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Education

09/2015 - 05/2016

Harvard University, Master Thesis at the Self-organizing Systems Research Group
Master thesis (6/6): *A Low-Cost, Highly Maneuverable, Miniature Underwater Robot intended for Collective Behaviors,* SSR, Prof. Radhika Nagpal
Design of a simple and low-cost underwater swarm robot, aimed at underwater monitoring in a collective of 100 robots.
The thesis focused on the requirements for the locomotion system of an individual robot. Low-cost, high maneuverability, and miniaturization were achieved and experimentally demonstrated by using several submersible propulsors. Each of them has an electromagnetic coil in order to oscillate a magnetic rubber fin and is particularly low in cost. The integration of four independent and custom-designed propulsors to a highly maneuverable yet simple and small robot was the main contribution of this thesis.

09/2014 - 05/2016

ETH Zurich, Master of Science in Mechanical Engineering
Focus on robotics/mechatronics, main interests in autonomous mobile robots and artificial intelligence.
Semester thesis (6/6, 1 conference paper): *Force Sensing Catheter*, MSRL, Prof. Bradley Nelson
Development and validation of a contact force sensing ablation catheter for the medical treatment of cardiac arrhythmia. The catheter makes use of a novel force sensing principle that consists of a Hall sensor and a magnet, embedded in a 3.5mm diameter tip.

09/2010 - 08/2013

ETH Zurich, Bachelor of Science in Mechanical Engineering
Focus project in mechatronics (5.5/6, 1 patent): *Ship Inspection Robot* (SIR), PDZ, Prof. Mirko Meboldt
Team leader among 10 interdisciplinary students from mechanical and electrical engineering as well as industrial design.
Development of an inspection robot for cargo holds of big bulk carriers that has the ability to drive on tank walls and to climb a broad variety of obstacles thanks to its unique magnetic wheel configuration. The robot executes visual inspection for rust, corrosion, and leaks on the tanks. Alstom Inspection Robotics patented parts of the climbing mechanism.

Bachelor thesis (5.75/6): *Obstacle Climbing Control for an Inspection Robot with Magnetic Wheels*, ASL, Prof. Roland Siegwart
Control of a 4WD inspection robot (SIR) while climbing non-continuous obstacles, such as bulb-, T-, L-, or I-profiles.
Design of a controller in Python which compares the front and real wheel torques in order to adjust the wheel speeds correctly, avoiding the identification of obstacles and the installation of additional measurement devices, such as optical encoders or resistive wire strains. Obstacle Climbing Control (OCC) reduces the wheel slip, or, if there is no wheel slip, minimizes the structural stress on the drivetrain and thus enhances the lifetime of the robots. On Ship Inspection Robot, OCC reduced torque peaks in obstacles by up to 40%.

08/2006 - 07/2010

Wil High School
First in class (5.6/6). Focus on mathematics/physics, elective subjects: economics/law

Experience

08/2016 - Present

Harvard University
Research Scholar at the Self-organizing Systems Research Group:
Development of a school of underwater robots for applications where monolithic robots are not the most suitable choice and as a scalable platform to study 3-dimensional swarming. Research questions in order to coordinate a collective of miniature underwater robots include:
1) What are the requirements for the design and the locomotion system of an individual robot (c.f. master thesis)?
Low-cost and ease of manufacture are important for keeping the cost of the collective within reasonable bounds. High maneuverability is important so that each individual can exhibit fast response to its neighbors' actions to maintain a cohesive collective. Miniaturization is important in order to operate a school of underwater robots within a laboratory environment.
2) What information is required and how should it be communicated among the robots (current work)?
3) What rules can organize the collective (future work)?

09/2013 - 02/2014

Bühler Holding AG in Bangalore (India)
Internship in four projects for Corporate Technology and R&D Food Processing:
1) Feasibility study for a new Paddy Separator
Project management including conception, technical planning, design and manufacturing of a prototype, execution of test runs, and formulation of recommendations for future work.
2) Design of a new Single Screw Extruder
Modelling and dimensioning of the framework, the motor suspension and the cooling system, considering the critical operating conditions; cost- and production-optimized design; overview of production and assembly of the prototype as well as of the test runs; formulation of BOMs for the series production.
3) Validation of a prototype for the capacity-wise oil spraying of pulses
Installation and test runs on customer site, analysis of measurement data, preparation of the industrialization process.
4) Design studies for the emergency cooling of a Coffee Roaster
Development of concepts for the emergency drive of the cooling drum during blackouts.

