

Robotics Club

University of Patras

UNIVERSITY OF PATRAS

ROBOTICS CLUB



The Robotics Club

- Student team at the **University of Patras** with the goal of giving students the opportunity to have **hands-on experience** with **robotics** during their studies.
- Supported by the Robotics Research Group
- Main activity: design and construction of small to medium scale robots. Completely original designs in every field (electronics, mechanical design, programming).



Robotics **Club**
University of Patras

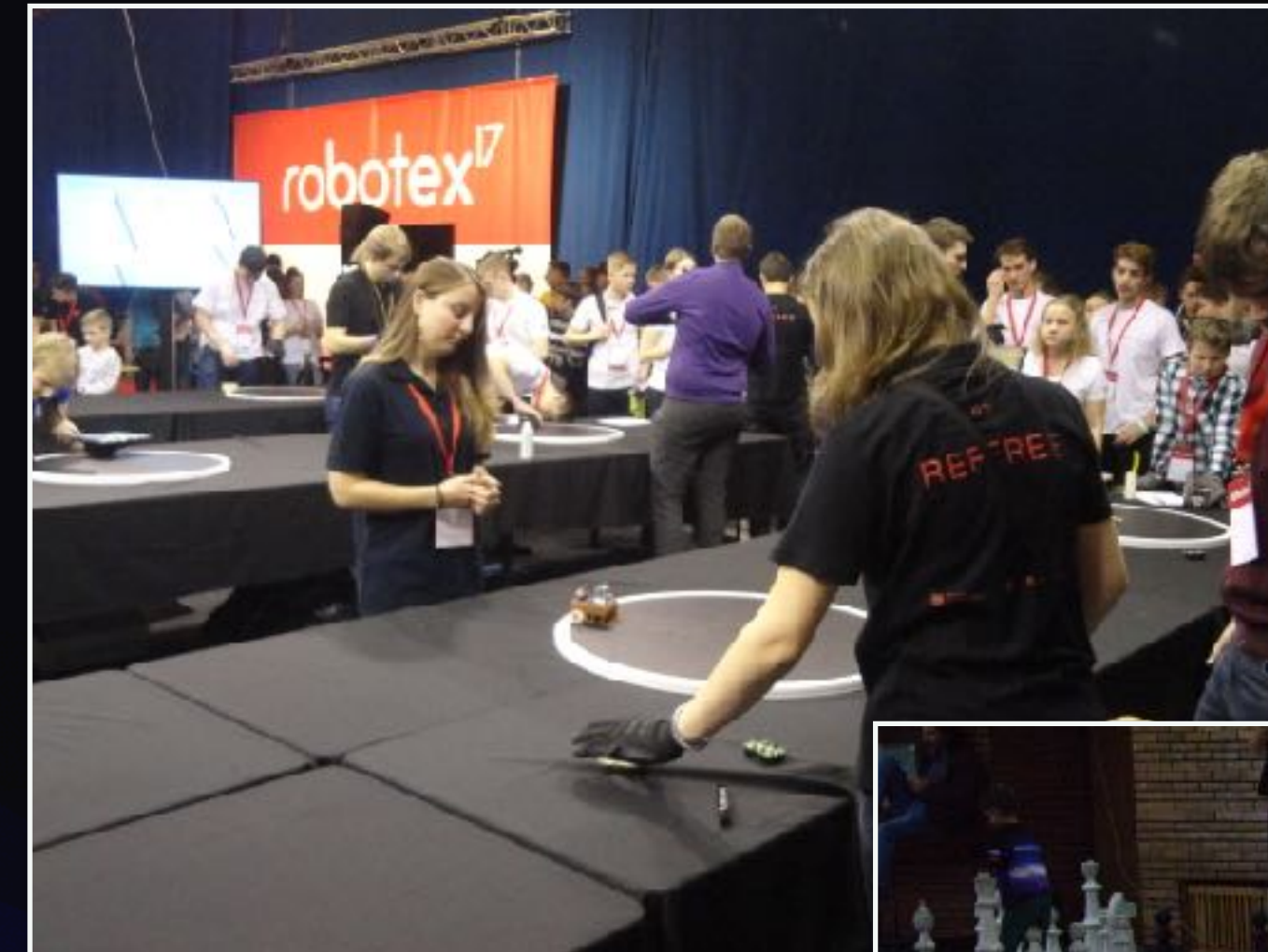
Team Members

- Mainly students from School of Engineering of the University of Patras
 - Electrical and Computer Engineering
 - Computer Engineering and Informatics
 - Mechanical Engineering and Aeronautics Department



