robotics Swiss National Centre of Competence in Research

COMMUNITY NEWSLETTER

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Public Version

SAVE THE DATE: The Swiss Robotics Day 2022 will take place on 4-5 November at the Beaulieu Convention Center in Lausanne. **All details on the website** https://swissroboticsday.ch/**.**

LATEST NCCR NEWS

Swiss Drone Days

On 11-12 June 2022 the Swiss Drone Days took place near Zurich, with the world's first AI vs Human drone race. Throughout the event, over 1000 visitors watched races between the world's best drone pilots and the AI-powered drones from Scaramuzza's lab. The team successfully demonstrated that AI-powered drones are capable of outperforming even the world's best pilots: drones surpassed both Alex Vanover, world champion 2019 of Drone Racing League, and Thomas Bitmatta, world champion 2019 of the MultiGP International league. The NTN Innovation Booster Robotics also organised a conference and ideation workshop on drone technology during the Drone Days. Read more.

ICRA 2022

The IEEE International Conference on Robotics and Automation took place in Philadelphia from 23 to 27 May. Several NCCR members appeared in the programme, including Marco Hutter giving one of the keynote talks; Aude Billard participating in a workshop on collaborative robots; Davide Scaramuzza for a workshop on robotics in the wild; Alexander Alahi who co-organised a workshop on human motion prediction; Jamie Paik as co-organiser of a worskhop on Bio-inspired design, actuation and locomotion.

Hannover Messe

NCCR participated in the Hannover Messe, from 30 May to 2 June, where it shared a booth with Swiss start-ups Bota Systems and AICA. The NCCR booth was placed in the Swiss pavilion, and in the section "Digital Transformation" of the fair. The start-ups received valuable business leads and were able to exchange with the attendees about their products and services. Other spin-offs from NCCR Robotics exhibited their products and services, including Noonee with their chairless chair and ANYbotics with ANYmal. Attendees to the NCCR Robotics booth were also particularly interested in finding out about the educational aspects of the project. Read more.

ETH robotics innovation days

Registrations are open for the 2022 ETH Robotics Innovation Day, that will take place on 1 July at the Arch_Tec_Lab building (HIB), ETH Hönggerberg campus. In this forum the latest advancement in robotics will be showcased aiming to spark new applications and disrupting technologies developed in a close collaboration between academia and industry. Because of limited capacity, participants must register early on to secure a spot. Read more.

Article on safety of aerial vehicles

Siegwart's lab has a new article in IEEE Robotics and Automation Letters called "Power-based Safety Layer for Aerial Vehicles in Physical Interaction using Lyapunov Exponents". As the performance of autonomous systems increases, safety concerns arise, especially when operating in nonstructured environments. To deal with these concerns, the work presents a safety layer that detects and responds to unstable dynamics caused by external disturbances. The safety layer is implemented independently and on top of already present controllers, and limits power flow when the system's response would lead to instability. The proposed architecture is experimentally validated on an Omnidirectional Micro Aerial Vehicle (OMAV) both in free flight and interaction tasks. Read more.

Call for exhibitors at the Swiss Robotics Days

In this issue...

ROBOTICS WORLD

Top News

- A First Small Step Toward a Lego-Size Humanoid Robot
- Artificial skin gives robots sense of touch and beyond

External calls

- 2nd CFP DARS 2022: 16th International Symposium on Distributed Autonomous Robotic Systems
- ICRA 22 Workshop on Challenges in applying academic research to real-world robotics

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. We remind you that our spin-fund call is now closed.
nccr-robotics@epfl.ch

- Innosuisse training on business growth in advanced engineering. Modules in Lausanne and Zurich in October and November.

Equal Opportunities Corner

- **NCCR Robotics EO awards.**

We have open calls for the Award for Career Development, Award for Scientific Visibility, Women Keynote Speakers Support Programme.

- How effective are programmes to attract more girls to STEM in Switzerland?

An article in 24 Heures tries to answer the question (in French).

External positions

- Postdoctoral Researcher on Underwater Bio-Inspired Soft Robotics

To mark the ending of NCCR Robotics, this year's edition of the Swiss Robotics Day will exceptionally take place over two days on November 4 and 5, in the Center of Lausanne at the Beaulieu Convention Center. NCCR Robotics is launching a call for exhibitors, inviting all interested companies to reserve their booth now, by contacting nccr-robotics@epfl.ch. Read more.

