

ANDRIY SARABAKHA

Presidential Postdoctoral Fellow

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[Portfolio Website](#) • [LinkedIn Page](#) • [Google Scholar](#) • [Youtube Channel](#) • [GitHub Repository](#)

EDUCATION

- Doctor of Philosophy in Mechanical and Aerospace Engineering** *January 2016 – August 2020*
Nanyang Technological University, Singapore (Singapore)
Thesis: ‘Learning Control of UAVs Using Artificial Intelligence-Based Methods’
- Master of Science in Artificial Intelligence and Robotics** *September 2012 – July 2015*
“Sapienza” Università di Roma, Rome (Italy) *Grade: 110 cum laude/110*
Thesis: ‘Reactive Obstacle Avoidance for UAVs Based on Dynamic Feedback Linearisation’
- Bachelor of Science in Computer Engineering** *September 2007 – March 2012*
“Sapienza” Università di Roma, Rome (Italy) *Grade: 110 cum laude/110*
Thesis: ‘On-Line Computer Game “UNO”’ (in Italian)
- Technical Manager in Information Technology** *September 2003 – July 2007*
I.T.I.S. “Antonio Meucci”, Rome (Italy) *Grade: 100/100*
Thesis: ‘Computer Game “Pacman” with Joystick’ (in Italian)

WORK EXPERIENCE

- Presidential Postdoctoral Fellow** *February 2022 – present*
Nanyang Technological University, Singapore (Singapore)
Tasks: development of continual learning and incremental evolution algorithms for aerial robots
- Senior Scientist** *October 2020 – January 2022*
Technische Universität München, Munich (Germany)
Tasks: lead Flying Systems Arena and Underwater Systems Lab, supervise PhD students, proposals writing
- Research Assistant** *March 2020 – September 2020*
Singapore University of Technology and Design, Singapore (Singapore)
Tasks: development of learning algorithms for nature-inspired unmanned aerial vehicles

INDUSTRIAL PROJECTS

- Mobile Robotics Hub for Environment Protection and Monitoring** *January 2021 – January 2022*
Dobeneck Technologie Foundation, Munich (Germany)
Tasks: project leader, management and coordination of research assistants and PhD students
- Safe Autonomous Mobile Robot** *October 2020 – February 2021*
VDI/VDE Innovation + Technology GmbH, Munich (Germany)
Tasks: project leader, management of the resources
- Indoor Manned-Unmanned Teaming with Multiple UAVs** *March 2020 – September 2020*
DSO National Laboratories, Singapore (Singapore)
Tasks: implementation of trajectory generation and collision avoidance for unmanned aerial vehicles
- Visualisation of Virtual Outcrops Using Aerial Robots** *April 2019 – July 2019*
Danish Hydrocarbon Research and Technology Centre, Aarhus (Denmark)
Tasks: preparation of unmanned aerial vehicles and installation of on-board sensors
- Learning Path Planning of UAVs with Vision-Based Sensing** *March 2018 – November 2019*
Ministry of Education, Singapore (Singapore)
Tasks: implementation of deep neural network-based controllers for unmanned aerial vehicles
- Fuzzy Neural Network-Based Learning Control of UAVs** *January 2016 – May 2018*
ST Aerospace, Singapore (Singapore)
Tasks: development, implementation and testing of adaptive controllers for Y6 coaxial hexacopter

TEACHING EXPERIENCE

Aircraft Propulsion

Teaching Assistant at Nanyang Technological University (Singapore)

January 2018 – March 2018

Flight Instrumentation and Navigation

Teaching Assistant at Nanyang Technological University (Singapore)

August 2017 – November 2017

STUDENT MENTORING

Perception and Control of Autonomous Underwater Vehicles

Doctoral student at Technische Universität München, Munich (Germany)

January 2022 – present

Efficient Robotic Telepresence

Doctoral student at Technische Universität München, Munich (Germany)

October 2020 – March 2022

Auditory Feedback in Robotic Telepresence

Doctoral student at Technische Universität München, Munich (Germany)

October 2020 – March 2022

Benchmarking Robotic Manipulators

Doctoral student at Technische Universität München, Munich (Germany)

October 2020 – January 2022

Development of a Collaborative Wheeled Mobile Robot

Doctoral student at Technische Universität München, Munich (Germany)

October 2020 – February 2021

Synthetic Images for CNNs in Autonomous Drone Racing

Master student at Aarhus Universitet, Aarhus (Denmark)