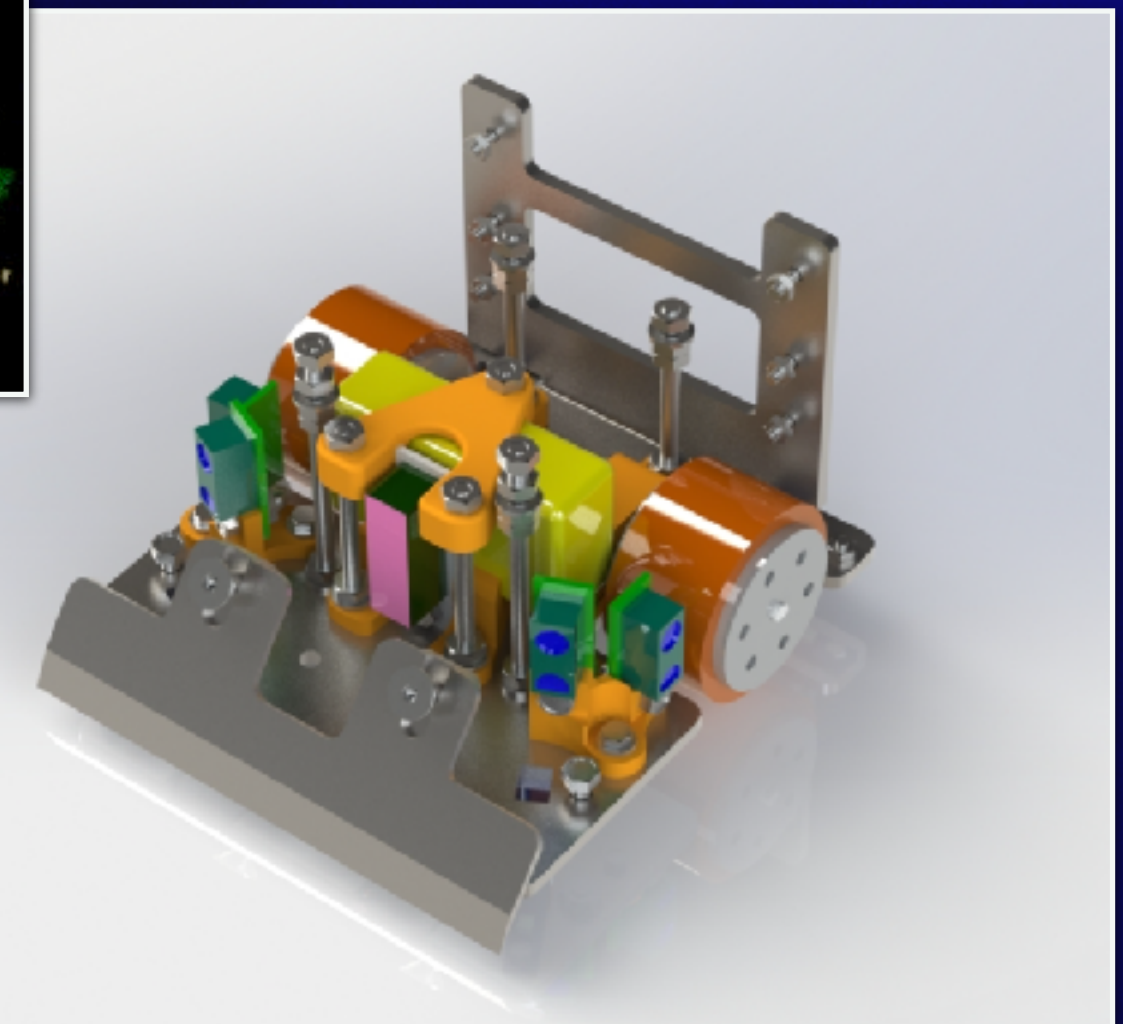
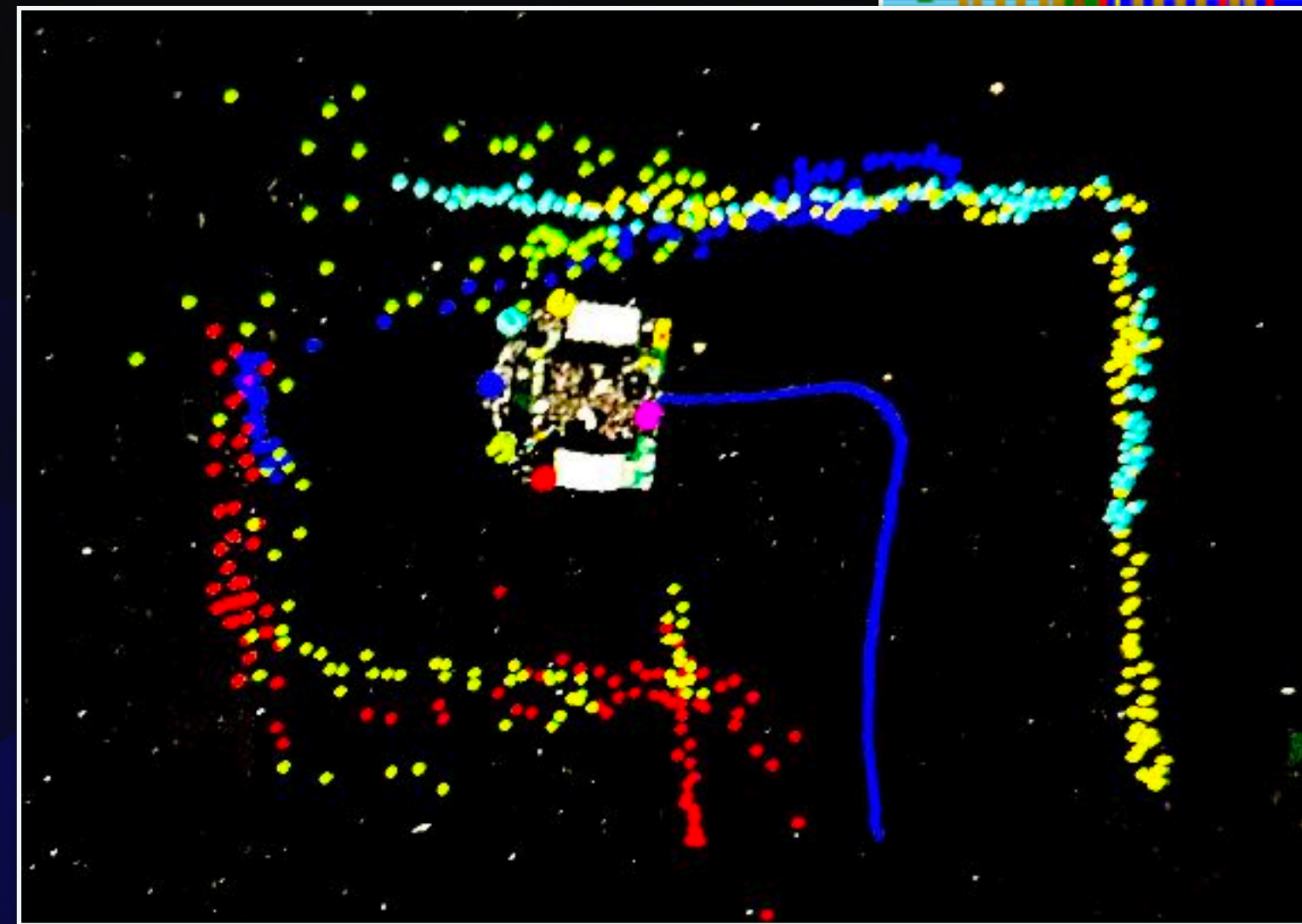
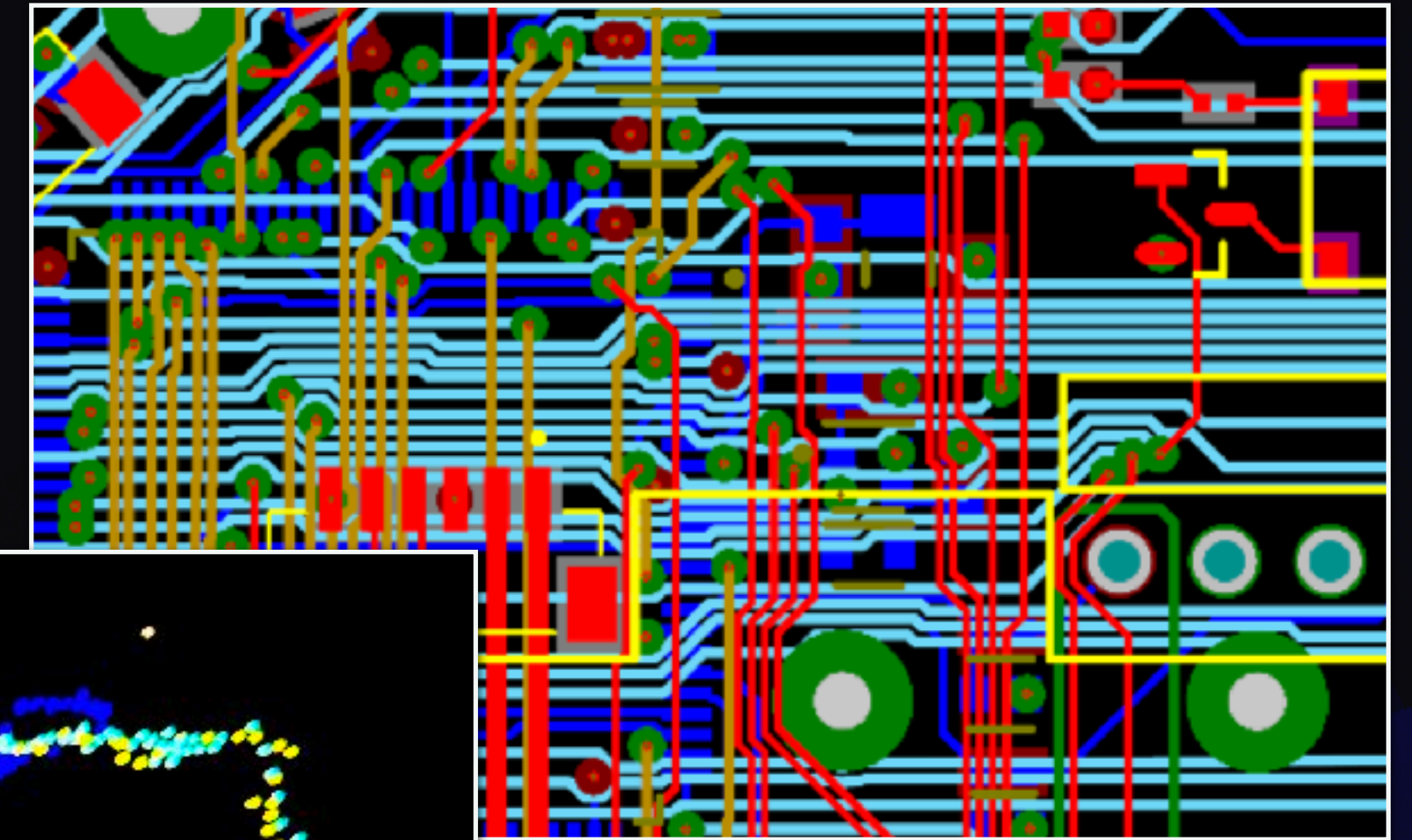
Goals/ Motives

- Participation in international robotics and design competitions.
- Creation of a comprehensive design and testing ecosystem to support the club's activities and projects.
- Educational work for its members and interested parties in the form of workshops and real world projects.



Main Interests

- Path Planning
- Motion Planning
- Electronics and PCB Design
- Computer Vision
- Mechanical Design
- Simulation



Outcomes for the Members

- Specialized knowledge in the field of **robotics** and **control**.
- **Practical application** of university knowledge.
- Work in a multi person environment consisting of **various specialties** and **collaboration** between subgroups. A fairly good understanding of the environment and working methods in industry.
- **Transferable skills** to any other technical or non-technical field.
- Hands-on experience and undertaking **real tasks from day one**.



