



INDUSTRY CLUB

industryclub.control.lth.se // newsletter No 2



LUNDS
UNIVERSITET

The Automatic Control Industry Club: Exploring, Expanding and Applying Control Technology

Welcome to Newsletter Nr 2, December 2021

In the newsletter we will present interesting new developments at our department, report about advances in the field of automatic control, as well as opportunities for collaborations.

We welcome you to be a part of this!

Industry Club

The Industry Club is an initiative to build an ecosystem around the Department of Automatic Control at Lund University. We have created this as a way to share ideas and get feedback on the research we do. We want to reach out to the industry and other organizations to collaborate on new projects and initiate new research questions. The interface of the Industry Club will be a recurring newsletter, a webpage, and online and live events.

Highlights from the department

Interesting topics are being discussed on a daily basis at the department. Here are a few examples of recent topics that we would like to highlight.

- *Julia Toolbox for Control Systems.* Julia is a toolbox for control in Julia presented at the CDC 2021 tutorial session on open-source software for control. Julia is a modern open-source language that aims to be a fresh approach to technical computing. It is high level with a mathematical syntax, but it is compiled to fast machine code. It also has the functionalities of a traditional control toolbox, and it can also handle symbolic variables and automatic differentiation. For more information see the github [repository](#) or the CDC tutorial [paper](#).
- *Digital Twins for Production Improvements.* The concept of Digital Twins is of interest to many manufacturing companies. Together with SWEP AB in Landskrona, our MSc student [Sergio Mora Carron](#) worked on Digital Twins, with the goal of building a digital model of a real production flow. He used real figures and advanced tools, and reached substantial productivity improvements. Another MSc thesis, also with

SWEP, by [Amparo Tarazona Ferrandis](#), focused on design and test of a robotic cell for stud bolt welding in heat exchangers.

- *The EU Robotics Week* was successfully carried through on site this year. In total 500 school children, master program students and researchers enjoyed the tours to see and learn about robotics. The researchers and PhD students at the Departments of Automatic Control and Computer Science demonstrated a wide range of robots, from bluebots and facial recognition to industrial and mobile robots. Last year's digital [EU Robotics Week](#) can provide some examples.
- *You're welcome to attend our upcoming PhD defences.* Per Skarin (20 dec, 2021), Martin Heyden (21 jan, 2022) and Taouba Jouini (28 jan, 2022) will defend their theses. You are most welcome to attend the events and learn about their work. More info is available at the [webpage](#).

Highlights from the control world

We are frequently attending control conferences, events and meetings around the globe. Below you'll find a glimpse of what we consider the most valuable take-aways.

- *CDC* - This year's Conference on Decision and Control (CDC) was held in Austin, Texas. One of many highlights was the presentation of the Julia ControlSystems.jl toolbox, a valuable tool that has been developed by current and former graduate students at the Department of Automatic Control. In addition, an impressive Bode lecture was given by prof. P. Khargonekar on the role of control theory in tackling climate change, and a very interesting semi-plenary on robustness and internal model control was given by Prof. Marconi.
- *Control and Robotics at hospitals.* Advanced

transplantations are performed at large hospitals, like SUS in Lund. A top-modern facility for organ transplantation at SUS was inaugurated in November. The new facility incorporates a testbed equipped with robots for, e.g., robot assisted surgery. The Control Department is collaborating with SUS on this as described in [Läkartidningen](#).

- *A new tool for valve stiction detection in the Process Industry*, called “Stiction analyzer” is available on [Github](#). The tool ties in with the industrial software SEEQ. It has been developed as part of an MSc thesis supervised by Margret Bauer, guest professor at the department.

- *Control technology and AI - for the forest*. There are great expectations on the Swedish forest. It should sequester carbon for the climate, secure biodiversity, and deliver biofuels and timber. The forest should also provide recreation, the right of public access and profitability for the Swedish economy to secure pensions. These are conflicting goals that are difficult to specify, and they generate problems that are hard to solve. The event Nordic AI Popup Live - AI for the forest discusses AI technologies using drones and satellites to monitor and control how the forest is doing. See the video [recordings](#) and the [AI Lund](#) webpage for more details.

Upcoming opportunities

- *Hosting and MSc thesis?* Hosting an [MSc thesis](#) project is our most common form of collaboration with the industry. The project corresponds to 20 weeks of full-time studies, and the topic should be related to systems and control engineering. It can include modelling and simulation, machine learning, design and optimization, as well as real-time implementation. See our website or contact us for more information.

- *Would you like to prototype?* [X-Lab](#), a makerspace at LTH, provides prototyping opportunities for students and external companies. Equipment and material are made available for anyone to explore, create and innovate. More about X-Lab and how to engage is available [here](#)

- *Hosting an industrial PhD student*. The next call to apply for funding for WASP industrial PhD students will open on Jan 21 and close on April 7. This gives companies a chance to let a suitable employee become a WASP-funded PhD-student at our department. A win-win situation for our department, as well as your company. On January 24, 13.00-16.00, a WASP webinar will be held on this

topic. Contact us already now if you are interested to learn more. More information will soon be available on the [website](#).

- *“Industry club day save the date!”* An Industry Day will allow you to network, discuss ideas, get new influences, and visit our Department. We are eager to welcome you to the first Industry Day. Please reserve Thursday March 24 2022 at 16 (approx 2h). More info will be provided in the next newsletter.



HAPPY HOLIDAYS!



Contact

Department info: [webpage](#)

Contact: industryclub@control.lth.se

Sign up to Industry Club: [Industry Club website](#).

