

Aerial Robotics International Research Symposium

June 21-22, 2017

Keynote Speaker



Prof. Dario Floreano

Laboratory of Intelligent Systems, EPFL, Switzerland (lis.epfl.ch), Director
Swiss National Center of Competence in Robotics (www.nccr-robotics.ch), Director

Title: Biologically inspired drones

We are witnessing the advent of a new era of robots — drones — that can autonomously fly in natural and man-made environments. These robots have a major impact on civilian tasks, including transportation, communication, agriculture, disaster mitigation and environment preservation. However, autonomous flight in confined spaces and near humans presents great scientific and technical challenges owing to the energetic cost of staying airborne, to the perceptual intelligence required to negotiate complex environments, and to the safety requirements. Here I will show biologically inspired principles and technologies to improve capability, safety, and use of drones in civilian applications.

Bio

Prof. Dario Floreano is director of the Laboratory of Intelligent Systems at the Swiss Federal Institute of Technology Lausanne (EPFL). He is also founding director of the Swiss National Center of Competence in Robotics, which sponsors almost 60 researchers in wearable, mobile, and educational robots from 20 robotics labs across Switzerland. Prof. Floreano holds an M.A. in visual psychophysics, an M.S. in Neural Computation, and a PhD in Robotics. He held research positions at Sony Computer Science Laboratory, at Caltech/JPL, and at Harvard University. He is interested in robotics and A.I. at the convergence of biology and engineering. His research activities include aerial robotics, soft robotics, wearable robotics, and evolutionary robotics. He published more than 350 peer-reviewed articles, more than 10 patents, and 4 books on Artificial Neural Networks, Evolutionary Robotics, Bio-inspired Artificial Intelligence, and Bio-inspired Flying Robots with MIT Press and Springer Verlag. He is on the Advisory Board of Future and Emergent Technologies of the European Commission, has been a founding member of the World Economic Forum Council on robotics and smart devices, co-founder of the International Society of Artificial Life, Inc., and executive board member of the International Society for Neural Networks. He spun off two successful companies in drones (senseFly and Flyability) and a non-for-profit platform for public awareness of robotics and A.I. (RoboHub).

Keynote Speaker



Prof. Dr. Roland Siegwart

Autonomous Systems Lab & Wyss Zurich

Title: Flying Robots – Design and Autonomous Navigation

While robots are already doing a wonderful job as factory workhorses, they are now gradually appearing in our daily environments and offering their services as autonomous cars, delivery drones, helpers in search and rescue and much more.

For fast inspection of complex environments, flying robots are probably the most efficient and versatile devices. However, the limited flight time and payload, as well as the restricted computing power of drones renders autonomous operations quite challenging.

This talk will focus on the design and autonomous navigation of flying robots. Innovative designs of flying systems, from novel concepts of omni-directional multi-copters and blimps to solar airplanes for continuous flights are presented. Recent results of visual navigation including visual-inertial localization and mapping (SLAM) in GPS denied environments are showcased and discussed. This includes a specially developed visual-inertial sensor and appropriate algorithms for real-time on-board SLAM, collision avoidance and global planning.

Bio

Roland Siegwart is professor for autonomous mobile robots at ETH Zurich, founding co-director of the Wyss Translational Center Zurich and member of the board of directors of multiple high tech companies. He studied mechanical engineering at ETH, brought up a spin-off company, spent ten years as professor at EPF Lausanne (1996 – 2006), was vice president of ETH Zurich (2010 -2014) and held visiting positions at Stanford University and NASA Ames.

He is and was the coordinator of multiple European projects and co-founder of half a dozen spin-off companies. He is IEEE Fellow, recipient of the IEEE RAS Inaba Technical Award and officer of the International Federation of Robotics Research (IFRR). He is in the editorial board of multiple journals in robotics and was a general chair of several conferences in robotics including IROS 2002, AIM 2007, FSR 2007 and ISRR 2009. His interests are in the design and navigation of wheeled, walking and flying robots operating in complex and highly dynamical environments.

Speakers

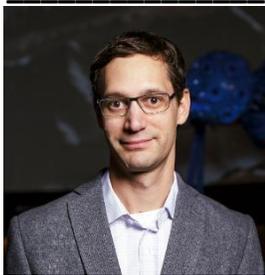


Prof. Dr. Jonathan P. How

Professor of Aeronautics and Astronautics, Massachusetts Institute of Technology

Dr. Jonathan How is the Richard C. Maclaurin Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology. He received a B.A.Sc. from the University of Toronto in 1987 and his S.M. and Ph.D. in Aeronautics and Astronautics from MIT in 1990 and 1993, respectively. He then studied for two years at MIT as a postdoctoral associate for the Middeck Active Control Experiment (MACE) that flew onboard the Space Shuttle Endeavour in March 1995. Prior to joining MIT in 2000, he was an Assistant Professor in the Department of Aeronautics and Astronautics at Stanford University.

