Report from Aerostream Summer School 2023

Date: 3.7.2023 – 6.7.2023

Number of participants: 53 (42 on site, 11 online), 8 lecturers

Web & Program: https://fly4future.com/aerostream-summer-school-2023/

Location: Czech Technical University in Prague (CTU)

This event is co-financed in the scope of the AeroSTREAM project that has received funding from the European Union's Horizon Europe Framework Programme under grant agreement No. 101071270.

Last year, very shortly after the initiation of the project AeroSTREAM, Fly4Future s.r.o. organized a first edition of the AeroSTREAM Summer School. This year again brought together a great team of students and academic researchers to gather in this vibrant learning environment and to share their knowledge and experience during the AeroSTREAM Summer School 2023. Same as last year the summer school was organized in cooperation with the CTU and was held on its facilities giving the opportunity to see the technical background of MRS (Multi Robot Systems) group (led by Martin Saska).

The goal of this event was to provide AeroSTREAM members with the knowledge, ideas, and experience of the best experts in the field of Multi-Robot Systems in a comprehensive and effective way. This year eight European top robotic researchers from the academic field accepted our invitation and shared their scientific insights with us.

The main focus of the second edition of the AeroSTREAM Summer School was on various robotic topics as motion planning among decision-making agents, aerial swarms environment and multi-sensor fusion for localization and navigation, etc. Beside the general program of the summer school there was time specially dedicated to AeroSTREAM activities, e.g. brainstorming on Aerostream research activities or seminar on applications being solved within the AeroSTREAM project.

Besides lectures there were two blocks with short presentations of students where anyone from the participants could introduce their work and have the opportunity to get feedback from the audience. Next, there was also a dedicated time for the lab tour guided by MRS students where all participants could see MRS office and laboratory facilities with equipment, posters with MRS achievements, showcase of MRS and CTU drones with explanation of special features and applications of those drones and introduction to the work of the F4F company and MRS group.
Following the lectures there were computer practicals where attendants got the opportunity to implement learned methodology into a fully functional robotic system. CTU and F4F employees were there ready to help and consult.

Same as last year the event was organized in a hybrid way, combining virtual and physical attendance. Anyone from the project members could join virtually not only as a passive listener but also actively participate using a Slack channel. Online students were able to participate more interactively by directly asking during lectures and presenting their current work in the student presentation section to on-site participants which supported discussion and future cooperation after the event.

During some of the lectures students got an opportunity to try out different parameterizations and settings of the simulation environment according to the presented methodology to enhance the presented topic into more hands-on exercise.

On each day of the Summer School there was enough time dedicated to networking so anyone had a chance to speak with the lecturers personally. Moreover an evening social program was organized to give participants the chance to both relax after a tough day of lectures and to network among other participants and lecturers. A variety of events took place, including a tour of historic Prague, welcome party, Czech pubs tour, and a banquet with a social program.

Either way Summer school provided an enriching opportunity for individuals of all ages to engage in a wide range of educational experiences. Whether students seeking to broaden their knowledge or professionals aiming to enhance their expertise, the summer school became a hub for learning, personal growth, and networking. In this setting, participants had the unique opportunity to develop new contacts or strengthen the “old ones”.

Program

Monday 3.7.2023

- 08:00-08:45 – Registration (for later coming possible during the day)
- 09:00-09:30 – **Martin Saska** – welcome and organizational details
- 09:30-10:30 – **Zdeněk Hurák** – Distributed control: applications in vehicular platooning and (micro-)manipulation
- 10:30-11:00 – Coffee Break
- 11:00-12:30 – **Martin Saska** – Research of groups of aerial robots at CTU in Prague
- 12:30-13:30 – Lunch
- 13:30-15:00 – **Tomáš Báča** – Introduction into MRS system in ROS
- 15:00-16:00 - **Filip Novák/Parakh M. Gupta/Tomáš Báča** - Practical seminar tasks introduction
- 16:00-16:30 – Coffee Break

- 16:30-17:00 - **Jan Bednář/Daniel Heřt** - Drone Platform Overview
- 17:00-19:00 - Workshop (Practicals in group)
- 19:00-21:00 - Social program: Welcome drink

Tuesday 4.7.2023

- 08:45-09:00 - Registration (for later coming)
- 09:00-10:30 - **Javier Alonso Mora** - Motion Planning among Decision-Making Agents: modeling uncertainty and interaction
- 10:30-11:00 - Coffee break
- 11:00-12:30 - **Stephan Weiss** - On Estimator Consistency: From Multi-Sensor Fusion to Collaborative State Estimation
- 12:30-13:30 - Lunch
- 13:30-15:00 - Practical in PC lab (simulations in Gazebo)
- 15:00-16:00 - **Dario Floreano** - Aerial Swarms that Interact with the Environment, Robots, and Humans (Part I)
- 16:00-16:30 - Coffee break
- 16:30-17:30 - **Dario Floreano** - Aerial Swarms that Interact with the Environment, Robots, and Humans (Part II)
- 17:30-18:15 - Short presentations of students (Part I)
- 18:30-20:00 - Guided tour in Prague's Old Town