How to compete with robots

Floreano's lab, in collaboration with a team of economists at the University of Lausanne, has published an article in Science robotics describing a method to assess the risk of automation for almost 1,000 jobs, and to suggest alternative occupations to shield workers from the risk of being replaced by robots. Read more.

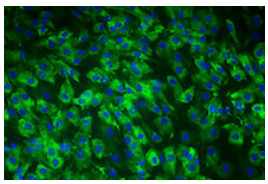
FIRST Global Challenge

From 13-16 October 2022, Geneva will host the FIRST Global Challenge, an olympics-style, international robotics competition that takes place in a different country each year. More than 180 countries will come together face-to-face in the spirit of global purpose, unity, and collaboration. NCCR participated in efforts to attract the competition to Geneva, and calls upon volunteers that would like to participate as referees or robot doctors. Read more.

Joint paper with NASA

Scaramuzza's lab has collaborated with NASA's Jet Propulsion Laboratory for an article on "Exploring Event Camera-based Odometry for Planetary Robots". The article introduces a visual-inertial odometry algorithm to allow the use of event cameras as sensors for vision-based exploration on future Mars helicopter missions. Code and datasets can be found here. Read the full article.

Article in Science Advances



A recent *Science Advances* publication from the Bar-Nur lab details how non-muscle cells convert into muscle stem cells and fibers using a protein called MyoD in concert with small molecule treatment. Utilizing integrative bulk and single-cell multiomics approaches, the team characterized the conversion process and generated cells. Their findings suggest that muscle stem cells and fibers produced via this approach capture in a more faithful manner skeletal muscle cell identity ex vivo, carrying implications for using these myogenic cells for regenerative medicine purposes, disease modeling and possibly biohybrid robots. Read more.

Living things exhibition

EPFL invited to explore the close links between the world of science and the world of animals through a 200 m2 exhibition at the BEA 2022 Fair in Bern, where a selection of research projects from the school's laboratories was presented. The exhibition included robot demonstrations, interactive animations, interviews with EPFL researchers, class visits, and workshops for families. The works of Jamie Paik, Auke Ijspeert and Dario Floreano were on display. Read more and see images.

NTN Innovation Booster Robotics matchmaking session

As part of the 'Future of Construction' symposium that takes place at ETH Zürich from June 21 to 23, the NTN Innovation Booster Robotics will be holding a match-making session on Thursday, 23 June. The NTN team will assist participants with being matched with other stakeholders of the conference, so that they can forge contacts and exchange ideas. Read more.

Career Development Awards

Two additional Career Development Awards have been granted this past quarter to PhD students based at ETH Zurich. Since the Award for Career Development was launched in Y10, we attributed 9 awards for over CHF 23,000, allowing several women researchers to attend conferences and summer schools, supported research visits to different labs to work on PhD and Master thesis or attend international competitions. The call will continue until October 2022, for activities running until 30 November. Read more.

Book on the ethics of robotics

The book "Les robots parmi nous" has been published by EPFL Press. It was supported by NCCR Robotics and Francesco Mondada coordinated its production. The project began after a survey on the EPFL robotics master two years ago, when the students noted that the second least developed skills was "Respect relevant legal guidelines and ethical codes for the profession". The NCCR Robotics Education Committee then decided to work with a specialist of ethical issues in robotics, Johan

· Post-Doctoral position in Deep-learning for urban search and rescue drone missions - IMT Atlantique, Brest, France

NCCR Robotics

Director
Prof. Dario Floreano (EPFL)

Co-director
Prof. Robert Riener (ETH Zurich)

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Rochel, already teaching on these issues at EPFL. Two years after, one of the results is a book on robotics ethics, targeting both robot designers and users, with the objective to help in the exploration of the complex ethical questions raised by these technologies. Read more.

Article on optimal quadrotor flight

The Scaramuzza lab has a new paper accepted in in IEEE Transactions on Robotics (T-RO), called "Model Predictive Contouring Control for Time-Optimal Quadrotor Flight". The article shows how the problem of flying through multiple waypoints in minimum time can now be solved in real-time. Read more.