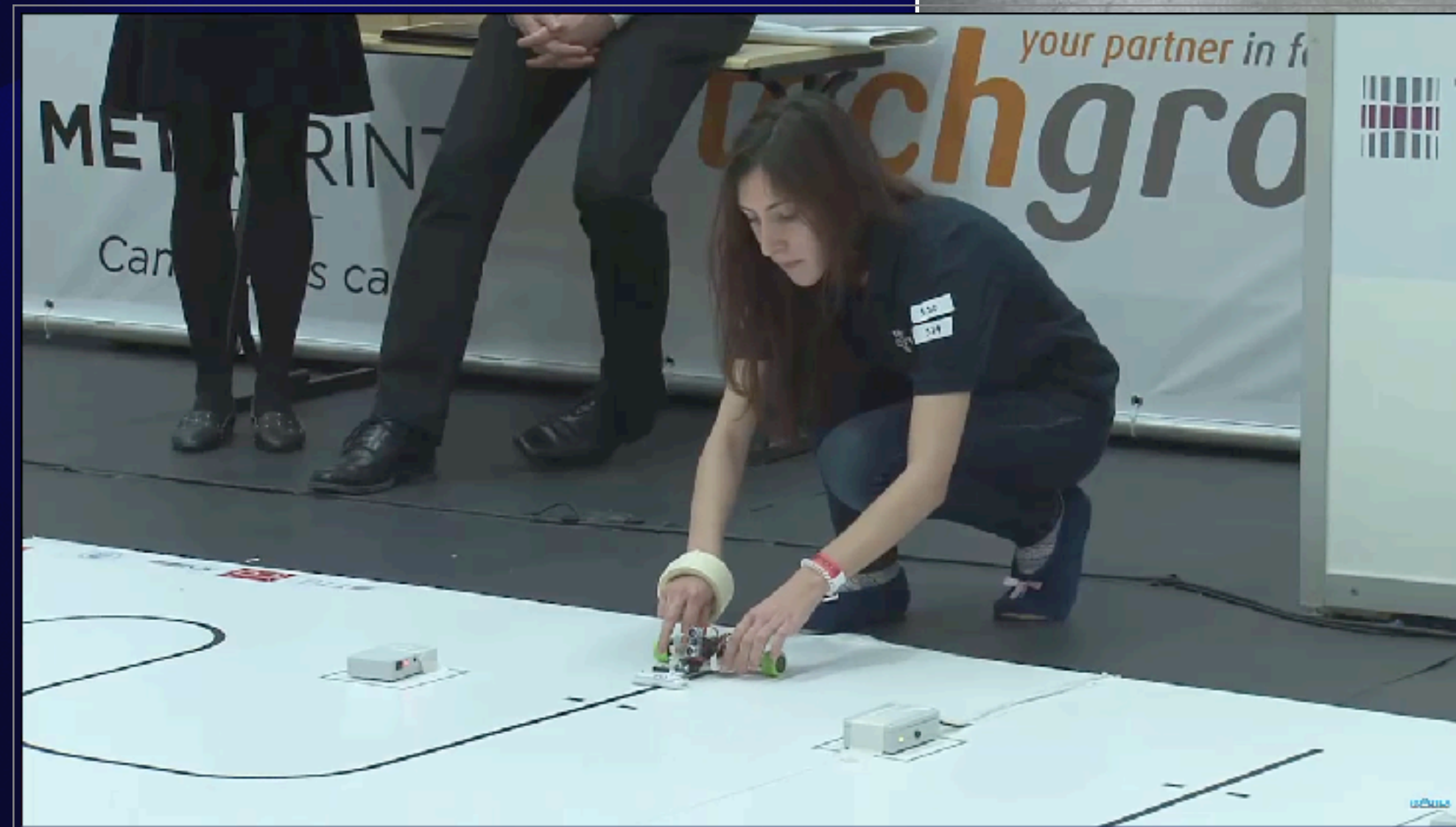
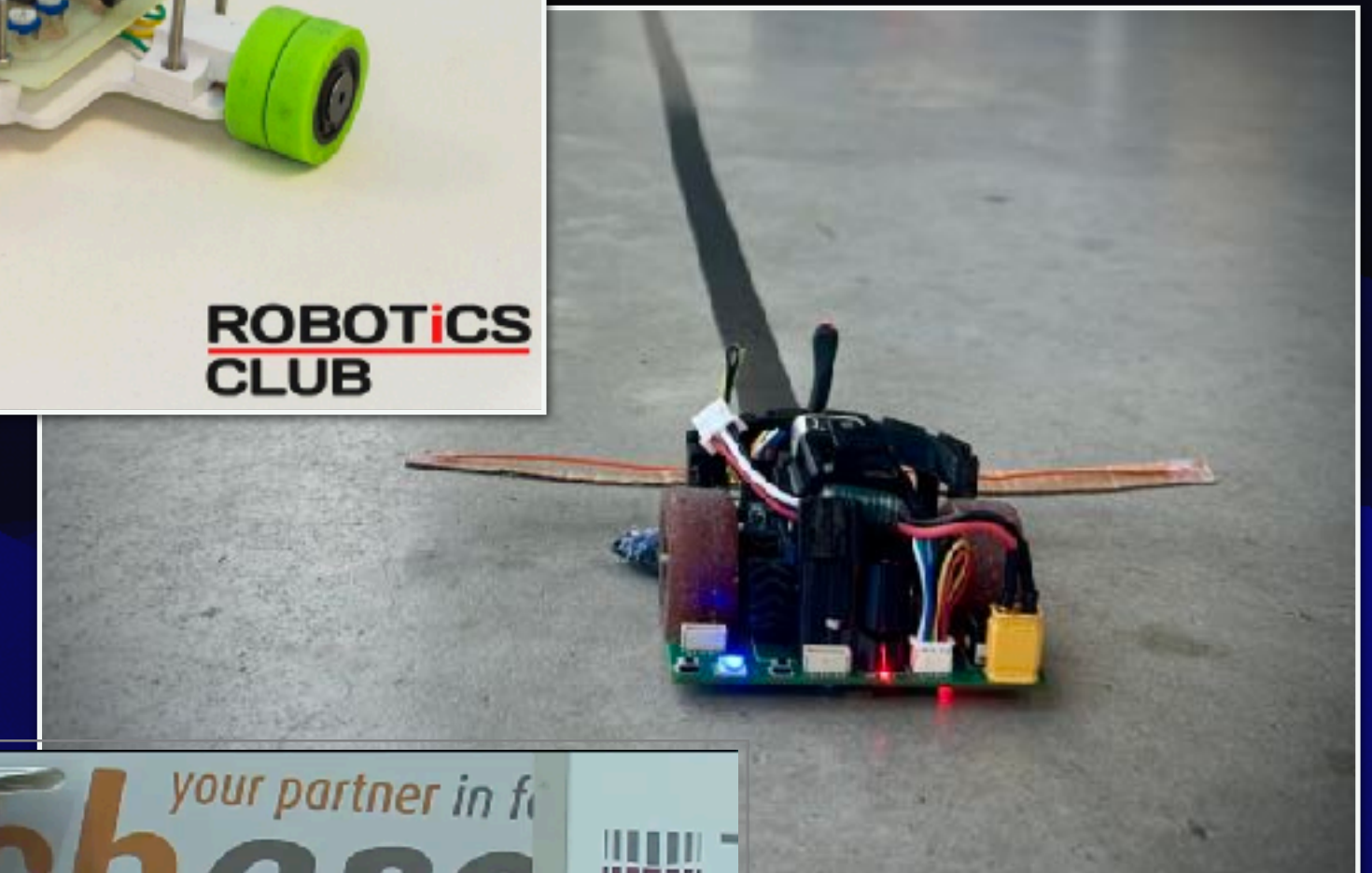
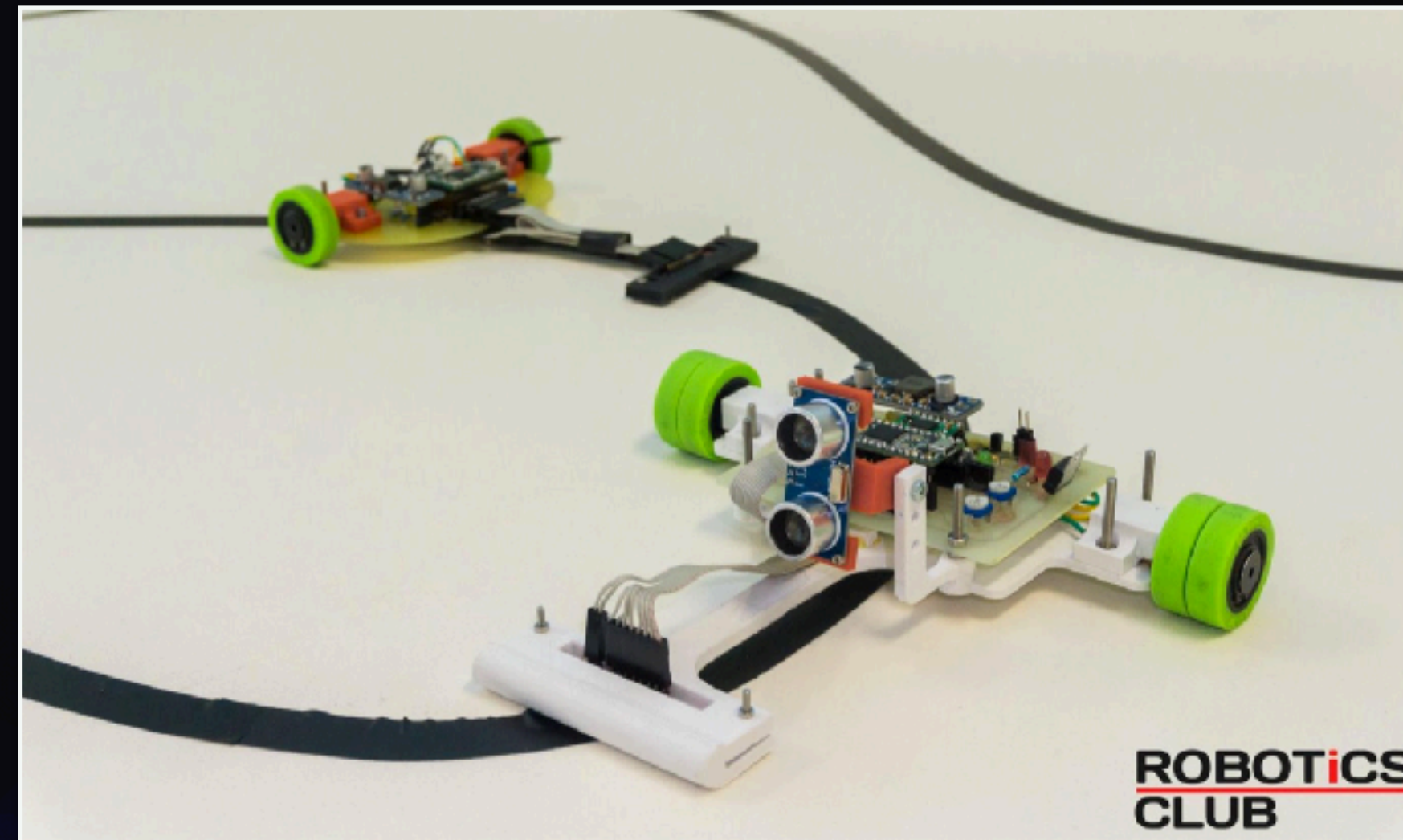