He is the Editor-in-chief of the IEEE Control Systems Magazine and an Associate Editor for the AIAA Journal of Aerospace Information Systems. Professor How was the recipient of the 2002 Institute of Navigation Burka Award, a Boeing Special Invention award in 2008, the IFAC *Automatica* award for best applications paper in 2011, the AeroLion Technologies Outstanding Paper Award for the Journal *Unmanned Systems* in 2015, won the IEEE Control Systems Society Video Clip Contest in 2015, and received the AIAA Best Paper in Conference Awards in 2011, 2012, and 2013. He is a Fellow of AIAA and a senior member of IEEE.



Prof. Dr. Stephan Michael Weiss

Full Professor, Institute of Intelligent System Technologies, Alpen-Adria-Universitat

Stephan Weiss is Full Professor of Robotics and head of the Control of Networked Systems Group at the Alpen-Adria-Universität (AAU) in Klagenfurt, Austria. He received both his MSc in Electrical Engineering and Information Technology in 2008 and his Ph.D. in 2012 from the Eidgenössische Technische Hochschule (ETH) Zurich, Switzerland. His Ph.D. Thesis on "Vision Based Navigation for Micro Helicopters" first enabled GPS independent navigation of small UAVs using on-board visual-inertial state estimation. His algorithms were the key to enable the Mars Helicopter Scout proposal and corresponding proof-of-concept technology demonstration at NASA's Jet Propulsion Laboratory where he worked from 2012 until 2015 as Research Technologist in the Mobility and Robotic Systems Section and where he lectured at the California Institute of Technology. He holds patent applications filed by NASA-JPL and CalTech concerning visual-inertial navigation methods for sUAVs.



Sebastian Scherer

Systems Scientist, Robotics Institute, Courtesy Appointment, Mechanical Engineering

Sebastian Scherer is a Systems Scientist at the Robotics Institute (RI) at Carnegie Mellon University (CMU). His research focuses on enabling autonomy for unmanned rotorcraft to operate at low altitude in cluttered environments. He and His team have shown the fastest and most tested obstacle avoidance on an Yamaha RMax (2006), the first obstacle avoidance for micro aerial vehicles in natural environments (2008), and the first (2010) and fastest (2014) automatic landing zone detection and landing on a full-size helicopter. Dr. Scherer received his B.S. in Computer Science, M.S. and Ph.D. in Robotics from CMU in 2004, 2007, and 2010. He is a Siebel scholar and a recipient of multiple paper awards and nominations, including AIAA@Infotech 2010 and FSR 2013. His research has been covered by the national and internal press including IEEE Spectrum, the New Scientist, Wired, der Spiegel, and the WSJ. His work on self-landing helicopters has received the Popular Science Best of What's New 2010 Award and in fall 2016 he demonstrated his inspection robots to President Obama.

Speakers



Prof. Sanjiv Singh

Research Professor, Carnegie Mellon University, CEO, Near Earth Autonomy

Sanjiv Singh is a Research Professor at the Robotics Institute, Carnegie Mellon University and the CEO of near Earth Autonomy. He started his career working on the earliest autonomous ground vehicles to operate outdoors in 1985. Since then, he has led research efforts with applications in aviation, agriculture, mining and construction. In 2010 he led a team that demonstrated the first autonomous, full-scale helicopter capable of take off, search for viable landing sites and safe descent. In 2011 he led the autonomy effort for Transformer, DARPA's flying car program. He holds a Ph.D. in Robotics from Carnegie Mellon University and is the founding editor of the Journal of Field Robotics.



Prof. Jerome Le Ny

Associate Professor, Polytechnique Montreal, Department of Electrical Engineering

I am an Associate Professor in the [Department of Electrical Engineering](#) at Polytechnique Montreal since May 2012, and a member of [GERAD](#), a multi-university research group on decision analysis. I co-direct the [Mobile Robotics and Autonomous Systems Laboratory](#). In the past I have been affiliated with the [GRASP Laboratory](#) and the [PRECISE](#) Center for embedded systems at the University of Pennsylvania, as well as the [Laboratory for Information and Decision Systems](#) at MIT, where I received my PhD in September 2008. I graduated from the [Ecole Polytechnique](#) in France in 2001, and I also received in 2003 a M.Sc. in Electrical Engineering from the [University of Michigan](#). You can see my [CV](#) and a more official [biographical sketch](#) for more details.