1 million downloads for "Elements of Robotics"

The textbook on robotics written by Francesco Mondada and Moti Ben Ari, based on the experience of using the Thymio robot in schools, has reached 1 million downloads. The book has been the focus of many educational activities within NCCR Robotics over the last years. Read more and download.

Swiss Robotics Masters Award

We remind you that NCCR Robotics has established a Swiss Robotics Masters Award open to outstanding and highly motivated female students who wish to pursue a Master program with a strong robotics component in one of Switzerland's higher education institutions. Read more.

CONGRATULATIONS

IEEE RAL Best Paper Award

The paper "Autonomous Quadrotor Flight Despite Rotor Failure With Onboard Vision Sensors: Frames vs. Events" by Sihao Sun , Giovanni Cioffi, Coen de Visser, Davide Scaramuzza was selected for the IEEE Robotics and Automation Letters Best Paper Award. Read the paper.

NCCR ROBOTICS OPEN POSITIONS

Researcher in context recognition (SUPSI)

The University of Applied Sciences and Arts of Southern Switzerland (SUPSI) has opened a position at the Department of Innovative Technologies (DTI), located in the new USI-SUPSI campus in Lugano-Viganello (Campus Est), in particular at the Institute of Systems and Technologies for Sustainable Production (ISTePS), a full time (100%) position for Researcher in context recognition for robotic industrial applications. Contract start date on September 2022 or date to be agreed. Read more.

Swiss Postdoctoral fellowships

The Floreano lab invites interested applicants to consider the SNSF funding scheme for postdoctoral fellowship in order to apply for a position in the lab. This funding scheme will offer applicants with a PhD and no more than eight years of postdoctoral experience a position at a non-commercial research institution in Switzerland for 12-24 months. Read more.

PRESS COVERAGE

Switzerland: the laboratory of tomorrow's robots

Swissinfo has published a long dossier on the Swiss robotics ecosystem, focussed in particular on NCCR Robotics' role in advancing research on robotics over 12 years, and including links to past stories and interviews to our members. Read more.

Feature article from the UK Institution of Mechanical Engineering

A news article on the website of the British institution covers Scaramuzza's work on drones flying in unknwown environments. Read more.

Floreano on delivery drones

NCCR Robotics Director was interviewed by Le Temps about the recent decision by La Poste to stop its drone-delivery project after 5 years. Read more.

NCCR Robotics in IEEE's Video Friday

The video about NCCR Robotics realised by RoboHub as part of their coverage of the 2021 Swiss Robotics Day was feature in IEEE Spectrum's weekly collection of the best videos on robotics. Watch.

EPFL Podcast

Auke Ijspeert was interviewed for the new EPFL podcast "Sur les traces du vivant", talking about bio-inspired robotics. Listen to the episode (in French).

Robots and jobs

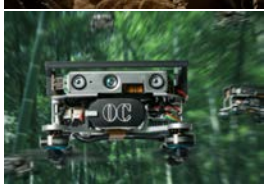
The *Science Robotics* publication by Floreano's lab, with Rafale Lalive's group at UNIL, drew considerable media attention, with articles in the Daily Mail, Advanced Science News, Blick, MSN and more

Inside DARPA's Subterranean Challenge

IEEE Spectrum has published a long, in-depth story about last years' SubT Challenge, where the Cerberus team (including Hutter's and Siegwart's labs and Flyability) won the final competition. Read more.

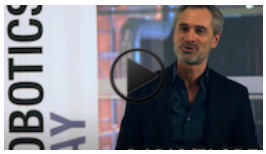
Drone swarms on RTS

Enrica Soria, from Floreano's lab, has appeared on RTS commenting the recent result by a Chinese research team, that for the first time flew a drone swarm in an unknown environment based only on onboard sensors. Listen to the episode.