Competition Categories

Competition Categories

Line Following

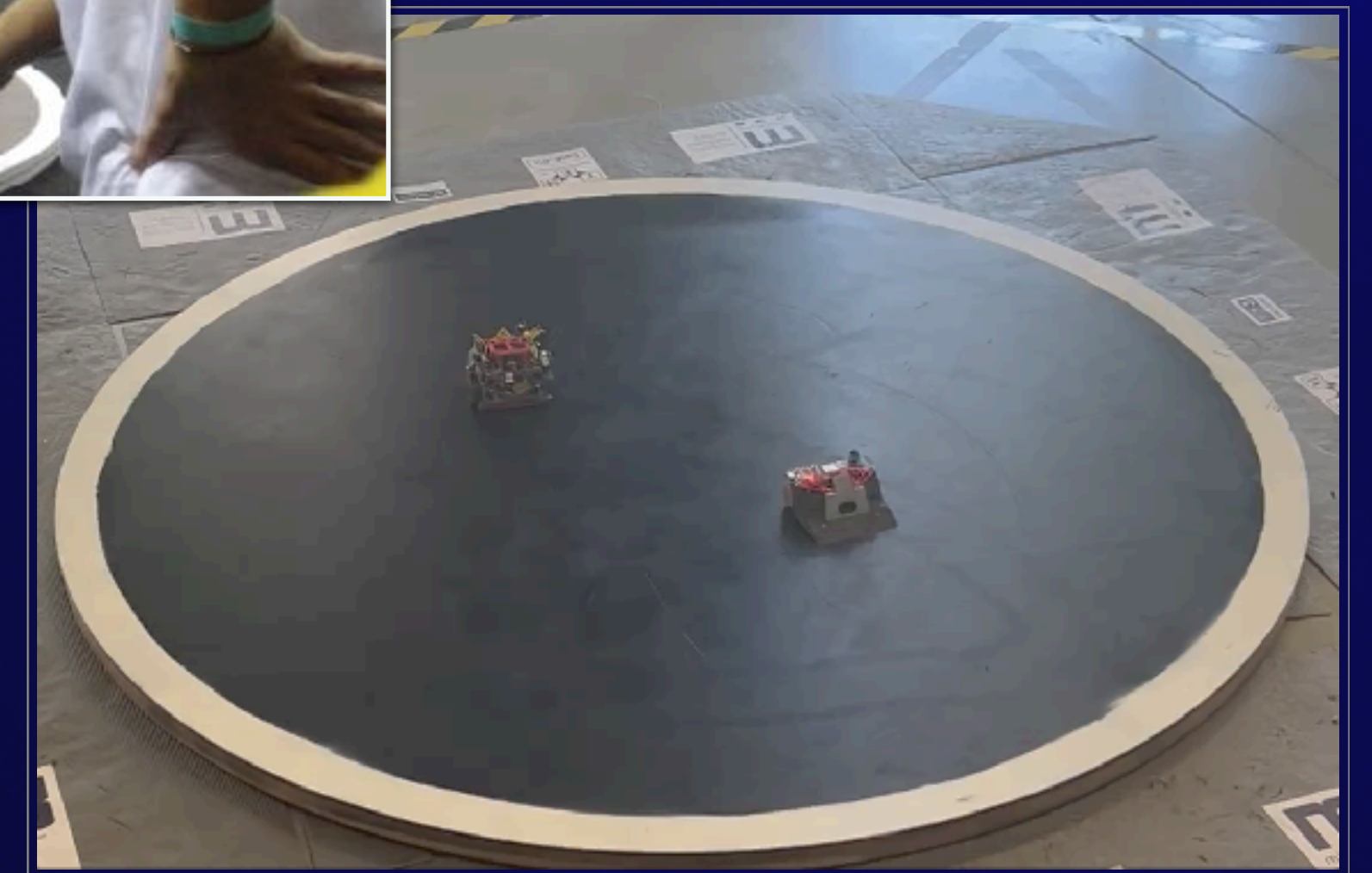
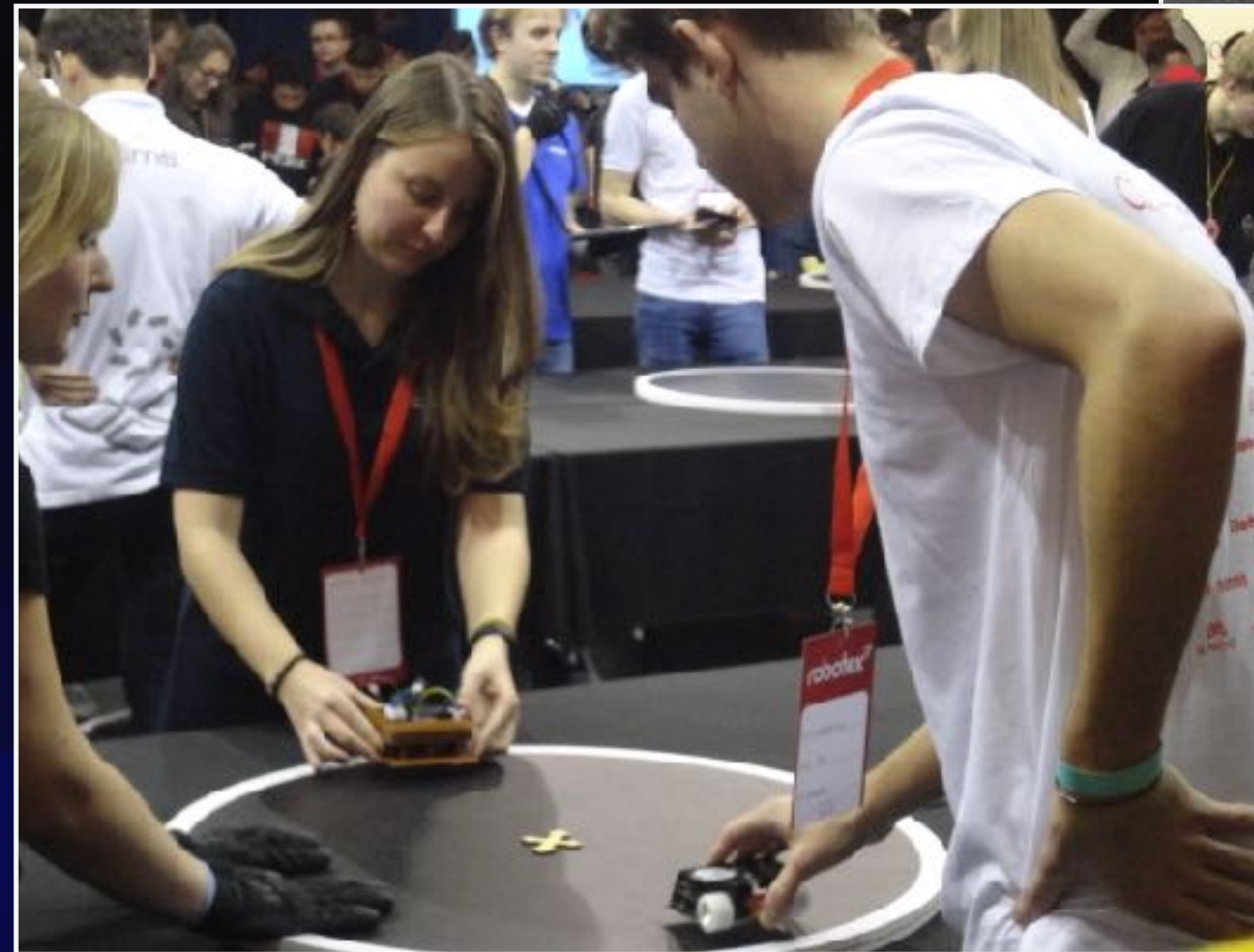
- The robot's goal is to **complete a course as quickly as possible**.
- The course is defined by a **black line** on the ground. It may contain **complex obstacles or special features** (Line following enhanced).
- Cooperation of multiple subsystems to achieve **maximum speed** (downforce systems, wheel control, position control, etc.).



