robotics

Swiss National Centre of Competence in Research

COMMUNITY NEWSLETTER

📢 LATEST NCCR NEWS

CYBATHLON 2020

Completely reinvented in the face of the pandemic, the 2020 edition of the Cybathlon race was a huge success. 51 teams from 20 countries competed against each other in different time zones and locations, completing everyday tasks with the help of state-of-the-art assistance systems. NCCR spin-off Twiice came 2nd in the Powered Exoskeleton race. See all results. The talks of the Cybathlon Symposium on 17 September are also available.

ANYmal in Science Robotics

The Hutter lab, in collaboration with the KAIST lab in Korea and Intel, has published an article in Science Robotics (also featured on the cover of the journal) describing a control strategy that allows the ANYmal robot to walk on challenging terrains, including conditions that the robot never encountered before. ANYbotics has also partnered with construction firm Losinger Marazzi to explore ANYmal's potential to patrol their sites to identify and report safety issues. The case study is described here.

New associate member

Georg Rauter has joined the consortium as associate member in September, becoming NCCR Robotics' tenth associate PI and adding the University of Basel to our partner institutions. In Basel, Georg heads the BIROMED-Lab, that develops bio-inspired robotic and mechatronic systems for medical applications, in particular for minimally invasive robotic surgery. We give him a warm welcome to the team.

Career Development Award

The NCCR Robotics Equal Opportunities Award for Career Development was awarded to Anna-Maria Georgarakis for a collaboration project on textile interfaces with Professor Heike Vallery at TU Delft. Anna-Maria joined the Riener lab in November 2016 as a PhD student. Her research focuses on upper extremity biomechanics, physiology and assistive devices.

A raptor-inspired drone

In the latest issue of Science Robotics, the Floreano lab describes a drone with a feathered wing and tail that give it unprecedented flight agility, inspired by the northern goshawk - a fast and powerful raptor. The first author is Enrico Ajanic (pictured), a PhD student in Floreano's lab. Read more

Forest dwelling drones

The Kovac lab at EMPA has developed drones that can attach sensors to trees to monitor environmental and ecological changes in forests, tested them at NEST experimental robot testing space at Empa and on trees at Imperial College London's Silwood Park Campus. Read more

Robotics Today

Davide Scaramuzza was an invited speaker at the Robotics Today's seminar series organized by MIT and Stanford, where he talked about Learning to Fly, covering topics ranging from perception to planning and control, from model-based to model-free autonomy. Watch the presentation

Nature of Robotics at EPFL

From 22 January to 25 April 2021, EPFL Pavilions (formerly named ArtLab) hosts the exhibition *Nature of Robotics: An Expanded Field*. Through artists' works and scientific productions, it invites contemporary reflection on the place of artificial agents in our natural and social ecosystems. Visions emerging from the laboratories are juxtaposed with speculative creatures, drawings, diagrams, and videos produced by

ROBOTICS WORLD

Top News

· Coordinated Robotics wins Darpa SubT Virtual Cave Circuit
· Warehouse robots upgraded for fastest decisions
· Robots invade the construction site

External calls

· Call for papers on "New Trends of Autonomous Robot Navigation"
· Call for papers for special issue on "Multi-sensor fusion for Autonomous Robots"

Start-up corner

Please find the following links related to start-up support. If you would like to promote your events through our channel, please contact us nccr-robotics@epfl.ch
· What do investors look for? - From eu.startup, an article with tips from top European investors
· Business creation ICT - upcoming online training events for ICT companies, from 8 February to 11 March 2021.

Equal Opportunities Corner

· Can we make our robots less biased than we are? A New York Times story on how A.I. developers are committing to end the injustices in how their technology is often made and used.
· Understanding persistent gender gaps in STEM. A Policy Forum in Science shows how gender relates to pursuit of a degree in science, technology, engineering, and math.

External positions

· Tenure Track assistant professor of Robotics at the University of Copenaghen
· Postdoc in Human-Robot Interaction at the

contemporary artists. NCCR members Auke Ijspeert, Selman Sakar, Hebert Shea and Jamie Paik collaborated with the exhibition. Read more

📢 CONGRATULATIONS

Top Swiss engineering startups

The NCCR Robtics spin-offs Sevensense and ANYbotics took top spots in the annual ranking of the Top Swiss Startup award. In the category of engineering startups, Sevensense ranks 2nd and ANYbotics won the public voting.

BCI competition

The Courtine lab won second place at the annual "Brain-Computer Interface" Award, with the project "A Brain–Spine Interface Complements Deep-Brain Stimulation to Both alleviate gait and Balance Deficits and Increase Alertness in a Primate Model of Parkinson's Disease". Read more

PhD Defenses

At the Dillenbourg lab, Thibault Asselborn and Alexis Jacq have successfully defended their PhD thesis, entitled "Analysis and Remediation of handwriting difficulties" and "Mutual Understanding in Educational Human-Robot Collaborations" respectively.

