

ETH Lab Tours

ECC13 will offer conference participants a chance to tour local research facilities in order to gain insight into the variety of controls research activities at ETH Zurich. Tours will be offered on all three conference days (see schedule below) and will include visits to the Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koepl), the Institute for Dynamic Systems and Control (Profs. Guzzella, D'Andrea), and the Institute for Robotics and Intelligent Systems (Profs. Nelson, Siegart, Riener, Gassert, Buchli).

The lab tours are free of charge, but prior registration is required (see below).

Note: In addition to presenting their research during the lab tours, the above institutes will also exhibit examples of their research projects in the ETH Main Building during the conference. The academic exhibitions will be open all day during the first two conference days (17.-18.07.13) and can be visited without prior registration.

Contact: Sebastian Trimpe, Academic Tours Chair, labtours@ecc13.ch

Registration

All conference participants who would like to attend the lab tours must register online at: <http://www.ecc13.ch/labtours.html>

Tour registration will open on Monday (15 July) and will remain open throughout the conference until 1 hour before the start of each tour, or as long as free spots are available. Participation is limited to 150 participants per day (6 groups each day, each group with a maximum of 25 participants).

Please note that advanced registration is required.

There is no cost to attend the tours.

Schedule

Tours are offered in the evening on Wednesday (17 July) and on Thursday (18 July), and during lunchtime on Friday (19 July).

Wednesday, July 17, 2013, 17:30–19:00

Each group will visit two labs. Participants can choose their group when registering on line.

Group 1:

Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koeppl)
Rehabilitation Engineering Lab (Prof. Gassert)

Group 2:

Institute for Dynamic Systems and Control (Prof. D'Andrea)
Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koeppl)

Group 3:

Autonomous Systems Lab (Prof. Siegart)
Institute for Dynamic Systems and Control (Prof. D'Andrea)

Group 4:

Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koeppl)
Autonomous Systems Lab (Prof. Siegart)

Group 5:

Institute for Dynamic Systems and Control (Prof. Guzzella)
Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koeppl)

Group 6:

Rehabilitation Engineering Lab (Prof. Gassert)
Institute for Dynamic Systems and Control (Prof. Guzzella)

Thursday, July 18, 2013, 17:30–19:00

Each group will visit two labs. Participants can choose their group when registering on line.

Group 1:

Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koeppl)
Multi-Scale Robotics Lab (Prof. Nelson)

Group 2:

Institute for Dynamic Systems and Control (Prof. D'Andrea)
Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koeppl)

Group 3:

Sensory-Motor Systems Lab (Prof. Riener)
Institute for Dynamic Systems and Control (Prof. D'Andrea)

Group 4:

Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koepl)
Sensory-Motor Systems Lab (Prof. Riener)

Group 5:

Institute for Dynamic Systems and Control (Prof. Guzzella)
Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koepl)

Group 6:

Multi-Scale Robotics Lab (Prof. Nelson)
Institute for Dynamic Systems and Control (Prof. Guzzella)

Friday, July 19, 2013, 12:45–13:30

Each group will visit one lab. Participants can choose their group when registering on line.

Group 1:

Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koepl)

Group 2:

Institute for Dynamic Systems and Control (Prof. D'Andrea)

Group 3:

Autonomous Systems Lab (Prof. Siegwart)

Group 4:

Automatic Control Laboratory (Profs. Lygeros, Morari, Smith, Koepl)

Group 5:

Institute for Dynamic Systems and Control (Prof. Guzzella)

Group 6:

Agile and Dexterous Robotics Lab (Prof. Buchli)

Meeting Information

Registered tour participants should gather in their group in front of the ECC13 registration area in the ETH Main Building 15 minutes prior to the start of the tour. Each group will have a tour guide who will lead the group to the different research facilities.

The groups will leave promptly at the indicated starting times and will not wait for late arrivals.

Meeting times

Wednesday, July 17, 2013: 17:15 (tour starts 17:30 sharp)
Thursday, July 18:, 2013 : 17:15 (tour starts 17:30 sharp)
Friday, July 19, 2013: 12:30 (tour starts 12:45 sharp)

Meeting place

ETH Main Building, in front of the ECC13 Registration Desk.

Please register online before the tour. Only participants with prior registration will be permitted to attend.

Participating Labs

Following is a list and short description of the labs that will participate in the lab tours. Please note that not all labs offer tours on all three of the conference days.

Automatic Control Laboratory, ETH Zurich
Prof. John Lygeros, Manfred Morari, Roy Smith, Heinz Koeppel
<http://control.ee.ethz.ch>

This tour provides an insight into the activities of the Automatic Control Laboratory at the Department of Information Technology and Electrical Engineering, ETH Zurich. We present five exhibits revolving around the application of modern control theory and optimization techniques to a variety of different systems.

Learn how optimization can alleviate the costs of operating an electric power network and watch autonomous helicopters steered by predictive control and real-time optimization software. Enjoy visualizations of intracellular molecular interactions employing realistic geometries and models. Witness robotic agents being controlled by sound and get a hands-on introduction to interactive teaching material developed for undergraduate courses on systems and control.