Competition Categories

Sumo

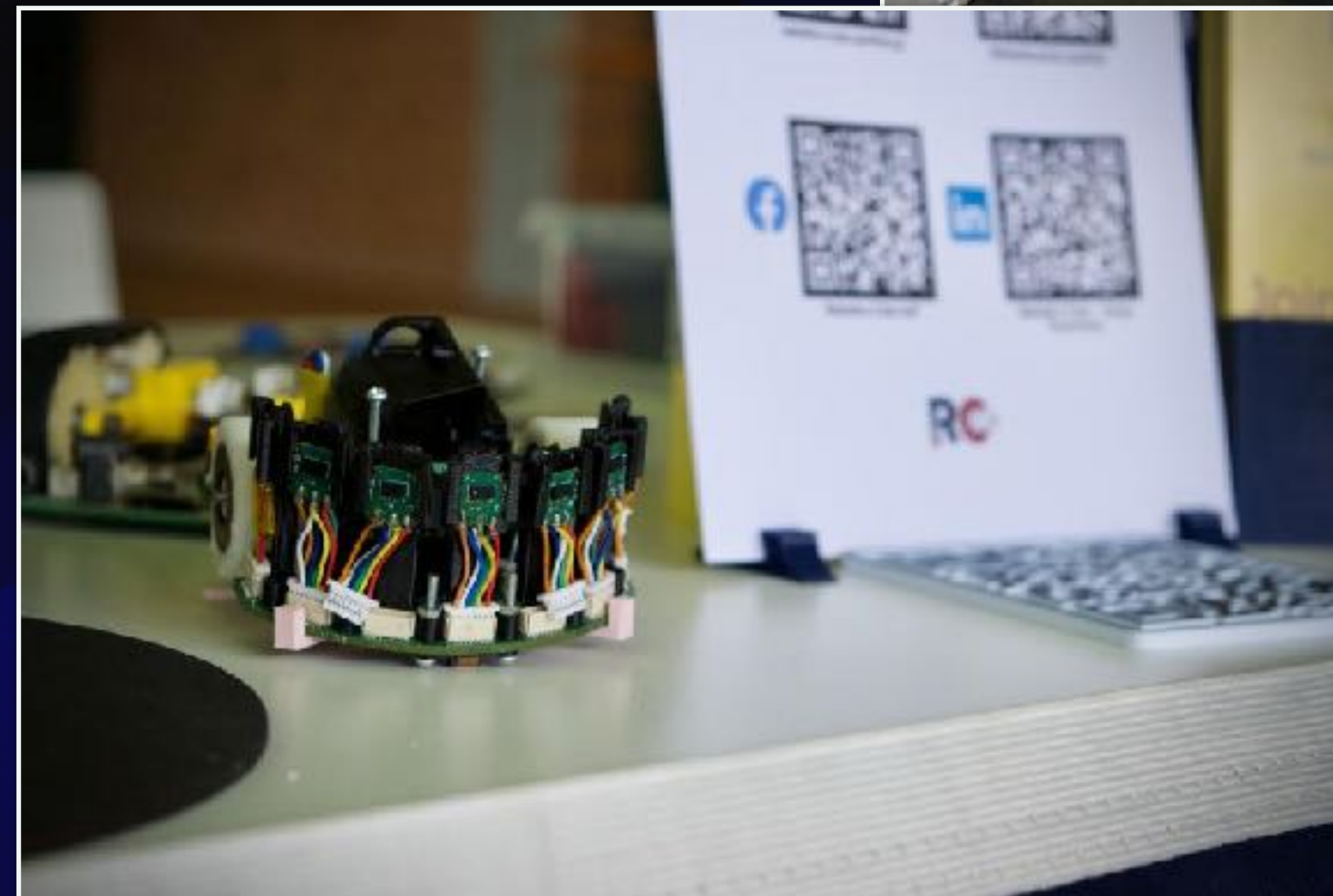
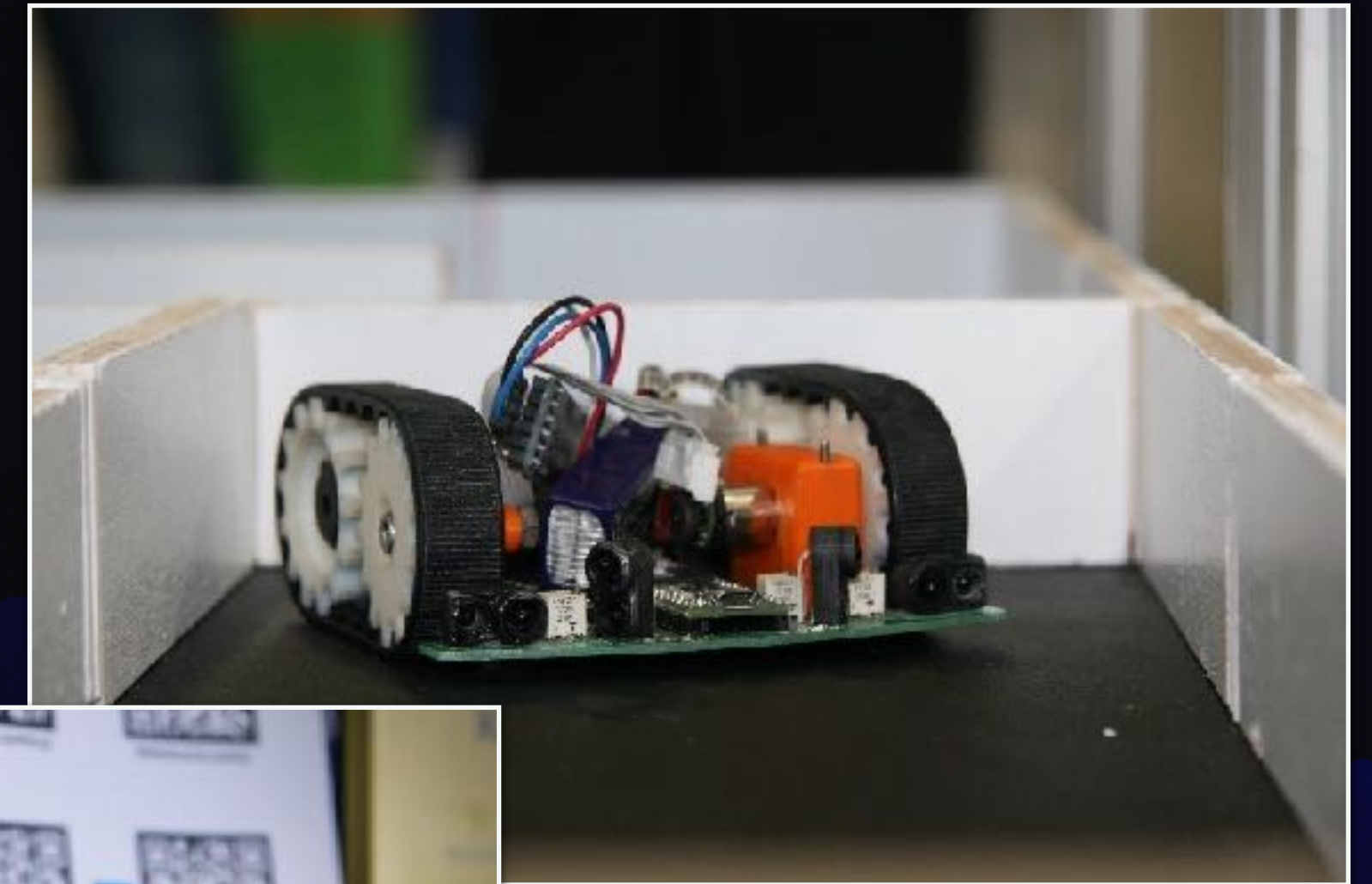
- Two opposing robots battle each other with the aim of **knocking the other off the track**.
- Various sizes and weights, from tiny to large robots.
- Use of **algorithms** to locate the enemy and attack it effectively.
- Fast **control**, effective **detection and tracking** systems, and **optimal mechanical design** are essential.



