Marija Popović

Curriculum Vitae

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Current Position: *Junior Research Group Leader*, Cluster of Excellence "PhenoRob", University of Bonn, Germany

Date of Birth	14.05.1993	Place of Birth	Belgrade, Serbia
Citizenship	Serbian	Marital Status	Single

LinkedIn | GitHub | Google Scholar | ResearchGate

Research Interests: Active decision-making, planning/coordination, and perception/computer vision for aerial and ground vehicles, with applications in agriculture and inspection robotics.

Education

Sep 2015 - Oct 2019 **Doctor of Philosophy**, *Autonomous Systems Lab*, ETH Zürich, Switzerland
- Ph.D. Thesis: Environmental Mapping and Informative Path Planning for UAV-based Active Sensing

Oct 2011 - Jun 2015 **Master in Engineering in Integrated Mechanical & Electrical Engineering (IMEE)**, *Department of Electrical & Electronic Engineering*, University of Bath, UK
Top graduate with first-class honors (88.14% overall)
- Final Year Project: Genetic Algorithm-based Optimisation for Non-linear Systems
- Group Business & Design Project: Avionics Design for a UAV in Search and Rescue

Jun 2013 - Aug 2013 **Science & Engineering Summer Experience (SENSE)**, *Technische Universität Braunschweig*, Braunschweig, Germany
Research assistant and summer exchange student (1.0+ overall)

Sep 2008 - Jun 2011 **International Baccalaureate Diploma Programme (IBDP)**, *American International School in Abu Dhabi*, Abu Dhabi, UAE
Top graduate with honors (44 points overall)
- 7, 7, 6 points in Higher Level subjects Physics, Mathematics, and Chemistry

Professional and Academic Experience

Feb 2021 - Present **Junior Research Group Leader**, *Cluster of Excellence "PhenoRob"*, University of Bonn, Germany
- Leading research group (2 PhD students) in Core Project 4 *Autonomous In-Field Intervention*

Dec 2019 - Feb 2021 **Research Associate**, *Smart Robotics Lab*, Imperial College London, UK
- Dec 2019 - Feb 2021: Member of EPSRC-funded Project *Aerial Additive Building Manufacturing*
  - Four-year project aiming to develop an aerial robotic construction system
- Dec 2019 - Feb 2021: Member of EPSRC/Orca Hub-funded Project *SWIFT*
  - One-year project aiming to develop real-time visual robotic mapping and inspection

Sep 2015 - Oct 2019 **Scientific Researcher and Teaching Assistant**, *Autonomous Systems Lab*, ETH Zürich, Switzerland
- Jan 2019 - Apr 2019: Visiting researcher at the *Centre for Autonomous Systems*, UTS, Australia
  - Research on active sensing under localisation uncertainty
- Apr 2015 - Sep 2018: Member of EU-Horizon 2020 Project *Flourish* (UAV navigation)
  - Three-year project aiming to develop an adaptable robotic solution for precision agriculture
- Nov 2016 - Mar 2017: Participant in the *Mohamed Bin Zayed International Robotic Challenge*
  - Biannual robotics competition in Abu Dhabi with total prize money of US $5M
- Supervisor of Master (6) and Semester (2) student projects

Oct 2015 - Jul 2019 **IB Tutor**, *Yashina Tutors*, Switzerland
Active tutor for HL/SL Maths and Physics.

Jun 2014 - Aug 2014 **DAAD Research Internships in Science & Engineering (RISE) Intern**, *Universität Bremen*, Bremen, Germany
Research assistant in Group of Computer Architecture & Group of Reliable Embedded Systems.

Citation Indices

h-index: 11 | i10-index: 11 | Number of citations: 539 | determined via Google Scholar on Jul 12

Honors and Awards

2017 Two second places in the *Mohamed Bin Zayed International Robotic Challenge* (Challenges 3 and Grand Challenge) as team member

2015 Moog International Woman in Engineering Prize, UK

2015 M&W Prize for Best Interdisciplinary Engineering Project, UK

2015 M&W Prize for Best Final Year IMEE Student, UK

2014 - 2015 Elected Departmental Staff-Student Liaison Committee (SSLC) Student Chair, UK

2012 - 2015 Elected SSLC IMEE Academic Representative (3 years), UK

2013 BP Centurion Award, UK

2011 IBDP Valedictorian of 2011 graduating class, UAE

2011 IBDP Honors Award, UAE

Research Grants

2021 *Argelander Starter-Kit Grant for Postdocs*, awarded to excellent early-career researchers (€13,700)

Teaching Experience

Spring 2021 **Module Leader, Decision-Making for Autonomous Robots**, University of Bonn, Germany
MSc course, introduced and organised new module, lecturing 2 hours/week.

