1. Curriculum Vitae

www.asl.ethz.ch

Name:	Roland Y. Siegwart
Nationality:	Swiss
Date of birth:	May 2, 1959, Switzerland
Marital status:	Married, three children
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1.1. Education

8/1989 PhD in Mechanical Engineering, ETH Zurich, with distinction Silver Medal ETH
Thesis No. 8962 ETH: *Electro-magnetically Suspended Milling Spindle with Active Digital Control*,
Referent: Prof. Dr. G. Schweitzer, Co-Referent: Prof. Dr. J. Hugel.

12/1983 Master in Mechanical Engineering, Swiss Federal Institute of Technology, ETH Zurich.

6/1979 Baccalaureate (Matura) type C, Schwyz

1.2. Professional Career

2006 - Full Professor for Autonomous Systems, Swiss Federal Institute of Technology Zurich (ETH)

- Director of the Autonomous System Lab (ASL) with, around 6 Postdocs, 25 doctoral students and 10 technical and administrative collaborators.

2005 Visiting Professor at NASA Ames and Stanford University (4 month)

2002-06 Vice Dean, School of Engineering (STI), EPFL

1996-06 Full Professor in Microengineering Swiss Federal Institute of Technology Lausanne (EPFL).

- Director of the Autonomous System Lab (ASL)

1990-97 Vice-president R&D, MECOS Traxler AG (part time).

- Development and implementation of active magnetic bearings for machine tools, turbo compressors, ultra vacuum technology, textile spindles and various other applications.

1990-96 Deputy Head and Lecturer, Institute of Robotics, ETH Zurich (part time).

- Initiator and leader of various projects in robotics and mechatronics.
- Nano Robot: Co-initiator of the interdisciplinary Polyproject 'Nano Roboter'. Leader of the activities in nano-robotics at the Institute of Robotics.
- Initiator and lecturer of 'Bau intelligenter Mechatronikprodukte', a new type of lecture with special emphasis on 'hands on' experience and system design.

1989-90 Postdoc at Center of Design and Research (CDR), Stanford University, California, USA.

- Research activities in the field of product design, micro-robotics, tactile gripping and solar car design.

1985-89 Research and teaching assistant, Institute of Mechanics (Prof. Schweitzer), ETH.

1985-86 Lecturer for turbomachinery, Technical University (HTL), Zurich.

1984-85 Research and teaching assistant, Turbomachinery Lab (Prof. Gyarmathy), ETH Zurich.

1.3. Primary Research Interest

- Mobile Robot design and navigation - Localization and mapping, planning in dynamic environments, human robot interaction, locomotion concepts for rough terrain, mobile micro-robots, space rovers, autonomous cars and unmanned aerial vehicles.
- Mechatronics Design and Systems Engineering (smart product design, innovation, creativity).
- Artificial Cognitive Systems (Perception, representations, probabilistic reasoning and planning)

Please visit http://www.asl.ethz.ch for details on my research activities

1.4. Major achievements of the last years

- We have developed one of the *most sophisticated robotized cars called Smartter* and implemented our research results in dynamic path planning and 3D mapping for fully autonomous driving in urban environments. For global planning we extended in collaboration with the Carnegie Mellon University the D* algorithms with street-features. The probabilistic 3D mapping approach developed in collaboration with the University of Freiburg enables on-line construction of consistent maps in outdoor settings. The Smartter is also the high-end demonstrator of the European project SPARC led by Daimler Chrysler.
- With our partners for INRIA in Grenoble and College de France we extended the *Bayesian approach for cognitive systems* towards reliable topological navigation. This very promising work is now continued in the EU project BACS (Bayesian Approach to Cognitive Systems) with a highly interdisciplinary team that is coordinated by us.
- Our *solar powered micro-airplane Sky-Sailor* was developed as feasibility demonstrator for the European Space Agency with the aim to prepare technology of future Mars exploration. The current prototype weights only 2.4 kg and has the capacity for continues flight on Earth.
- Our works in the field of *highly integrated mobile micro-robots* resulted in a family of very small robots representing today the state-of-the-art in the field. They have become the evident candidates for the European Project LEURRE which had as goal the investigation of *mixed cockroach-robot societies*. We established new learning algorithms that enable hierarchical learning even with systems that have very limited calculation power. The experiments conducted by our partners from the University of Brussels demonstrated that the robots are accepted by their natural counterparts and that they can strongly influence the collective behavior of the cockroach-robot society. Our technological development towards very compact and highly integrated robots is now transferred to *inspection robots* that we develop with ALSTOM for servicing of power plants.
- Our recent work in the design and control of *autonomous helicopters* resulted in the probably most powerful quadrotor micro-helicopter of its class. The gained competences in this project enabled us to win the EU project muFly which has as goal to develop a fully autonomous micro-helicopter of around 30 g. It shall be powered by a micro full cell and controlled by a micro IMU and a specially developed omni-directional camera.
- Our long-term research towards *feature and functional based environment mapping* enabled us to generate very consistent and compact 3D maps of large environments base on plain features. In comparison with common 3D maps based on point clouds, our approach requiring around one 100 times less computer memory. It is currently extended in the EU project COGNIRON towards functional based environment maps used for personal robots.
- The quality and performance of our extended research in autonomous navigation and robot localization was impressively proved through our installation *of 11 tour-guide robots* during the five month of the Swiss National exhibition expo.02. To our best knowledge it is still the largest installation of *fully autonomous personal robots* in public places up to date.
- Our research on new *wheeled locomotion concepts for rough terrain* led to novel concepts outperforming all existing solutions. They are now considered by the European Space Agency (ESA) for the 2011 ExoMars mission to Mars and made us a key partner for current and future developments of ESA.
- Robots are a very motivating tool for engineering education. Since more that 10 years we are constantly developing *educational robot platforms* and extensively using them in hands-on education at all levels.
- The collaborators of our Lab have founded 9 spin-off companies during the last 6 years. Together with some additional companies, this makes Switzerland the country with the highest density of companies in the field of mobile robotics This puts us in an excellent position for taking a lead in the upcoming marked of service and personal robotics.