Competition Categories

Maze

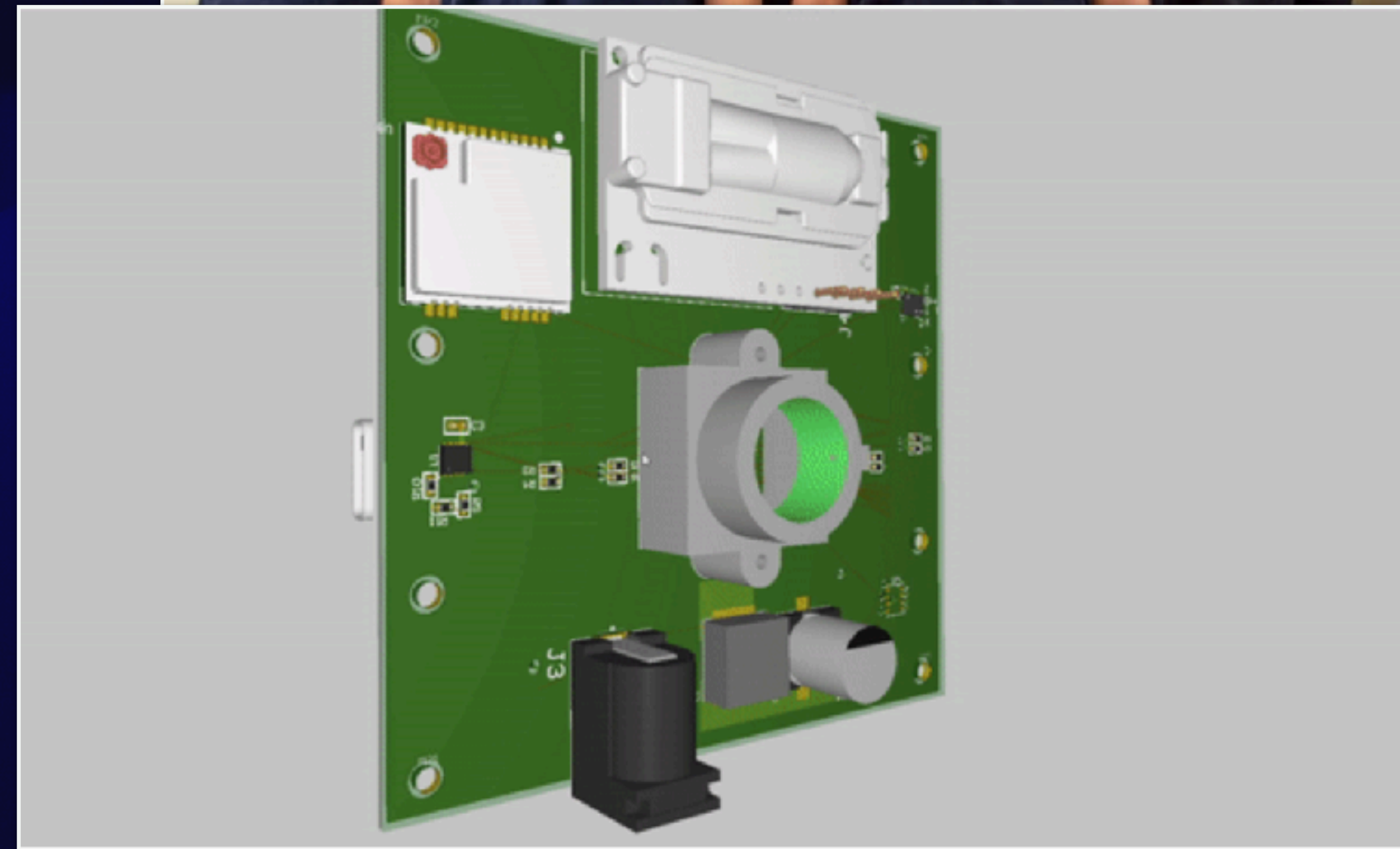
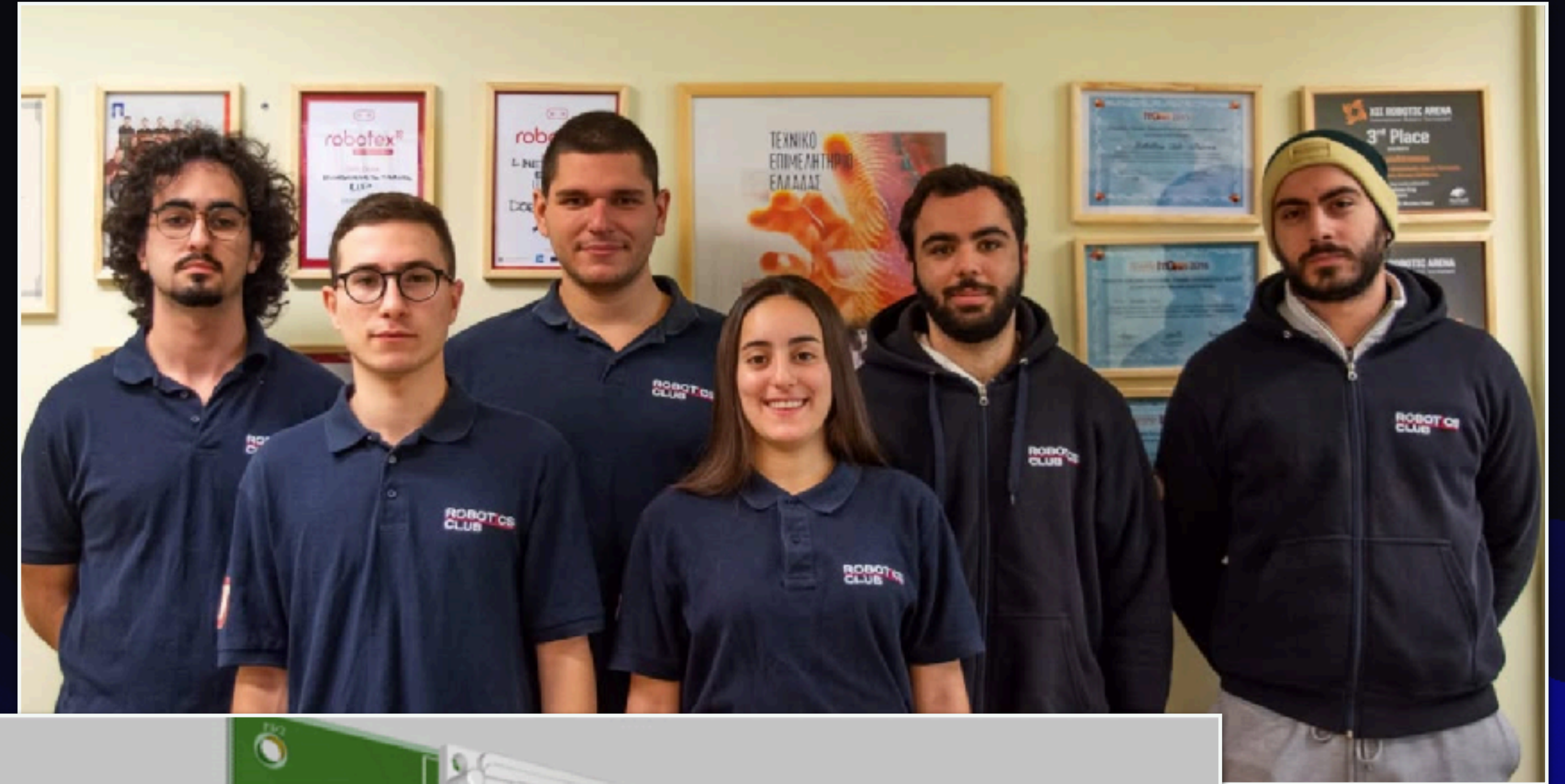
- An autonomous robot undertakes the **exploration/mapping** and then the **rapid resolution** of an unknown maze.
- Applications of path finding, motion planning, and control algorithms.
- At a competitive level, these robots require effective optimization at all levels.