Spring 2020 **Teaching Assistant, Advanced Robotics**, Imperial College, UK
MEng/MSc course, 4 hours/week, substitute lecturing for Dr. Leutenegger, project supervision. [Link]

Spring 2018 **Teaching Assistant, Perception and Learning for Robotics**, ETH Zürich, Switzerland
BSc/MSc course (non-recurring), project supervision. [Link]

Autumn 2016, 2017, 2018 **Teaching Assistant, Robot Dynamics**, ETH Zürich, Switzerland
BSc/MSc course. [Link]

Spring 2017, 2018 **Teaching Assistant, Autonomous Mobile Robots**, ETH Zürich, Switzerland
BSc/MSc course. [Link]

Online Teaching Examples (YouTube)

2021 **Decision-Making for Autonomous Robots: What is Planning?** - https://youtu.be/M71-2VtXbXM

2021 **Decision-Making for Autonomous Robots: Reinforcement Learning** - https://youtu.be/wqZ7xeXFtWI

2021 **Decision-Making for Autonomous Robots: Informative Planning** https://youtu.be/3w5YIYN-y8o

Invited Talks

May 2021 "PhenoRob" Women in Science Series (online)

Sep 2020 University of Bonn, DE

Jul 2020 University of Michigan, USA (online)

Jul 2019 Imperial College London, UK

Jul 2019 University of Oregon, USA (online)

Jan 2019 University of Technology, Sydney, AUS

Feb 2015 ETH Zurich, Zürich, Switzerland

Professional Memberships

Member of the IEEE, IEEE Robotics & Automation Society, IEEE Women in Engineering Society, and Women in AI Society.

Services for Journals

Associate Editor for journal *IEEE Robotics and Automation Letters* (2021).

Guest Editor for Field Robotics section of journal *Remote Sensing* for the special issue on Applications of Remote Data Capture Systems in Agriculture and Vegetation (2021).

Associate Editor for Field Robotics section of journal *Frontiers in Robotics and AI* (2020).

Reviewer: *IEEE Robotics and Automation Letters* 2018-21; *Science Robotics* 2020; *Remote Sensing* 2020; *IEEE Transactions on Robotics* 2019; 2021; *Autonomous Robots* 2019; *Jour. of Field Robotics* 2018; *IEEE Access* 2018.

Services for Conferences

Main Organiser of Workshop on Agricultural Robotics and Automation. *European Conference on Mobile Robots* (2021).

Program Committee Member of 2nd Workshop on Informative Path Planning and Adaptive Sampling. *Robotics: Science and Systems* (2019).

Reviewer: *European Conference on Mobile Robots* 2021; *IEEE Int. Conf. on Robotics and Automation* 2016; 2018-21; *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems* 2017-21; *IEEE Conf. on Control Tech. and Applications* 2020; *Robotics: Science and Systems* 2018-19; 2021; *IEEE Int. Conf. on Advanced Robotics and Mechatronics* 2018; *IEEE Int. Symp. on Safety, Security, and Rescue Robotics* 2016; *Int. Joint Conf. on Artificial Intelligence* 2016.

Outreach and Other Activities

Participant in IEEE RAS Women in Engineering summer mentoring event (2020).

Media coverage: EU Grants Science Stories article on Project *Flourish* (2019).

Languages

Serbian — Native proficiency

English — Bilingual proficiency
- IELTS (2010)

German — Full professional proficiency
- Goethe-Zertifikat B2 (Sep 2012)
- Swiss German course C1-C2 (Sep 2015 - Dec 2015)

French — Limited working proficiency
- DELF A2 (Nov 2007)
- Individual tutoring B1

Spanish — Limited working proficiency
- A2 course (Sep 2016 - Dec 2016)

Publication List

Peer-Reviewed Journal/Magazine Articles

[J9] **M. Popović***, F. Thomas*, S. Papatheodorou, N. Funk, T. Vidal-Calleja, S. Leutenegger. "Volumetric Occupancy Mapping With Probabilistic Depth Completion for Robotic Navigation". In: *IEEE Robotics and Automation Letters*. IEEE, 2021. 6(3). [pdf]

[J8] N. Funk, J. Tarrio, S. Papatheodorou, **M. Popović**, P. F. Alcantarilla, S. Leutenegger. "Multi-Resolution 3D Mapping with Explicit Free Space Representation for Fast and Accurate Mobile Robot Motion Planning". In: *IEEE Robotics and Automation Letters*. IEEE, 2021. 6(2): pp.3553-3560. [pdf]

