the Collaborative Robot
Malcolm Mielle
2024, URL: `https://patents.google.com/patent/WO2024184105A1/en?inventor=Malcolm+Mielle`

Method and Device for Measuring a Shaft Such as an Elevator Shaft
Malcolm Mielle, Mariam Hassan
2024, URL: `https://patents.google.com/patent/EP4421015A1/en?inventor=Malcolm+Mielle`

Method of Operating a Landing Door of an Elevator Shaft and Door Opening Tool for Such a Door
Malcolm Mielle, Shuhan He
2024, URL: `https://patents.google.com/patent/EP4324778A1/en?inventor=Malcolm+Mielle`

DATASETS

ThermoNeRF: Multimodal Neural Radiance Fields for Thermal Novel View Synthesis
anonymous
2024, DOI: `10.5281/ZENODO.10835108`

Ground Truth Matches between Maps with High Disparity
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2019, DOI: `10.5281/ZENODO.2574036`

Dortmund Slam Dataset - Radar, Velodyne
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2018, DOI: `10.5281/ZENODO.1489911`

Hannover University Slam Dataset - Radar, Velodyne
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2018, DOI: `10.5281/ZENODO.1489924`

Örebro University Basement SLAM Dataset - Radar, Velodyne
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2018, DOI: `10.5281/ZENODO.1489896`

Novel Radar
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2017, DOI: `10.5281/ZENODO.893154`

Sketch Maps Dataset
Malcolm Mielle, Martin Magnusson, Achim J. Lilienthal
2017, DOI: `10.5281/ZENODO.892062`

SOFTWARE

Schindler-EPFL-Lab/thermo-nerf
2024, URL: `https://github.com/Schindler-EPFL-Lab/thermo-nerf`

Schindler-EPFL-Lab/team
2022, URL: `https://github.com/Schindler-EPFL-Lab/team`

MalcolmMielle/Auto-Complete-Graph
2017, URL: `https://github.com/MalcolmMielle/Auto-Complete-Graph`

MalcolmMielle/maoris
2017, URL: `https://github.com/MalcolmMielle/maoris`

References

Dr. Martin Magnusson   *Örebro University*
martin.magnusson@oru.se

Prof. Olga Fink   *École Polytechnique Fédérale de Lausanne*
olga.fink@epfl.ch

Prof. Achim J. Lilienthal   *Technical University of Munich*
achim.j.lilienthal@tum.de

Prof. Andres Perez-Uribe   *Haute École d'Ingénierie et de Gestion du Canton de Vaud*
Andres.Perez-uribe@heig-vd.ch

Languages

French   mother tongue
English   C2
Swedish   A2

Scientific and Societal Impact

- I made available 6 datasets—including one related to firemen operations (`https://zenodo.org/records/1489911`) and one related to building renovation (`https://zenodo.org/records/10835108`).

- Currently developing a dataset of synthetic buildings for windows-to-wall ratio of building, targeting building renovation for Xu et al. 2024.

- During covid lockdown, I led a group of volunteers in the evaluation of three state-of-the-art methods for spo2 measurements (used for early detection of covid symptoms) from smartphone cameras (`https://github.com/CoVital-Project/Spo2_evaluation`).

- Developed an app to reduce food waste (`https://malcolmmielle.github.io/Fridgify/`).