Competition Categories

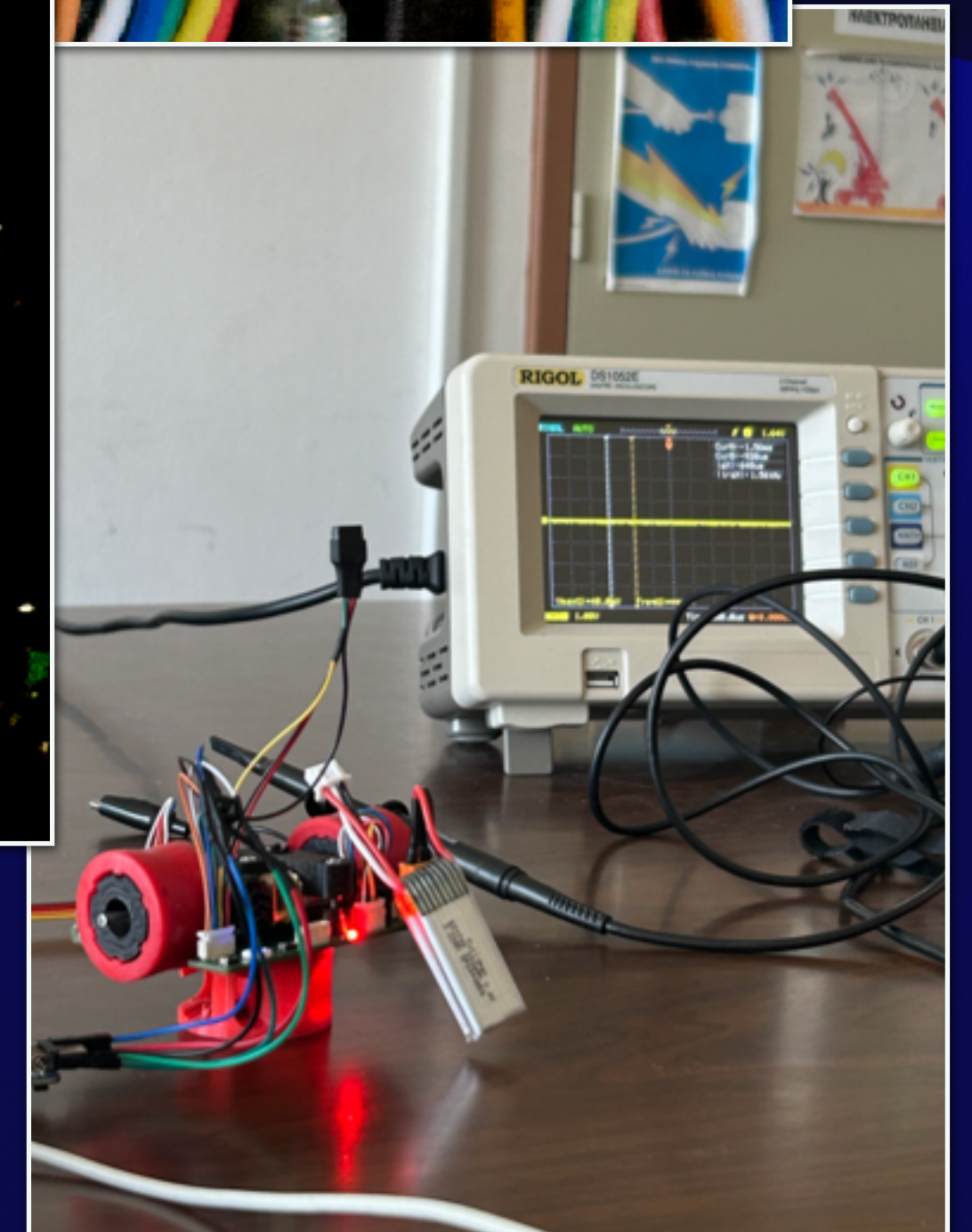
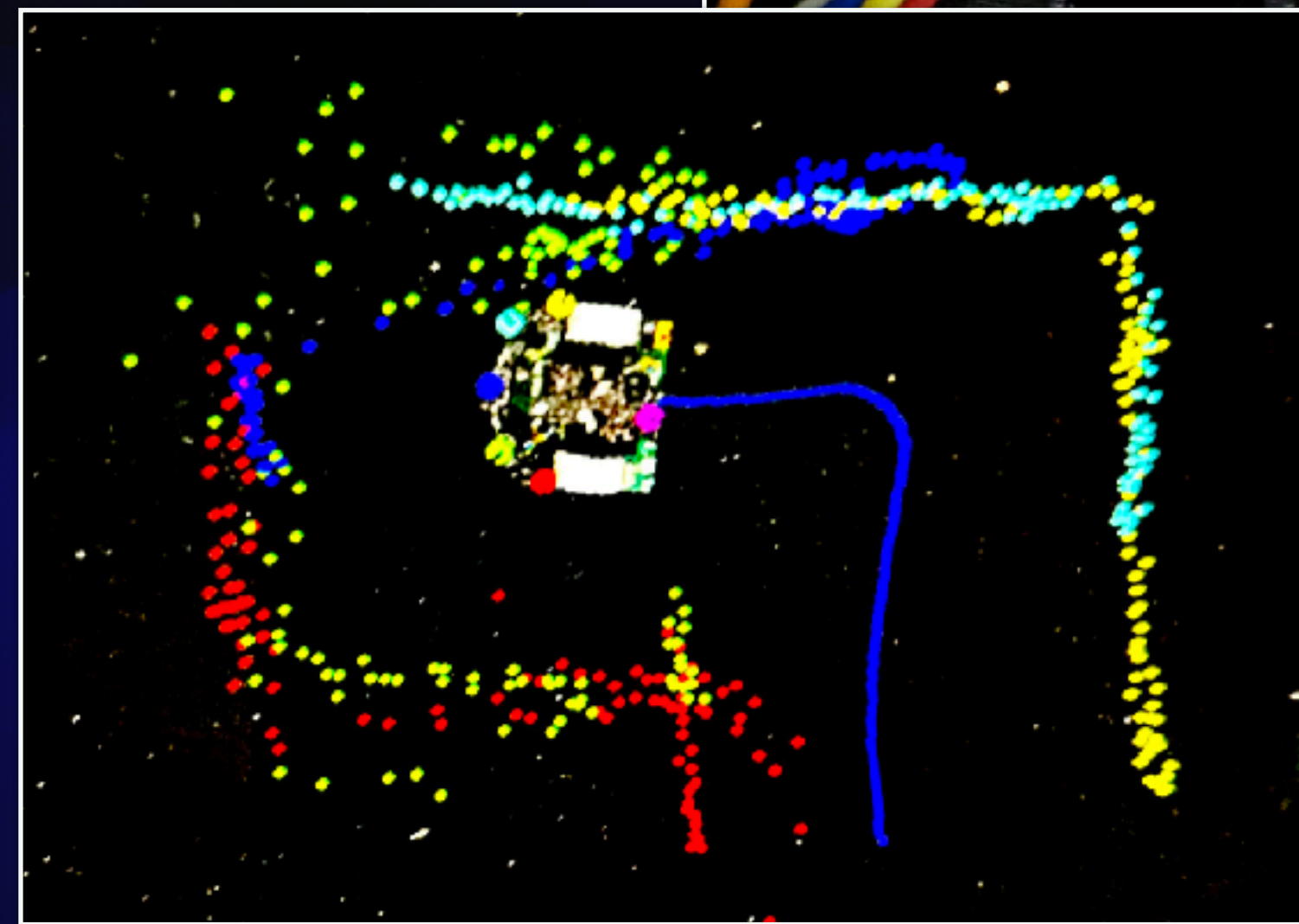
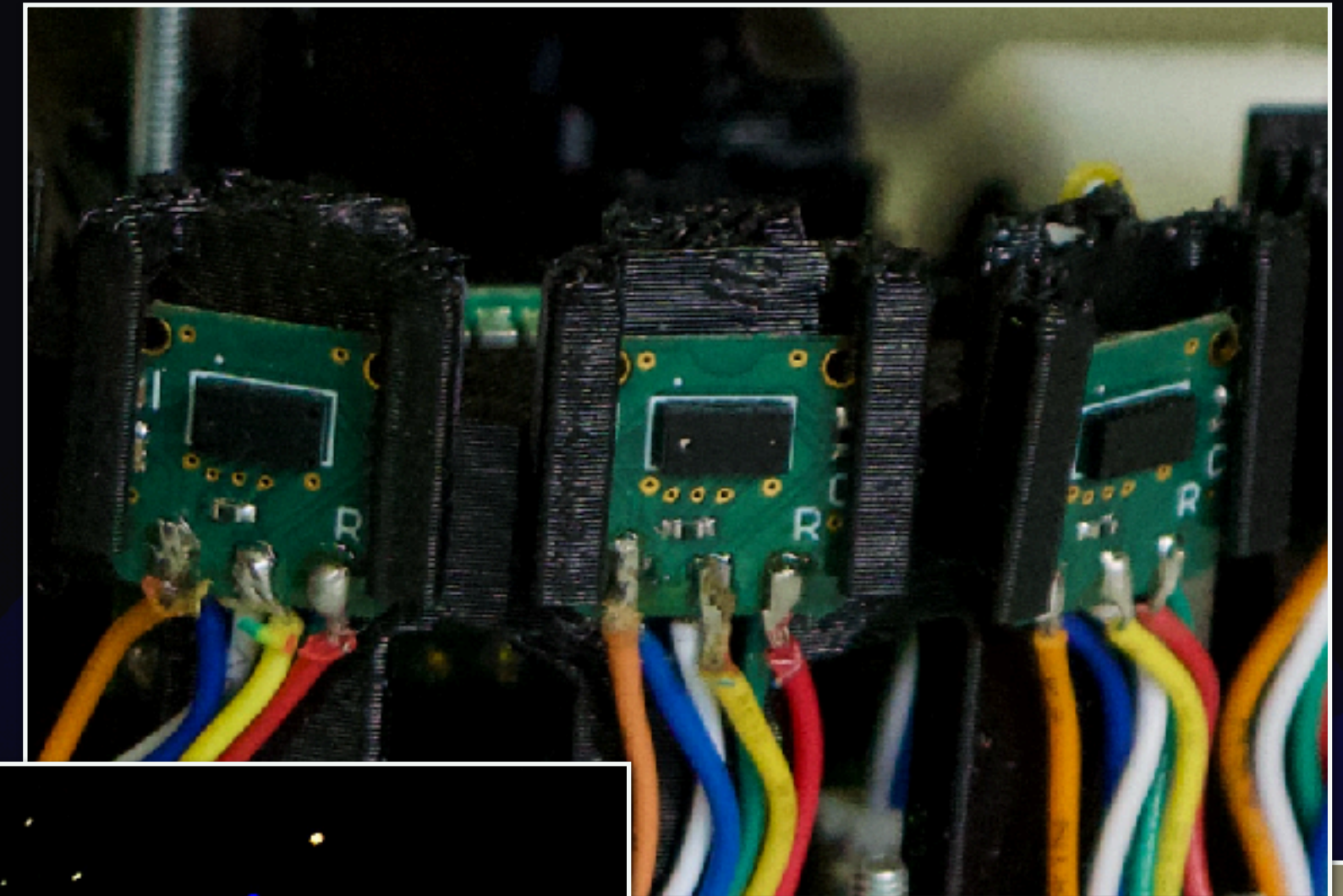
Other Competitions