January 2019 – July 2019

Design, Construction and Control of Gripper for UAV

Bachelor student at Nanyang Technological University, Singapore (Singapore)

August 2017 – April 2018

AWARDS & GRANTS

Presidential Postdoctoral Fellowship

Research grant at Nanyang Technological University

February 2021 – January 2024

Outstanding Reviewer Award 2021

Junior Reviewers Program at IEEE/ASME Transactions on Mechatronics

July 2021

Singapore International Graduate Award

PhD scholarship at Nanyang Technological University

January 2016 – January 2020

TECHNICAL SKILLS

Programming Languages

C, C++, Matlab, Java, Python, HTML, PHP, SQL, L^AT_EX

Operating Systems

Windows, Linux, ROS

Software Tools

Microsoft Office, Photoshop, Corel Video Studio, Git

LANGUAGE KNOWLEDGE

Ukrainian	Mother tongue
English	Advanced
Italian	Advanced
German	Beginner

ACADEMIC REFERENCES

- Assoc Prof Erdal Kayacan – erdal@eng.au.dk
- Assoc Prof Domenico Campolo – d.campolo@ntu.edu.sg
- Assoc Prof Yiqun Dong – yiqundong@fudan.edu.cn
- Assist Prof Changhong Fu – changhongfu@tongji.edu.cn
- Prof Giuseppe Oriolo – oriolo@diag.uniroma1.it

REVIEW DUTIES

Journals	IEEE Transactions on Fuzzy Systems, IEEE/ASME Transactions on Mechatronics, IEEE Transactions on Industrial Electronics, IEEE Robotics and Automation Letters, IEEE Transactions on Industrial Informatics, IEEE/CAA Journal of Automatica Sinica, IEEE Transactions on Systems, Man and Cybernetics: Systems, Information Sciences
Conferences	ICRA'21, 22, IROS'18, 20, 21, 22, FUZZ-IEEE'17, 18, 20, 21, 22, ROBOVIS'21

PUBLICATION LIST

Journal Articles

- [10] **A. Sarabakha**, S. K. H. Win, L. S. T. Win, S. Foong, and P. N. Suganthan, "Dynamical Model and Intelligent Control of a Single Actuator Monocopter." In preparation.
- [9] H. X. Pham, **A. Sarabakha**, M. Odnoshyvkina, and E. Kayacan, "PencilNet: Zero-Shot Sim-to-Real Transfer Learning for Robust Gate Perception in Autonomous Drone Racing," *IEEE Robotics and Automation Letters*. Submitted. video: tiny.cc/PencilNet
- [8] K. Yezerska, **A. Sarabakha**, A. Dushina, P. Wagner, A. Dyck, and M. Wark, "Model-Based Degradation Prediction on Impedance Data and Artificial Neural Network for High-Temperature Polymer Electrolyte Membrane Fuel Cells after Hydrogen Starvation," *International Journal of Hydrogen Energy*. Submitted.
- [7] **A. Sarabakha** and E. Kayacan, "Online Deep Fuzzy Learning for Control of Nonlinear Systems Using Expert Knowledge," *IEEE Transactions on Fuzzy Systems*, vol. 28, no. 7, pp. 1492–1503, July 2020. doi: [10.1109/TFUZZ.2019.2936787](https://doi.org/10.1109/TFUZZ.2019.2936787), video: tiny.cc/DFNN
- [6] **A. Sarabakha**, C. Fu, and E. Kayacan, "Intuit Before Tuning: Type-1 and Type-2 Fuzzy Logic Controllers," *Applied Soft Computing*, vol. 81, pp. 105495–105510, Aug. 2019. doi: [10.1016/j.asoc.2019.105495](https://doi.org/10.1016/j.asoc.2019.105495), video: tiny.cc/FM-FLC
- [5] S. Patel, **A. Sarabakha**, D. Kircali, and E. Kayacan, "An Intelligent Hybrid Artificial Neural Network-Based Approach for Control of Aerial Robots," *Journal of Intelligent & Robotic Systems*, pp. 1–12, May 2019. doi: [10.1007/s10846-019-01031-z](https://doi.org/10.1007/s10846-019-01031-z), video: tiny.cc/failure_ANN
- [4] **A. Sarabakha**, C. Fu, E. Kayacan, and T. Kumbasar, "Type-2 Fuzzy Logic Controllers Made Even Simpler: From Design to Deployment for UAVs," *IEEE Transactions on Industrial Electronics*, vol. 65, no. 6, pp. 5069–5077, June 2018. doi: [10.1109/TIE.2017.2767546](https://doi.org/10.1109/TIE.2017.2767546), video: tiny.cc/SI-IT2-FLC
- [3] E. Kayacan, **A. Sarabakha**, S. Coupland, R. John, and M. A. Khanesar, "Type-2 Fuzzy Elliptic Membership Functions for Modeling Uncertainty," *Engineering Applications of Artificial Intelligence*, vol. 70, pp. 170–183, Apr. 2018. doi: [10.1016/j.engappai.2018.02.004](https://doi.org/10.1016/j.engappai.2018.02.004)
- [2] C. Fu, **A. Sarabakha**, E. Kayacan, C. Wagner, R. John, and J. M. Garibaldi, "Input Uncertainty Sensitivity Enhanced Nonsingleton Fuzzy Logic Controllers for Long-Term Navigation of Quadrotor UAVs," *IEEE/ASME Transactions on Mechatronics*, vol. 23, no. 2, pp. 725–734, Apr. 2018. doi: [10.1109/TMECH.2018.2810947](https://doi.org/10.1109/TMECH.2018.2810947), video: tiny.cc/SLAM-FLC
- [1] **A. Sarabakha**, N. Imanberdiyev, E. Kayacan, M. A. Khanesar, and H. Hagnas, "Novel Levenberg-Marquardt Based Learning Algorithm for Unmanned Aerial Vehicles," *Information Sciences*, vol. 417, pp. 361–380, Nov. 2017. doi: [10.1016/j.ins.2017.07.020](https://doi.org/10.1016/j.ins.2017.07.020), video: tiny.cc/FNN