[J7] A. Pretto, S. Aravecchia, W. Burgard, N. Chebrolu, C. Dornhege, T. Falck, F. Fleckenstein, A. Fontenla, M. Imperoli, R. Khanna, F. Liebisch, P. Lottes, A. Milioto, D. Nardi, S. Nardi, J. Pfeifer, **M. Popović**, C. Potena, C. Pradalier, E. Rothacker-Feder, I. Sa, A. Schaefer, R. Siegwart, C. Stachniss, A. Walter, V. Winterhalter, X. Wu, J. Nieto. "Building an Aerial-Ground Robotics System for Precision Farming". In: *IEEE Robotics and Automation Magazine*. IEEE, 2020. In press.

[J6] **M. Popović**, T. Vidal-Calleja, G. Hitz, J. J. Chung, I. Sa, R. Siegwart, J. Nieto. "An informative path planning framework for UAV-based terrain monitoring". In: *Autonomous Robots*. Springer, 2020. pp.889-911. [pdf]

[J5] M. Faria, R. Marín, **M. Popović**, A. Millane, R. Siegwart. "Efficient Lazy Theta* Path Planning over a Sparse Grid to Explore Large 3D Volumes with a Multirotor UAV". In: *Sensors*. MDPI, 2019. 19(1). [pdf]

[J4] R. Bähnemann, M. Pantic, **M. Popović**, D. Schindler, M. Tranzatto, M. Kamel, M. Grimm, J. Widauer, R. Siegwart, J. Nieto. "The ETH-MAV Team in the MBZ International Robotics Challenge". In: *Jour. of Field Robotics*. Wiley Periodicals, 2019. [arXiv]

[J3] I. Sa, M. Kamel, M. Burri, M. Bloesch, R. Khanna, **M. Popović**, J. Nieto., R. Siegwart. "Build Your Own Visual-Inertial Drone: A Cost-Effective and Open-Source Autonomous Drone". In: *IEEE Robotics and Automation Magazine*. IEEE, 2018. pp.89-103. [pdf]

[J2] I. Sa, **M. Popović**, R. Khanna, Z. Chen, P. Lottes, F. Liebisch, J. Nieto, C. Stachniss, A. Walter, R. Siegwart. "WeedMap: A Large-Scale Semantic Weed Mapping Framework Using Aerial Multispectral Imaging and Deep Neural Network for Precision Farming". In: *Remote Sensing*. MDPI, 2018. 10(3). [pdf]

[J1] I. Sa, Z. Chen, **M. Popović**, R. Khanna, F. Liebisch, J. Nieto, R. Siegwart. "weedNet: Dense Semantic Weed Classification Using Multispectral Images and MAV for Smart Farming". In: *IEEE Robotics and Automation Letters*. IEEE, 2018. 3(1): pp.588-595. [pdf]

Peer-Reviewed Conference Papers

[C13] F. Stache*, J. Westheider*, F. Magistri, **M. Popović**, C. Stachniss. "Adaptive Path Planning for UAV-based Multi-Resolution Semantic Segmentation". In: *European Conference on Mobile Robots*. 2021. Under review.

[C12] Y. Wang, N. Funk, M. Ramezani, S. Papatheodorou, **M. Popović**, M. Camurri, S. Leutenegger, M. Fallon. "Elastic and Efficient LiDAR Reconstruction for Large-Scale Exploration Tasks". In: *IEEE Int. Conf. on Robotics and Automation*. IEEE, 2021. Accepted. [arXiv]

[C11] D. Tzoumanikas, F. Graule, Q. Yan, D. Shah, **M. Popović**, S. Leutenegger. "Aerial Manipulation Using Hybrid Force and Position NMPC Applied to Aerial Writing". In: *Robotics: Science and Systems*. MIT Press, 2020. [pdf]

[C10] **M. Popović**, T. Vidal-Calleja, J. J. Chung, J. Nieto, R. Siegwart. "Informative Path Planning and Mapping for Active Sensing Under Localization Uncertainty". In: *IEEE Int. Conf. on Robotics and Automation*. IEEE, 2020. Accepted. [arXiv]

[C9] A. A. Meera, **M. Popović**, A. Millane, R. Siegwart. "Obstacle-aware Adaptive Informative Path Planning for UAV-based Target Search.". In: *IEEE Int. Conf. on Robotics and Automation*. Montréal, QC: IEEE, 2019. [pdf]

[C8] F. Causa, **M. Popović**, G. Fasano, M. Grassi, J. Nieto, R. Siegwart. "Navigation aware planning for tandem UAV missions in GNSS challenging environments". In: *AIAA Science and Technology Forum and Exposition*. San Diego: AIAA, 2019. [pdf]