Prof. James Richard Forbes

Assistant Professor, McGill University

I am interested in control and estimation techniques for mechanical, aerospace, and robotic systems. In particular, I am interested in vibration control, spacecraft attitude control, the control of (flexible) robotic manipulators, and mobile robot localization. I am interested in fundamental theoretical developments, as well as the application of new and existing control theories to practical, real-world problems. Synthesis of controllers, for example, robust yet optimal controllers, using numerical techniques is also of interest to me. My research is primarily motivated by (but not exclusively) aerospace problems; I seek to develop better control and estimation techniques thus enabling Earth science, astronomy, and the commercial development of the Canadian aerospace industry.



Prof. Kamesh Subbarao

Associate Professor, Department of Mechanical & Aerospace Engineering, UTA

Dr. Kamesh Subbarao is currently an Associate Professor in the Department of Mechanical and Aerospace Engineering at the University of Texas at Arlington. He got his PhD from Texas A & M University (2001) and his MS and BS degrees from the Indian Institute of Science, Bangalore (1995) and Indian Institute of Technology, Kanpur (1993) respectively, all from the department of Aerospace Engineering. He has extensive experience in design, development and implementation of flight control systems. Broadly, his research interests include control of nonlinear dynamical systems that are subject to large uncertainties. Prior to joining UTA, he was associated with projects involving adaptive dynamic inversion based control of unmanned combat aerial vehicles (UCAV) and combined relative position and attitude control of a Powersail. From 2001-2003, as a developer at the MathWorks Inc., he made contributions to the controls and system identification toolboxes.

Panelists

Hallie Siegel (Moderator), Science Communicator, Editor-at-large in Robotics

Hallie Siegel is a communications consultant serving the technology, innovation and research sectors, with a focus on strategic communications in the fields of robotics, automation and AI. As the first Managing Editor of the international robotics news website Robohub.org, Hallie helped to build a global network of over 150 expert contributors and a readership of 75,000 unique monthly visitors. She currently works with startups, universities, and other organizations in the robotics sector to build thought leadership and plan for organizational change.

April Blaylock, Senior Unmanned Aerial Systems Engineer, Aeryon Labs

April Blaylock obtained her Masters of Applied Science in Engineering from the University of Waterloo with a background in autonomous robotics and computer vision. She has been with Aeryon Labs for the past 9 years working as a Senior Unmanned Aerial Systems Engineer in product research and development.

Omer Mian, Product Manager for Applanix' DMS (Direct Mapping Solution)

Omer Mian is Product Manager for Applanix' DMS (Direct Mapping Solution for UAVs), a high-efficiency solution for aerial imaging from unmanned aerial platforms. Omer's focus is on business development and overall product direction.

Omer, with a degree in geomatics engineering, an MBA in Finance and a PMP (Project Management Professional) Certification, has over 10 years of experience in the geomatics industry. Specializing in hydrography, GNSS-aided inertial technology, mobile mapping, digital photogrammetry and LiDAR, Omer brings a wealth of knowledge and experience to developing product lines and business development strategies for Applanix. Omer is a licensed engineer in the province of Ontario.

Philip Ferguson, Vice President Product Development, PrecisionHawk

Dr. Philip Ferguson holds a Masters and PhD from the Massachusetts Institute of Technology in Aerospace Engineering, under the supervision of renowned space engineering and policy professor, Dr. Dava Newman (who served as the Deputy Administrator of NASA under the Obama administration). Dr. Ferguson's doctoral research focused on astronaut brain modeling to predict control adaption in microgravity. Following graduate school, he developed attitude control systems for small space telescopes at Microsat Systems Canada Inc., eventually becoming the Engineering Manager for all attitude control systems products. Dr. Ferguson then took a position at Magellan Aerospace, Winnipeg, where he grew into the position of Engineering Manager for the electrical and software engineering teams in support of Magellan's Space and Defense contracts. At Magellan, he was also the University research programs' Principal Investigator and the spacecraft power subsystem lead for the RADARSAT Constellation Mission satellites. Since 2014, Dr. Ferguson has been the Vice President of Product Development at PrecisionHawk Inc., where he is responsible for all aircraft and payload systems engineering as well as production. He is also active in many of the industrial research programs PrecisionHawk conducts to improve the state of the art in UAV systems, remote sensing and airspace safety. He currently lives in Markham, Ontario Canada with his wife and two daughters.

Adam Sax, President & CEO, The Sky Guys

Adam started his first company at the age of 13 and has since founded and grown dozens of successful companies ranging from Internet businesses to real estate brokerages to global development firms.

He has been featured in the Globe & Mail, Toronto Star, Toronto Sun, REM | Real Estate

Magazine, BlogTO and BuzzBuzzHome, is an ongoing contributor to UrbanToronto and Metro News.

A technological visionary, Adam has a raw ability to create and market, which has been refined over years of experience in sales, strategy, and business innovation across a wide range of industries. He now endeavors to make the revolutionary benefits of drone technology accessible and applicable to businesses around the globe.