Wednesday 5.7.2023

- 08:45-09:00 - Registration (for later coming)

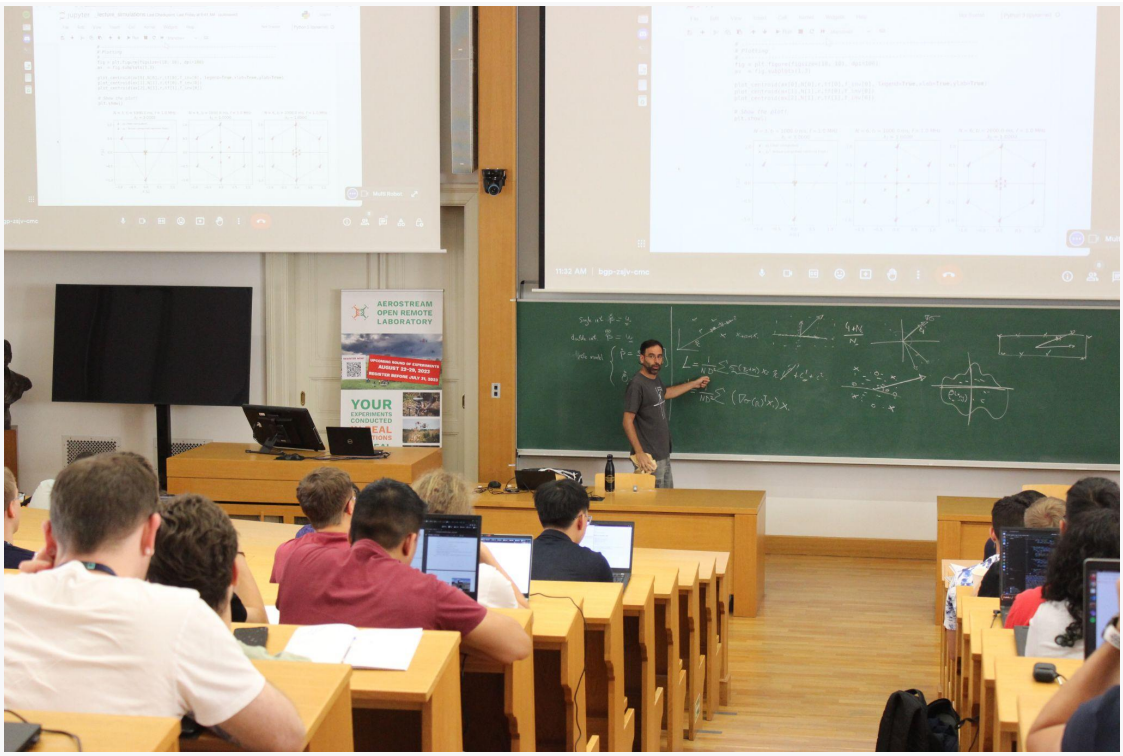
- 09:00-10:30 - **Hector García de Marina** - Resilient source seeking with robot swarms (Part I)
- 10:30-11:00 - Coffee break
- 11:00-12:15 - **Hector García de Marina** - Resilient source seeking with robot swarms (Part II)
- 12:15-13:15 - Lunch
- 13:15-15:15 - Practical in PC lab (simulations in Gazebo)
- 15:15-15:45 - Coffee break
- 15:45-18:00 - Short presentations of students (Part II)
- 19:00-22:00 - Banquet

Thursday 6.7.2023

- 08:45-09:00 - Registration (for later coming)
- 09:00-10:30 - **Eduardo Montijano** - Perception and Control of Non-Cooperative Agents with Teams of Robots
- 10:30-11:00 - Coffee break
- 11:00-12:30 - **Andreagiovanni Reina** - Collective decision-making in robot swarms
- 12:30-13:30 - Lunch
- 13:30-16:30 - Practical in PC lab (simulations in Gazebo) + Lab Tour

Martin Saska´s welcome and initial lecture.

Dario Floreano´s lecture.



Héctor García de Marina's lecture with illustrative demonstration.

