Dr. Raphael Zufferey

Robotics and micro-technology research scientist with extensive experience in mobile autonomous systems

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Education

2021-now **Postdoc**, *EPFL*, Switzerland.
Marie Curie Fellow
Member of the LIS/BIOROB research group Research: Aerial-Aquatic Flapping-wing robotics.

2020-2021 **Postdoc**, *University of Seville*, Spain.
Member of the Robotics Vision and Control research group led by Prof. Ollero.

Research: Design and development of novel flapping-wing aerial robots to test and validate our biological understanding of the nature counterparts.

2016-2019 **PhD**, *Imperial College London*, UK.
Member of the Aerial Robotics Lab research group. Research: *Aquatic Escape of Micro Aerial Vehicles*.

Thesis content: Practical and theoretical investigations into miniature aerial-aquatic robots capable of movement in both air and water. The work required extensive experimental work and resulted in two unique prototypes with distinct locomotion strategies. Supervision by Dr. M. Kovac. Department of aeronautics. (*Defended on 27 sept 2019*)

2015 **Master thesis**, *Harvard University*, US.
Student at the Microrobotics Laboratory research group. Research: Development of a micro legged robot of 2.5 grams, the Harvard Ambulatory Micro Robot (HAMR), involving key advances in piezoelectric actuators, micro PCB fabrication, wireless implementation. Significant challenges in small scale system integration were overcome. Supervision by Prof. R.J. Wood and Prof. D. Floreano.

2010-2015 **MSc, BA**, *EPFL*, Switzerland.
Micro-engineering bachelor and master, emphasis on electrical, mechanical and material science in addition to micro-systems, from semi-conductor physics to embedded programming.
Specialization in robotics and autonomous system.
Minor in Space Design and Technology
Final grade 5.4/6

< 2009 **Maturité**, *Gymnase de Nyon*, Switzerland, Equivalent of a Baccalaureate. Bilingual FR-DE.

Experience

2019-2020 **Research Scientist**, *Imperial College London*.
Post-doctoral researcher as part of the CASCADE aerial-aquatic research program

2013-2018 **Teaching**, *University*.
Imperial College London: 3rd year robotics application class. Experiment setup and guidance.
EPFL: Physics I, Physics II and Electromechanic Conversion teaching assistant.

2016-2019 **Webmaster**, *Imperial College London*.
Webmaster of the Aerial Robotics Lab website, including internal wiki development.

2014 **Intern**, *Logitech*, Switzerland.
Collaboration with Future Labs in the implementation of gesture control in a professional 2D camera.

2014 **Competition**, *EPFL*.
Autonomous robotics competition, development of a multi-terrain robot which localises itself, detects, picks up and brings home plastic bottles in unknown environment with obstacle avoidance and path planning. (supervision by Prof. A. Ijspeert)

2013-2014 **Semester Projects**, *EPFL*.
Project 1: Finite Element analysis of hyperelastic membranes in DEAs.
Project 2: Digital Sun Sensor : Interfacing and programming of a bare-die HDR camera array.

2009-2010 **Language Development**, *Bath Academy, UK & Bellevue College Seattle, US*.
Intensive english studies and public speaking classes.

Leadership

2016-2019 **Supervisor**, *Imperial College London*.
Close supervision of 3 master students and 2 undergraduate in aerial aquatic robotics. Work ranging from chemical propulsion vehicles, water entry studies and launch systems development to sailing flying robots.

2008-2016 **Scout Group Leader**, *Nyon*.
7 summer camps organized for 10-80 young people. Jeunesse et Sport (J+S) leader licence. Water rescue licenses: Pool, Lake and River Rescue.

2012-2015 **Department Delegate**, *EPFL*.
Micro-engineering class delegate during 3 years.

2012-2013, 2018 **University societies committee**.
1st year student Coaching society, *EPFL*
Micro-technology society, *EPFL*
Windsurfing society, *Imperial College London*

Skills

Professional: Micro technologies: analog and digital electronics, mechanics and micro-structure, robotic design, embedded software, semi-conductor physics, evolutionary algorithms, FEM, unmanned aircraft design, 3D motion capture system

Manufacturing: Machining, composites fabrication (prepreg, wet layup), 3D printing (plastics/metals), Laser micro machining, PCB design and fabrication

Computing: C, C++, Matlab, Python, GitHub, Solidworks, Draftsight, Creo, Fusion 360, LaTeX

Design: Adobe Illustrator/ Photoshop/ Premiere/ Lightroom/ After Effect, Blender

Sports: Rock climbing 3x/week, windsurf, ski, snowboard, surf, badminton & tennis

Music: Classical Piano since 1999 and guitar since 2013

Language: **French**, native
German, native
English, proficient *(IELTS score 8/9)*
Spanish, fluent

Grants & Awards

2021 **Marie Skłodowska-Curie Actions (MSCA)** Individual Fellowship

2020 **Best PhD in Robotics UK**, The Queen Mary UK Best PhD in Robotics Award

2019 **Best Paper Award**, AMAM 2019 conference, Lausanne Switzerland (Only award out of 82)