Conference Proceedings

- [12] P. So, **A. Sarabakha**, F. Wu, and S. Haddadin, "DR.J: Distributed Robot Judge for Decentralized Competitions and Benchmarking of Remote Performances," *2022 IEEE International Conference on Intelligent Robots and Systems (IROS)*. Submitted. video: tiny.cc/DrJ
- [11] A. Moortgat-Pick, P. So, M. Sack, E. Cunningham, B. P. Hughes, A. Adamczyk, **A. Sarabakha**, L. Takayama, and S. Haddadin, "A-RIFT: Visual Substitution of Force Feedback for a Zero-Cost Interface in Telemanipulation," *2022 IEEE International Conference on Intelligent Robots and Systems (IROS)*. Submitted. video: tiny.cc/A-RIFT
- [10] M. C. Yildirim, M. Sabaghian, T. Goll, C. Kössler, C. Jähne, A. Swikir, **A. Sarabakha**, and S. Haddadin, "Development of a Collaborative Wheeled Mobile Robot: Design Considerations, Drive Unit Torque Control, and Preliminary Result," in *2022 IEEE International Conference on Robotics and Automation (ICRA)*, Philadelphia, USA, 2022. Accepted. video: tiny.cc/SAM
- [9] H. X. Pham, I. Bozcan, **A. Sarabakha**, S. Haddadin and E. Kayacan, "GateNet: An Efficient Deep Neural Network Architecture for Gate Perception Using Fish-Eye Camera in Autonomous Drone Racing," in *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Prague, Czech Republic, 2021, pp. 4176–4183. doi: [10.1109/IROS51168.2021.9636207](https://doi.org/10.1109/IROS51168.2021.9636207) video: tiny.cc/GateNet