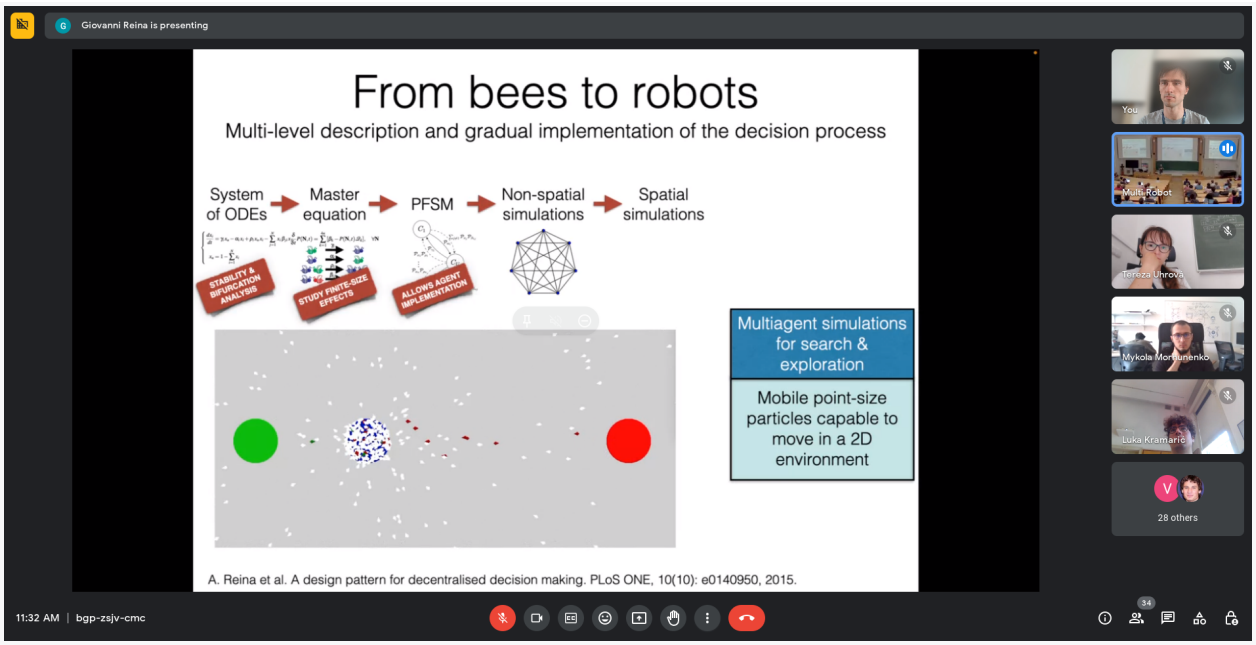
Board of speakers on a guided tour in Prague's Old Town.

Lab tour and showcase of the F4F and CTU drones.

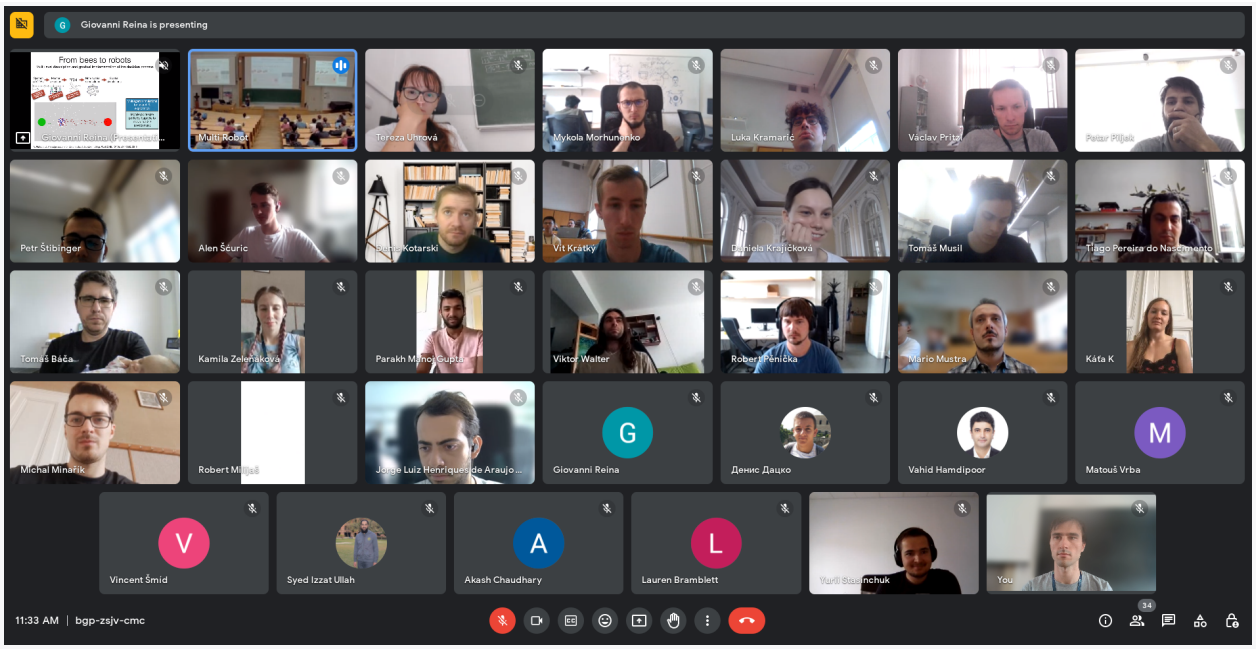
Showcase of the F4F and CTU drones and poster wall.

Workshops focused on specific topics.

Registration for the summer school.



Online transmission of the summer school.



Online participants joining the summer school virtually.

Board of speakers during the evening social program.

After-lecture leisure time and networking.

Networking during snacks and coffee breaks.

Evening social program - banquet.