Best student paper award CI competition

Arzu Guneysu Özgür (Dillenbourg lab) won the Best PhD student paper award at the 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN) with the article "Design of Dynamic Tangible Workspaces for Games: Application on Robot-Assisted Upper Limb Rehabilitation".

PhD Thesis

Florian L. Haufe (Riener lab) successfully defended his PhD thesis at ETH Zurich on 10 November 2020. His thesis is about "Walking with robots: how powered wearable devices assist human movement".
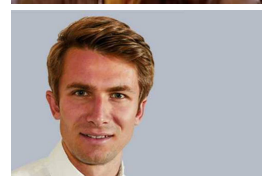
Women Master Students

Year 11's NCCR Robotics Awards for Women Master Students (previously known as Master Scholarships for Women), supported by the Education & Society committee, have been selected. They are Jessie van Dam, Monica Pérez Serrano, Shreya Kohli, Tzu-Chia Wang. The awardees will now contact the labs they would like to work with to discuss the possibility of having you host them.

PhD and Postdoc exchange

The scholarships for the PhD/Postdoc exchange programmes have also been awarded. Robert Baines (from Fabotory, Yale University) will go to Paik's lab at EPFL. Simon Klenk (from the Computer Vision Group, TU Munich), will go to Scaramuzza's lab at UZH. Ahmed Shehata (from the University of Alberta, Canada), will go to Raspopovic's lab at ETH Zurich.

📢 NCCR ROBOTICS OPEN POSITIONS

PhD and Postdoc at Biorob

The Ijspeert lab at EPFL has openings for 1 PhD student and 1 Postdoc on "quadruped robotics and machine learning". The project is at the intersection between robotics, machine learning, and computational neuroscience. Applications will be processed as they arrive until the position is closed. See details

PhD and Postdoc positions at UZH

Scaramuzza's lab has Postdocs openings in AI for robotics, such as deep (reinforcement) learning for computer vision and control to contribute to the areas of: autonomous drone racing, SLAM, Scene Understanding, and Computational Photography with Event Cameras. Read more

EPFL faculty position in Control for Intelligent Systems

This position targets applicants at the level of tenure-track Assistant Professor, but exceptional candidates may be considered at the rank of Associate Professor with tenure. You can find more information here. The search is particularly interested in, but not limited to, the following research areas: (i) complex interconnected systems, (ii) cyber-physical systems, (iii) safe and reliable control, (iv) pervasive intelligence, (v) autonomous systems and (vi) data-driven control.

BIOROB 2020

29 November - 1 December 2020 - Online

At the International Conference on Biomedical Robots and Biomechatronics, Anna-Maria Georgarakis from the Riener lab will present her paper on "Control for gravity compensation in tendon-driven upper limb exosuits". Florian L. Haufe will present his paper on "Increasing exercise intensity during outside walking training with a wearable robot". Shortlisted for BioRob 2020 Best Student Paper Award (Final winner to be announced on Tuesday December 2nd at 5pm EST).

📢 NCCR ROBOTICS CALLS

IEEE EMBS Neural Engineering 2021

The NER 21 Neuro Engineering conference which will be virtually held in May 2021 and is co-chaired by Silvestro Micera, is the world's gathering place for biomedical engineers, neuroscientists, and clinicians to share research and to exchange ideas and breakthrough advances in novel engineering tools for elucidating brain function and neuro technologies for the restoration and enhancement of impaired sensory, motor, and cognitive functions. The deadline for paper submission is December 10. Read More.

🖼️ PRESS COVERAGE

VariLeg team

An illustrated feature in "Technik und Wissen" was dedicated to the VariLeg Enhanced team, that competed in Cybathlon 2020 and in which Roger Gassert is main scientific supervisor. Read more

Interview in Le Temps

NCCR Robotics Director Dario Floreano was interviews in Le Temps on the risk that new regulations would pose to the Swiss drone industry. Read more

Neurotechnologies in Sciences at Avenir

The French magazine has an article on rehabilitation technologies, inspired by Cybathlon 2020. Read more

Hawk-inspired drone

The *Science Robotics* publication from Floreano's lab in October, on a raptor-inspired drone, was covered in an article by New Scientist. Read more

IEEE Spectrum Video Friday

The Scaramuzza lab's new quadrotor simulator, Flightmare, was featured in the IEEE Spectrum weekly selection of robotics videos. Read more
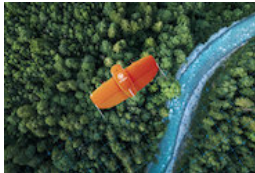
More press coverage available through NCCR Robotics website.