- [8] T. Morales, **A. Sarabakha**, and E. Kayacan, “Image Generation for Efficient Neural Network Training in Autonomous Drone Racing,” in *2020 IEEE International Joint Conference on Neural Networks (IJCNN)*, Glasgow, UK, 2020, pp. 1–8.
doi: [10.1109/IJCNN48605.2020.9206943](https://doi.org/10.1109/IJCNN48605.2020.9206943), video: tiny.cc/gate_detection
- [7] S. Patel, **A. Sarabakha**, D. Kircali, G. Loianno, and E. Kayacan, “Artificial Neural Network-Assisted Controller for Fast and Agile UAV Flight: Onboard Implementation and Experimental Results,” in *2019 International Workshop on Research, Education and Development on Unmanned Aerial Systems (RED-UAS)*, Cranfield, UK, 2019, pp. 37–43.
doi: [10.1109/REDUAS47371.2019.8999677](https://doi.org/10.1109/REDUAS47371.2019.8999677), video: tiny.cc/fast_ANN
- [6] S. Zhou, **A. Sarabakha**, E. Kayacan, M. K. Helwa, and A. P. Schoellig, “Knowledge Transfer Between Robots with Similar Dynamics for High-Accuracy Impromptu Trajectory Tracking,” in *2019 European Control Conference (ECC)*, Naples, Italy, 2019, pp. 1–8.
doi: [10.23919/ECC.2019.8796140](https://doi.org/10.23919/ECC.2019.8796140), video: tiny.cc/DNN
- [5] **A. Sarabakha** and E. Kayacan, “Online Deep Learning for Improved Trajectory Tracking of Unmanned Aerial Vehicles Using Expert Knowledge,” in *2019 IEEE International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019, pp. 7727–7733.
doi: [10.1109/ICRA.2019.8794314](https://doi.org/10.1109/ICRA.2019.8794314), video: tiny.cc/DNN-FLS
- [4] C. Fu, **A. Sarabakha**, E. Kayacan, C. Wagner, R. John, and J. M. Garibaldi, “Similarity-Based Non-Singleton Fuzzy Logic Control for Improved Performance in UAVs,” in *2017 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, Naples, Italy, 2017, pp. 1–6.
doi: [10.1109/FUZZ-IEEE.2017.8015440](https://doi.org/10.1109/FUZZ-IEEE.2017.8015440), video: tiny.cc/T1-FLC
- [3] **A. Sarabakha**, C. Fu, and E. Kayacan, “Double-Input Interval Type-2 Fuzzy Logic Controllers: Analysis and Design,” in *2017 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, Naples, Italy, 2017, pp. 1–6. doi: [10.1109/FUZZ-IEEE.2017.8015485](https://doi.org/10.1109/FUZZ-IEEE.2017.8015485), video: tiny.cc/DI-IT2-FLC
- [2] C. Fu, **A. Sarabakha**, E. Kayacan, C. Wagner, R. John, and J. M. Garibaldi, “A Comparative Study on the Control of Quadcopter UAVs by Using Singleton and Non-Singleton Fuzzy Logic Controllers,” in *2016 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, Vancouver, Canada, 2016, pp. 1023–1030. doi: [10.1109/FUZZ-IEEE.2016.7737800](https://doi.org/10.1109/FUZZ-IEEE.2016.7737800)
- [1] **A. Sarabakha** and E. Kayacan, “Y6 Tricopter Autonomous Evacuation in an Indoor Environment Using Q-Learning Algorithm,” in *2016 IEEE 55th Conference on Decision and Control (CDC)*, Las Vegas, USA, 2016, pp. 5992–5997. doi: [10.1109/CDC.2016.7799189](https://doi.org/10.1109/CDC.2016.7799189), video: tiny.cc/QLearning

INVITED TALKS

Workshops

- [2] “Artificial Neural Network-Based Controllers for Fast and Agile UAV Flight,” at *IROS 2019 workshop on Fast Neural Perception and Learning for Intelligent Vehicles and Robotics*, November 4, 2019, Macau.
- [1] “Learning Control of Unmanned Aerial Vehicles Using Artificial Intelligence-Based Methods,” at *LUCID 2017 workshop on Uncertainty in Data and Decision Making*, July 18, 2017, Rothley, UK.

Tutorials

- [2] “Vision-Based Control of UAVs Using Type-1 and Type-2 FLCs with ROS,” at *Computational Intelligence Chapter*, May 20, 2017, Nanyang Technological University, Singapore.
- [1] “Vision-Based Control of UAVs by Using Type-1 and Type-2 FLCs with ROS” at *FUZZ-IEEE 2017*, July 9, 2017, Naples, Italy.

ORGANIZED EVENTS

Conferences

- [2] Program Committee Member at *3rd International Conference on Robotics, Computer Vision and Intelligent Systems 2022*, October 26–27, 2022, Valletta, Malta.
- [1] Program Committee Member at *2nd International Conference on Robotics, Computer Vision and Intelligent Systems 2021*, October 27–28, 2021, virtual.

Competitions

- [1] “Autonomous Drone Racing Competition,” at *FUZZ-IEEE 2021*, July 11, 2021, virtual.