1.5. Other Professional Activities

Professional Services within University

- Chairman and founding member of the Space Center EPFL, 2004 – 2006
- EPFL delegate, Foundation of the IDIAP Research Institute, Martigny, 2003 – 2005
- Tenure Committee EPFL, 2002 – 2006
- Research Commission, EPFL 2001 – 2002

Editorial Boards, Profession Associations and Committees

- International Foundation of Robotics Research (IFRR): Board of Officers
- IEEE Robotics and Automation Society: AdCom Member 2007-2009
- Member of “Bewilligungsausschusses Exzellenzinitiative” of the DFG (Deutsche Forschungsgemeinschaft), 2006-07
- Deputy Head, National Competence Center for Research (NCCR) on Multimodal Information Management (IM2), 2003 – 2006
- Associate Editor, Journal of Field Robotics 2005 –
- Editor Board, Journal Intelligent Service Robotics, 2005 -
- Editor Board, Journals in Micromechatronics 2000 -
- IEEE Robotics and Automation Society: Vice President for Technical Activities, 2004 - 2005

- Member of Review Committee of LAAS - CNRS, Toulouse, October 2004
- Co-Chair of Technical Committee on Online Robots, IEEE Robotics and Automation Society, 1999- 2003
- National coordinator, International Federation of Robotics (IFR), 1997 - 2006
- Advisory board of the European Robotics Network (EURON), 2001 - present
- Co-Chair of EURON Interest Group on Mobile Robotics, 2001 - 2003
- Advisory Group for Automation and Robotics (AGAR), European Space Agency (ESA), 1998 - present
- Member of IFAC Technical Committee (TC) on Mechatronics, 2001 -
- Swiss representative of RobotFesta.
- Advisory Board SFB Humanoid Robots, University of Karlsruhe, Germany, 2001 - present
- Peer Leader for Mechatronics, Swiss Peer Review of the Universities of Applied Science, 2001 - 2003
- Board of the Swiss Society for Automatic Control 2000 - 2002

Organization of International Conferences and Workshops (Key Positions)

- General Co-Chair, Field and Service Robotics Conference, FSR 2007, Chamonix, June 2007
- General Chair, IEEE/ASME International Conference of Advanced Intelligent Mechatronics, AIM 2007, ETH Zurich, September 2007
- Area Program Co-Chair, IEEE International Conference on Robotics and Automation, ICRA 2005, Rome, April 2007
- Co-Chair, Bayesian Cognition workshop, Paris, January, 2006
- Co-Chair, Advanced Intelligent Mechatronics AIM 2005, Monterey, July 2005
- Area Program Co-Chair, IEEE International Conference on Robotics and Automation, ICRA 2005, Barcelona, April 2005
- General Co-Chair of LEURRE Workshop '*From Solitary Animal to Social Robots*', at the 8th Conference on Intelligent Autonomous Systems (IAS 8), March 11, 2004
- Co-Chair of Workshop '*Robot Programming by Demonstration*' at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 03), Las Vegas, October 27-31, 2003
- Program Co-Chair of the 2003 IEEE International Conference on Humanoids, Karlsruhe, Germany, October 1-3, 2003
- General Chair of the 2002 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), EPFL Lausanne, September 30 - October 5, 2002
- Program Chair of The Fourth European Workshop on Advanced Mobile Robots (EUROBOT'01), Lund Sweden, September 19-21, 2001
- Chairman of the EURON Summer-School on Mobile Robot Navigation, EPFL Lausanne, September 3-7, 2001
- Program Chair of The Seventh International Symposium on Magnetic Bearings, ETH Zurich, August 23-25, 2000
- Chairman of Workshop *'Mobile Micro-Robots'*, IEEE International Conference on Robotics and Automation (ICRA), San Francisco, USA, April 24-28, 2000
- Committee of First Coupe Suisse de Robotique, E=M6, 5.1998
- Chairman of the Workshop *'Robots on the Web*' at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Victoria, Canada, October 12-16, 1998
- Program Chair of The Fourth International Conference on Motion and Vibration Control, MOVIC'98, ETH Zurich, August 25-28, 1998
- Program Chair of The Forth International Symposium on Magnetic Bearings, ETH Zurich, August 24-26, 1994