NEW VIDEOS

NCCR Robotics at the Swiss Robotics Day 2021 - RoboHub



Healthcare robotics at the SRD 2021 - RoboHub

Mobile robotics at the SRD 2021 - RoboHub

Educational robotics at the SRD 2021 - RoboHub

SELECTED NCCR ROBOTICS PUBLICATIONS *

E. Cuniato, Lawrance, N. Robert Jon, Tognon, M., and Siegwart, R., “Power-based Safety Layer for Aerial Vehicles in Physical Interaction using Lyapunov Exponents”, IEEE Robotics and Automation Letters (2022).

J. Hidalgo-Carrió, G.Gallego, D. Scaramuzza, Event-aided Direct Sparse Odometry
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2022.

M. Pantic, C. Cadena, R. Siegwart, and L. Ott. "Sampling-free obstacle gradients and reactive planning in Neural Radiance Fields" Motion Planning with Implicit Neural Representations of Geometry Full-Day Workshop, ICRA 2022.

A. Romero, S. Sun, P. Foehn, D. Scaramuzza, Model Predictive Contouring Control for Time-Optimal Quadrotor Flight, IEEE Transactions on Robotics, 2022

S. Schaefer*, D. Gehrig*, D. Scaramuzza, AEGNN: Asynchronous Event-based Graph Neural Networks, IEEE Conference of Computer Vision and Pattern Recognition (CVPR), 2022, New

Orleans, USA.

S. Tulyakov, A. Bochicchio, D. Gehrig, S. Georgoulis, Y. Li, D. Scaramuzza. Time Lens++: Event-based Frame Interpolation with Parametric Non-linear Flow and Multi-scale Fusion, IEEE Conference of Computer Vision and Pattern Recognition (CVPR), 2022.

Mathias Gehrig, Manasi Muglikar, Davide Scaramuzza, Dense Continuous-Time Optical Flow from Events and Frames, arXiv, 2022.

M. Helmberger, K. Morin, N. Kumar, D. Wang, Y. Yue, G. Cioffi, D. Scaramuzza, The Hilti SLAM Challenge Dataset, Arxiv, 2022

J. Hidalgo-Carrió, G.Gallego, D. Scaramuzza, Event-aided Direct Sparse Odometry. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2022.

F. Mahlknecht, D. Gehrig, J. Nash, F. M. Rockenbauer, B. Morrell, J. Delaune and D. Scaramuzza, Exploring Event Camera-based Odometry for Planetary Robots, arxiv, 2022

N. Messikommer*, S. Georgoulis*, D. Gehrig, S. Tulyakov, J. Erbach, A. Bochicchio, Y. Li, D. Scaramuzza .Multi-Bracket High Dynamic Range Imaging with Event Cameras, IEEE Conference on Computer Vision and Pattern Recognition Workshop (CVPRW), New Orleans, 2022.

R. Penicka, D. Scaramuzza, Minimum-Time Quadrotor Waypoint Flight in Cluttered Environments, Robotics and Automation Letters (RAL), 2022

C. Pfeiffer, S. Wengeler, A. Loquercio, D. Scaramuzza. Visual Attention Prediction Improves Performance of Autonomous Drone Racing Agents. PLOS ONE, 2022

Angel Romero, Robert Penicka, Davide Scaramuzza, Time-optimal Online Replanning for Agile Quadrotor Flight. arXiv, 2022.

S. Schaefer*, D. Gehrig*, D. Scaramuzza, AEGNN: Asynchronous Event-based Graph Neural Networks. IEEE Conference of Computer Vision and Pattern Recognition (CVPR), 2022, New Orleans, USA.

Y. Song, D. Scaramuzza, Policy Search for Model Predictive Control with Application for Agile Drone Flight, IEEE Transaction on Robotics (T-RO), 2022.

Z. Sun*, N. Messikommer*, D. Gehrig, D. Scaramuzza, ESS: Learning Event-based Semantic Segmentation from Still Images, arXiv, 2022.

S. Tulyakov, A. Bochicchio, D. Gehrig, S. Georgoulis, Y. Li, D. Scaramuzza, Time Lens++: Event-based Frame Interpolation with Parametric Non-linear Flow and Multi-scale Fusion, IEEE Conference of Computer Vision and Pattern Recognition (CVPR), 2022, New Orleans, USA.

* Selected publications include those that have been notified to the editor. All members are kindly encouraged to inform the management team of new publications. Read all publications.