02/2013 - 05/2013

ETH Zurich
Assistant at the *Product Development Group Zurich*:
Supporting the lecture for *Innovation Process*. Coaching and leading three engineering teams during their course *Innovation Project*. The teams had to integrate several actuators and sensors into a mechatronic system to master a predefined challenge.

08/2010 - 09/2010

Andreas Stihl AG & Co.
Workshop Training at the world's leading chain saw manufacturer:
Introduction to different manufacturing processes like drilling, milling, turning; machine maintenance; quality control; CAD, engineering drawings, and tolerances.

Further Experience

Holenstein AG (07/2007, internship in a truckage company as a warehouse clerk), Lindenhof Elementary School and freelance private teaching (02/2007 - 06/2010, private lessons), Institute Rosenberg (01/2007 - 03/2013, ski instructor), Hardegger Kaese (07/2005, internship in manufacturing processes for dairy food)

Advanced Training

Swiss Study Foundation	*Seminars:* The Art of Debating, Negotiating Skills, Personal Self-management, Presentation Techniques, Understanding Economics, The Influence of Globalization on Borders and Territories
	Summer Schools: Populism as a Threat with Fritz Stern and Norbert Frei
	Conferences: How to Build a Smart and Stable Society, Switzerland and the European Union, China's Rise to a Global Power, The Fascination of Nanoparticles

Honors and Awards

Werner Siemens Fellowship	Fellowship of the *Werner Siemens Foundation* and the *Swiss Study Foundation* for excellence in STEM, awarded in 2016
Annual Scholarship	Scholarship for conducting research abroad from the *Swiss Study Foundation* for my stay at Harvard University in 2015
Best Innovator Award	Award of Buhler India for my innovative ideas during my internship in 2013
Long-term Fellowship	Became a fellow of the *Swiss Study Foundation* for excellent students in 2011
Graduation Award	Honors degree for first in class at Wil High School in year of graduation 2010
Sustainability Award	Award of the Employer's Association Wil for the best matura-paper at Wil High School in the field of sustainability 2010

Publications and Presentations

Patent on SIR	Berlinger, F.C.J., Clausen, C.M., Detrekoey, Y., Eichenberger, J., Eppenberger, M.A., Fisler, M.S., Mueller, A., Schmid, S.M. and Fischer, W., Alstom Technology Ltd, 2016. *Carriage cart with obstacle overcoming.* U.S. Patent Application 15/041,652.
Conference Paper	Chatzipirpiridis, G., Gervasoni, S., Berlinger, F., Ergeneman, O., Pané, S. and Nelson, B.J., 2015, June. Miniaturized magnetic force sensor on a catheter tip. In *2015 Transducers-2015 18th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS)* (pp. 1727-1730). IEEE.
Workshop Poster	Poster contribution and spotlight presentation at the *Workshp on Dynamic Locomotion and Manipulation* at ETH Zurich in 2016
Conference Talk	Presentation about SIR at the *Marine Maintenance World Expo and Conference 2016* in Amsterdam
Online Journal Article	Article about the prospects of SIR on *Robohub* in 2013

Leadership and Activities

Swiss Study Foundation	The Swiss Study Foundation promotes excellent students with broad interests whose personalities, creativity, and intellectual aptitudes raise the expectation of extraordinary contributions to science, economy, culture, and politics (compare with *The Woodrow Wilson National Fellowship Foundation* in the USA). I have been an active fellow since 2011 (c.f. *Advanced Training*) and organized a seminar for younger fellows in 2016: "Expand your comfort zone: work or study abroad!" had the purpose of animating students to go abroad and widen their horizons. I shared my experience from my internship in India and my master thesis in the USA.
WIFONA	Vice president of the *Wiler Forum für Nachhaltigkeit* (a forum for sustainability issues), 2010-2016 Responsible for the division of sustainable technologies and energies Member in the organizing committee for the 2010 forum on Sustainable Policy of Peace and Development with the Swiss Federal Council Micheline Calmy-Rey
Sports and Music	Golf, tennis, soccer, bike, ski, hiking; guitar, piano

Qualifications

Languages/Culture	German (mother tongue), English (CAE, 2010: proficient), French (DALF C1, 2010: conversational), Spanish (DELE B1, 2008: basic); visited over 50 countries on all continents
Computer	MATLAB/Simulink, CAD/CAE (SolidWorks, Siemens NX, Autodesk Inventor, COMSOL, V-Rep), LabVIEW, C/C++, Arduino, Python, LaTeX, MS Office