Institute for Dynamic Systems and Control (IDSC), ETH Zurich
Prof. Raffaello D'Andrea
<http://www.idsc.ethz.ch>

Witness autonomous flying vehicles as they learn acrobatic flips, dance, balance poles, and play ball, and find out directly from the researchers how these feats are accomplished. In this lab tour you will experience autonomous systems in action, and learn how these innovative testbeds – and the algorithms that control them – are pushing the boundaries of what is possible with autonomous machines. The tour will feature a demonstration of the Flying Machine Arena, a 10 x 10 x 10 meter

airspace where multiple flying vehicles learn and perform acrobatic maneuvers. <http://www.flyingmachinearena.org>

Raffaello D'Andrea and his team are part of the Institute for Dynamic Systems and Control (IDSC) in the Department of Mechanical and Process Engineering at ETH Zurich, where they have developed other innovative testbeds for autonomous control, including blind juggling robots and self-balancing cubes.

Institute for Dynamic Systems and Control (IDSC), ETH Zurich
Prof. Lino Guzzella
<http://www.idsc.ethz.ch>

Hybrid propulsion systems have a large potential to reduce CO₂-emissions of today's vehicles. Usually hybrid propulsion systems are built with an electric motor assisting the conventional combustion engine. In our lab we investigate a large variety of hybrid systems, including pneumatic hybrids, hydraulic hybrids as well as dual-fuel systems. On our test-benches we validate the simulation results for these systems and develop automated tools for the parametrization of the engine control unit as well as the energy management system.

Lino Guzzella and his team are part of the Institute for Dynamic Systems and Control (IDSC) in the Department of Mechanical and Process Engineering at ETH Zurich. Research topics include innovative power-trains but also medical engineering as well as energy management for buildings.

Rehabilitation Engineering Lab (RELAB), ETH Zurich
Prof. Roger Gassert
<http://www.relab.ethz.ch>

Discover how we use a combined approach of robotics, psychophysics and cognitive neuroscience to develop and clinically evaluate diagnostic, therapeutic and assistive tools in order to promote recovery, independence and social integration of the physically disabled. The tour features demonstrations of the Virtual Peg Insertion Test (VPIT), an assessment test combining haptic feedback and virtual reality, and ArmeoSenso, an IMU based home therapy and assessment system to train and evaluate upper limb function.

Autonomous Systems Lab (ASL), ETH Zurich**Prof. Roland Siegwart**<http://www.asl.ethz.ch>

The Autonomous Systems Lab (ASL) of ETH Zurich is internationally renowned in the field of autonomous robot design and navigation with great experience in design and navigation of wheeled, legged and flying robots operating in different types of environments. While the ASL robots "StarETH" the quadruped and "Rezero" the ball-bot will be showcased in the main exhibition hall, this tour will demonstrate (a) our powerful "SLAM sensor" which based on visual and inertial cues can provide robots the ability to perform localization and mapping, and (b) the results of AIRobots EU-FP7 project on inspection of large structures using a micro aerial vehicle.

Multi-Scale Robotics Lab (MSRL), ETH Zurich**Prof. Bradley J. Nelson**<http://www.iris.ethz.ch/msrl>

The Multi-scale Robotics Lab (MSRL) pursues a dynamic research program that maintains a strong robotics research focus on several emerging areas of science and technology. A major component of the research leverages advanced robotics for creating intelligent machines that operate at micron and nanometer scales. MSRL research develops the tools and processes required to fabricate and assemble micron sized robots and nanometer scale robotic components. Many of these systems are used for robotic exploration within biological domains, such as in the investigation of molecular structures, cellular systems, and complex organism behavior. Our research examines topical problems in such diverse fields as microrobotically assisted surgery, magnetic actuation and manipulation, micro and nanofabrication, low Reynolds number locomotion, wireless delivery of power, electrostimulation of biological materials, and micro and nanostructure characterization.

Sensory-Motor Systems Lab, ETH Zurich**Prof. Robert Riener**<http://www.sms.hest.ethz.ch>

Experience machines that let you immerse into a virtual world, let you engage in an optimal way, and support you to learn a new complex movement. Meet robots, which guide your limbs in a cooperative way, and support you just as much as needed. Learn more about the best human-centered control strategies of an active prosthetic leg.

Visit one of the world leading labs developing robots for the rehabilitation of gait function, as well as for the learning of movements in sports. The

tour will include a demonstration of the newest version of the gait robot Lokomat, an actuated knee prosthesis, and the virtual reality motion synthesis lab M-cube.

Robert Riener and his team are part of the Institute of Robotics and Intelligent Systems (IRIS) in the Departments of Health Sciences and Technology (HEST) and the Department of Mechanical and Process Engineering (MAVT) at ETH Zurich. Robert Riener is also affiliated with the Medical Faculty of the University of Zurich.

Agile and Dexterous Robotics Lab (ADRL), ETH Zurich

Prof. Jonas Buchli

<http://www.adrl.ethz.ch>

The research at the Agile and Dexterous Robotics Lab focuses on the understanding the control of dynamic motions of robots, humans and animals in unstructured environments. We aim at providing the 'intelligence' for versatile, agile and dexterous service robots and a better understanding of the outstanding control performance of humans and animals. In a short presentation we will highlight our research in the area of Legged Robotics, Machine Learning and modeling of human motor-control.

Newly opened less than half a year ago and affiliated with the Institute of Robotics and Intelligent Systems at the Mechanical Engineering Dept. at ETH Zurich, the ADRL gets its seed funding through a Swiss National Science Foundation Professorship Award to Jonas Buchli.