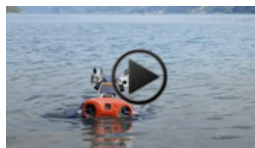## ▶️ NEW VIDEOS

ETH Library presents Episode 3 - The next steps

ANYmal Planet - fresh waters

Super-Human Performance in Gran Turismo Sport Using Deep Reinforcement Learning

Raptor-inspired drone with morphing wing and tail

📖 SELECTED NCCR ROBOTICS PUBLICATIONS *

E. Ajanic, M. Feroskhan, S. Mintchev, F. Noca, D. Floreano, Bioinspired wing and tail morphing extends drone flight capabilities. Science Robotics, 5, eabc2897 (2020)

R. Dubé, A. Cramariuc, D. Dugas, H. Sommer, M. Dymczyk, J. Nieto, R. Siegwart, and C. Cadena. "SegMap: Segment-based mapping and localization using data-driven descriptors." The International Journal of Robotics Research 39, no. 2-3 (2020): 339-355.

T. Gargot, T. Asselborn, H. Pellerin, I. Zammouri, S.M. Anzalone, L. Casteran, W. Johal, P. Dillenbourg, D. Cohen and C. Jolly, "Acquisition of handwriting in children with and without dysgraphia: A computational approach," Plos One, 2020.

Georgarakis, A.M., Song, J., Wolf, P., Riener, R. and Xiloyannis, M., 2020. Control for gravity compensation in tendon-driven upper limb exosuits. In 2020 8th IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob) (pp. 340-345). IEEE.

Haufe, F.L., Wolf, P., Duarte, J.E., Riener, R. and Xiloyannis, M., 2020, November. wIncreasing exercise intensity during outside walking training with a wearable robotW. In 2020 8th IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob) (pp. 390-395). IEEE.

F.L. Haufe, K. Schmidt, J.E. Duarte. et al. "Activity-based training with the Myosuit: a safety and feasibility study across diverse gait disorders". *J NeuroEngineering Rehabil* 17, 135 (2020). https://doi.org/10.1186/s12984-020-00765-4

H. Khodr, S. Kianzad, W. Johal, A. Kothiyal, B. Bruno and P. Dillenbourg, "AlloHaptic: Robot-Mediated Haptic Collaboration for Learning Linear Functions*," 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Naples, Italy, 2020, pp. 27-34.

J. Lee, J. Hwangbo, L. Wellhausen, V. Koltun and M. Hutter, Learning quadrupedal locomotion over challenging terrain, Science Robotics, Vol. 5, Issue 47, eabc5986, 21 Oct 2020.

Missiroli, F., Lotti, N., Xiloyannis, M., Sloot, L. S., Riener, R. and Masia L.,2020. Relationship between Muscular Activity and Assistance Magnitude for a Myoelectric Model Based controlled Exosuit . Frontiers in Robotics and AI.

J. Nasir, U. Norman, B. Bruno and P. Dillenbourg, "When Positive Perception of the Robot Has No Effect on Learning," 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Naples, Italy, 2020, pp. 313-320.

I. Neto, W. Johal, M. Couto, H. Nicolau, A. Paiva and A. Guneysu, "Using tabletop robots to promote inclusive classroom experiences," Proceedings of the Interaction Design and Children Conference (IDC), 2020, pp. 281-292.

A. G. Özgür, B. Bruno, V. Taburet, A. Özgür and P. Dillenbourg, "Design of Dynamic Tangible Workspaces for Games: Application on Robot-Assisted Upper Limb Rehabilitation," 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Naples, Italy, 2020, pp. 172-178.

S. Shahmoradi, A. Kothiyal, J.K. Olsen, B. Bruno and P. Dillenbourg, "What Teachers Need for Orchestrating Robotic Classrooms,". In: Alario-Hoyos C., Rodríguez-Triana M., Scheffel M., Arnedillo-Sánchez I., Dennerlein S. (eds) Addressing Global Challenges and Quality Education. EC-TEL 2020. Lecture Notes in Computer Science, vol 12315. Springer, Cham.

F. Tschopp, M. Riner, M. Fehr, L. Bernreiter, F. Furrer, T. Novkovic, A. Pfrunder, C. Cadena, R. Siegwart, and J. Nieto. "VersaVIS—An Open Versatile Multi-Camera Visual-Inertial Sensor Suite." Sensors 20, no. 5 (2020): 1439

Z. Zhexenova, A. Amirova, M. Abdikarimova, K. Kudaibergenov, N. Baimakhan, B. Tleubayev, T. Asselborn, W. Johal, P. Dillenbourg, A. Cohenmiller and A. Sandygulova, "A Comparison of Social Robot to Tablet and Teacher in a New Script Learning Context," Frontiers in Robotics and AI, 2020, vol. 7, n. 99.

NCCR Robotics

robotics 🔴 Swiss National Centre of Competence in Research

The Swiss National Centre of Competence in Robotics (NCCR Robotics) is a federally funded programme bringing together robotics laboratories from EPFL, ETH Zurich, University of Zurich, IDSIA, UNIBE, EMPA, University of Basel to work on wearable, rescue and educational robots.

The National Centres of Competence in Research are a research instrument of the Swiss National Science Foundation.