1.6. Honors, Distinctions, Awards

- Board of Officers, International Foundation of Robotics Research (IFRR), 2007 - (on appointment)
- Honorary Professor of the Swiss Federal Institute of Technology Lausanne (EPFL), 2006
- Member of Final Approbation Committee of the German Excellence Initiative of the German Science Foundation of the DFG, 2006-07 (on appointment)
- Member of the Swiss Academy of Engineering Sciences, 2006 (on appointment)
- Distinguished Lecturer, IEEE Robotics and Automation, 2006-07
- Best paper Award, Field and Service Robotics Conference (FSR), Australia, 2005 (with Andre Noth)
- Best paper Award, AMiRE 2003 (with Gilles Caprari)
- Winner of the 1998 and 1999 micro maze robot contest, Nagoya, November, 1998 and 1999 (with Gilles Caprari)
- Silver Medal (highest distinction), PhD thesis ETHZ
- Postdoctoral scholarship of the Swiss Science Foundation, 1989-90

1.7. Innovation Awards

- Winner 'Technologiestandort Schweiz', Mobile Field and Service Robots, 2001
- Attribution of the label 'KTI-Start-up' for the start-up company Shockfish SA, 2000
- Winner 'Technologiestandort Schweiz', Squeeze Film Air-Bearings, 2000

- Various selection as 'coolest robot of the week' by the NASA space telerobotics program

1.8. Spin-Offs & Start-ups

- *ALSTOM Inspection Robotics,* founded in Fall 2006
- *Home- Robotics Sarl,* founded in Summer 2006
- *GCtronic*, Electronics and Mechatronics, founded in Fall 2006, one collaborator
- *Singleton,* 3D Mapping of Buidings and Infrastructures, founded in Fall 2006, one collaborator
- *Nurobot*, Automation and Artifacts, founded in July 2003, one collaborator.
- *FiveCo*, Mechatronics and Embedded Intelligence, founded 2002, around 5 collaborators.
- *Triamec*, Mechatronik, Automatisierungstechnik und Robotik, founded 2002, around 7 collaborators.
- *BlueBotics* Ltd, founded in February 2001, 6 collaborators. BlueBotics is developing and realizing mobile robots for service applications.
- *Shockfish* Communication Ltd, founded in September 1999, around 10 collaborators. Shockfish is developing, producing and installing conference navigation systems.
- *MECOS* Traxler Ltd, founded in 1988, around 30 collaborators. MECOS is a leading company in the field of active magnetic bearings.

1.9. Plenary/Keynote Talks (non exhaustive)

- 27.2.2007: Keynote Presentation, International Symposium on Dynamic Problems of Mechanics, Diname 2007, Brazil
- 31.1.2007: Keynote Presentation, Physics in Signal and Image Processing, PSIP 2007, Mulhouse, France
- 16.11.2006: Keynote Presentation, Leitinnovation Servicerobotik, Berlin
- 15.5.2006: Keynote Presentation, 37th International Symposium on Robotics (ISR 2006) / Robotika 2006, München
- 23.4.2006: Keynote Presentation, 2as Jornadas Nacionales de Robotica, IEEE RAS Distinguished Lecturer, Madrid,
- 23.3.2004: Keynote Presentation, Research Day Nav 2004, EPFL
- 23.7.2003: Keynote Presentation, AIM Mechatronics Conference, Kobe, Japan, July 20-23, 2003.
- 15.7.2003: Keynote Presentation, Field and Service Robotics Conference, July 14-16, Japan.
- 10/11.4.2003: Presentation Mechatronics, Delft University.
- 20.2.2003: Keynote Presentation AMIRE 2003, Brisbane, Australia
- 25/26.6.2002: Presentation at International Colloquium of Autonomous and Mobile Systems, Fraunhofer and University Magdeburg.
- 5.6.2002: Keynote Presentation (Festvortrag), Mechatronik-Tag TU Dresden.
- 21.11.2000: Keynote speaker, AMS2000, Karlsruhe.

1.10. Major collaborations

Robotics and Mechatronics is a very interdisciplinary field of research. Our list of collaboration is therefore very large and goes form neuroscience up to art. Through our various European and Space projects we are strongly connected through all Europe and beyond. This includes from the scientific community strong collaborations with EPFL, HGKZ, CSEM; INRIA Grenoble, LAAS Toulouse, College de France, University of Freiburg, Karlsruhe, Amsterdam, Bielefeld, Vienna, Berlin, Brussels, KTH, IPA, Carnegie Mellon, Stanford and much more. Through our Space activities we have strong collaboration with ESA, Oerlikon Space, NASA Ames, Astrium, vH&S, DLR and many others. Our key industrial partners are Alstom, Daimler Chrysler, Siemens VDO, Electricité de France, Cedrat, Xsens, Probayes, and our Spin-off companies. In the field of product design and innovation we are working with an extended network of partners in Switzerland like Intelliact, StratXX, Hilti, Rieter, Mammut, Tribecraft, Schindler, only to name a few.

1.11. Publications

http://asl.epfl.ch/index.html?content=publications.php