[C7] M. Longhi, Z. Taylor, **M. Popović**, J. Nieto., R. Siegwart, G. Marrocco. "RFID-Based Localization for Greenhouses Monitoring Using MAVs". In: *Int. Conf. on Electromagnetics in Advanced Applications*. Cartagena: IEEE, 2018. [pdf]

[C6] T. Miki, **M. Popović**, A. Gawel, G. Hitz., R. Siegwart. "Multi-agent Time-based Decision-making for the Search and Action Problem". In: *IEEE Int. Conf. on Robotics and Automation*. Brisbane: IEEE, 2018. pp.2365-2372. [pdf]

[C5] **M. Popović**, T. Vidal-Calleja, G. Hitz, I. Sa, R. Siegwart, J. Nieto. "Multiresolution Mapping and Informative Path Planning for UAV-based Terrain Monitoring". In: *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems*. Vancouver: IEEE, 2017. pp.1382-1388. [pdf]

[C4] I. Sa, M. Kamel, R. Khanna, **M. Popović**, J. Nieto, R. Siegwart. "Dynamic System Identification, and Control for a Cost-Effective and Open-Source Multi-rotor MAV". In: *Field and Service Robotics*. Zürich: Springer, 2017. pp.605-620. [pdf]

[C3] A. R. Vetrella, I. Sa, **M. Popović**, R. Khanna, J. Nieto, G. Fasano, D. Accardo, R. Siegwart. "Improved Tau-Guidance and Vision-Aided Navigation for Robust Autonomous Landing of UAVs". In: *Field and Service Robotics*. Zürich: Springer, 2017. pp.115-128. [pdf]

[C2] **M. Popović**, G. Hitz, J. Nieto, I. Sa, R. Siegwart, E. Galceran. "Online Informative Path Planning for Active Classification Using UAVs". In: *IEEE Int. Conf. on Robotics and Automation*. Singapore: IEEE, 2017. pp.5753-5758. [pdf]

[C1] J. Pfeifer, R. Khanna, D. Constantin, **M. Popović**, E. Galceran, N. Kirchgessner, A. Walter, R. Siegwart, F. Liebisch. "Towards automatic UAV data interpretation for precision farming". In: *Int. Conf. of Agricultural Engineering*, 2016. [pdf]

Peer-Reviewed Workshop Papers

[W3] **M. Popović**. "Active Planning and Decision-Making for Autonomous Robots". In: *RSS Pioneers Workshop, Robotics: Science and Systems*. MIT Press, 2021. Under review.

[W2] H. Blum, S. Rohrbach, **M. Popović**, L. Bartolomei, R. Siegwart. "Active Learning for UAV-based Semantic Mapping". In: *2nd Workshop on Informative Path Planning and Adaptive Sampling, Robotics: Science and Systems*. MIT Press, 2019.

[W1] F. Liebisch, **M. Popović**, J. Pfeifer, R. Khanna, P. Lottes, C. Stanchiss, A. Pretto, I. Sa, J. Nieto, R. Siegwart, A. Walter. "Automatic UAV-based field inspection campaigns for weeding in row crops" [abstract]. In: *10th EARSeL SIG Imaging Spectrosopy Workshop*, Zürich, 2017.

Invited Articles

[A1] **M. Popović**. "Counting penguins with drones". In: *Science Robotics*. AAAS, 2020. 5(47). [pdf]

Book Chapters

[B1] C. Papachristos, M. Kamel, **M. Popović**, S. Khattak, A. Bircher, H. Oleynikova, T. Dang, F. Mascarich, K. Alexis, R. Siegwart. "Autonomous Exploration and Inspection Path Planning for Aerial Robots Using the Robot Operating System". In: *Robot Operating System* (Vol. 3). Springer, 2018. pp.67-111. [pdf]

Theses

[T1] **M. Popović**. "Environmental Mapping and Informative Path Planning for UAV-based Active Sensing". Ph.D. thesis, ETH Zürich, Department of Mechanical and Process Engineering, 2019. [pdf]

Presentations

[P1] **M. Popović**. "An Informative Path Planning (IPP) Framework for UAV-based Terrain Monitoring". In: International Conference on Digital Technologies for Sustainable Crop Production (DIGICROP) (online). 2020. [Link]

Not Peer-Reviewed Publications

[N1] H. S. Ahn, F. Dayoub, **M. Popović**, B. MacDonald, R. Siegwart, I. Sa. "An Overview of Perception Methods for Horticultural Robots: From Pollination to Harvest". In: *arXiv*, 2018. [pdf]