2018 **Best Conference Paper Nominee**, ICRA 2018 conference, Brisbane

2017 **Best Robot Video**, 'Micro Air Vehicles for Water Health Monitoring', AAAI-17, San Francisco

2009 Swiss Physics Olympiads nominee

Publication Record [ORCID]

Book Publication

2021 **Between sea and sky:Aerial Aquatic locomotion in Miniature Robots**.
Springer
R. Zufferey, R. Siddall, S. F. Armanini, M. Kovac

Journal Publications

2021 **Design of the high-payload flapping wing robot E-Flap**.
RA-L, Robotics and Automation Letters Article Video
R. Zufferey, *J.T. Barbero, M.M. Guzmán, [...], J.A. Acosta, A. Ollero*

2020 **MEDUSA: a Multi-Environment Dual-robot for Underwater Sample Acquisition**.
RA-L, Robotics and Automation Letters Article Video
D. Debruyn, R. Zufferey, *SF. Armanini, C. Winston, A. Farinha, Y. Jin and M. Kovac*

2020 **Unmanned Aerial Sensor Placement for Cluttered Environments**.
RA-L, Robotics and Automation Letters Article
A. Farinha, R. Zufferey, *P. Zheng, SF. Armanini and M. Kovac*

2019 **Multiple Consecutive Jet-gliding Flights with Water-reactive Fuel**.
Science Robotics Article Video
R. Zufferey, *A. Ortega Ancel, A. Farinha, [...] and M. Kovac*

2019 **SailMAV: design and implementation of a novel multi-modal flying sailing robot**.
RA-L, Robotics and Automation Letters Article Video
R. Zufferey, *A. Ortega Ancel, C. Raposo, S. F. Armanini, A. Farinha, R. Siddall, I. Berasaluce, H. Zhu, M. Kovac*

2018 **Power and Control Autonomy for High-Speed Locomotion With an Insect-Scale Legged Robot**.
RA-L, Robotics and Automation Letters Article Video
Goldberg B*, Zufferey R*, *Doshi N, Helbling EF, Whittredge G, Kovac M, Wood RJ*

2017 **A biologically inspired, flapping-wing, hybrid aerial-aquatic microrobot**.
Science Robotics Article Video
Chen Y, Wang H, Helbling EF, Jafferis NT, Zufferey R, *Ong A, Ma K, Gravish N, Chirarattananon P, Kovac M, Wood RJ. A*

Presented Conference Proceedings

2019 **SailMAV: design and implementation of a novel multi-modal flying sailing robot**.
IROS, International Conference on Intelligent Robots and Systems Conf Video
R. Zufferey, *A. Ortega Ancel, [...], and M. Kovac*

2019 **Adaptive Morphology in Aerial-Aquatic Robots**.
AMAM, 9th International Symposium on Adaptive Motion of Animals and Machines Article
R. Zufferey, *S. F. Armanini, A. Farinha, M. Kovac*

2018 **Power and Control Autonomy for High-Speed Locomotion With an Insect-Scale Legged Robot**.
ICRA, International Conference on Robotics and Automation Video
Finalist for Best Paper Overall award
Goldberg B*, Zufferey R*, *Doshi N, Helbling EF, Whittredge G, Kovac M, Wood RJ*

2015 **Cubeth ADCS design, implementation and validation tests**.
66th International Astronautical Congress Article
S. Rossi, A. Ivanov, G. Faure, B. Geissman, J. Amiguet, R. Valceschini, M. Starein, R. Zufferey, *G. Burri*

Posters

2018 **Bio-inspired Aquatic Micro Air Vehicle for Environmental Monitoring and Disaster Relief**.
ICRA, International Conference on Robotics and Automation
Alejandro Ortega Ancel, Raphael Zufferey *and Mirko Kovac*

2016 **An Aquatic Micro Air Vehicle**.
Breaking the Surface
Robert Siddall, Alejandro Ortega Ancel, Raphael Zufferey *and Mirko Kovac*

Teaching and Outreach

June 2021	Guest Lecture at TUM, eAviation Lab
Jan 2020	Invited "Extreme Environment Robotics" talk at UK RAS Chapter conference
Dec 2019	Invited talk at Sevilla Robotics Vision and Control group
Nov 2019	Session Chair, IROS, Macau
Nov 2019	Invited Talk at the Marine Soft-robotics workshop at IROS, Macau
Sept 2019	Invited Talk at the SOARX Bio-inspired Conference in London
March 2019	Invited Talk on mobile robots, Spain Research Institute (IMDEA)
April 2018	Royal Geographical Society, demonstration for children of mobile robotics
2017	Science Museum London, Gallery Exhibit on Aquatic Micro Air Vehicle prototype
July 2017	Science Museum 'Lates' Exhibitor
2017, 2018	Imperial Festival Presenter
Sept 2016	Live Robotics demo of the AquaMAV as part the Breaking The Surface conference