- The Robotics Club also participates in **design competitions** and **hackathons** alongside its main focus on competitive robots.
- **Application of the knowledge and skills** cultivated through robot design.



Current Tech Stack

- Custom single beam **LIDAR sensors**
- Custom STM32-based **control boards**
- Custom **embedded firmware and software** ensuring abstraction, expandability and maintainability for years to come
- Everything designed in-house by club members



Application in the Real World

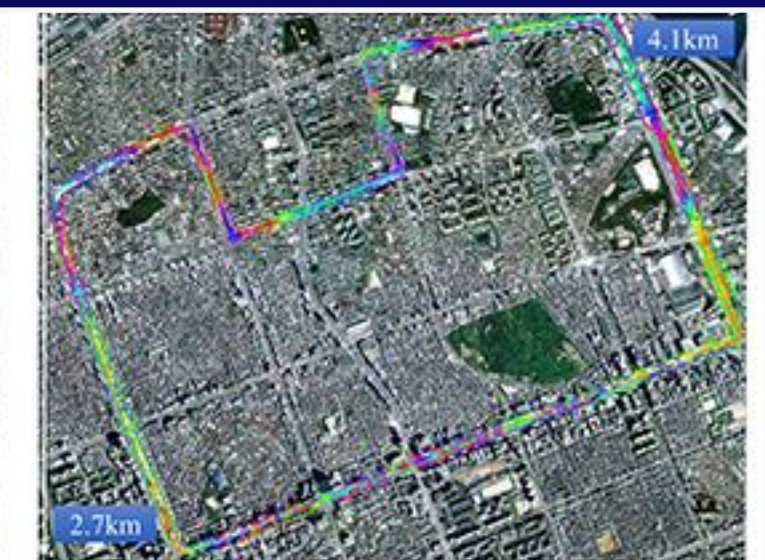
- The technologies used in the club are applied on a **larger scale** in various autonomous and robotic systems.
- For example:
 - Line following robots are used in **logistics** warehouses and large **sorting centers**.
 - Algorithms like those used in maze solving are used for **navigation** using maps.
 - LIDAR mapping technologies are used by **autonomous vehicles**.
 - And many more examples...



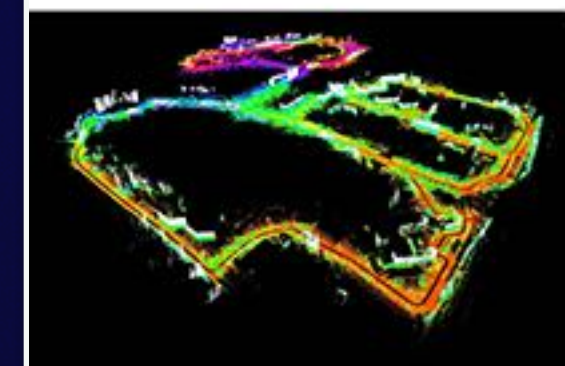
(a) Top-down view (Campus)



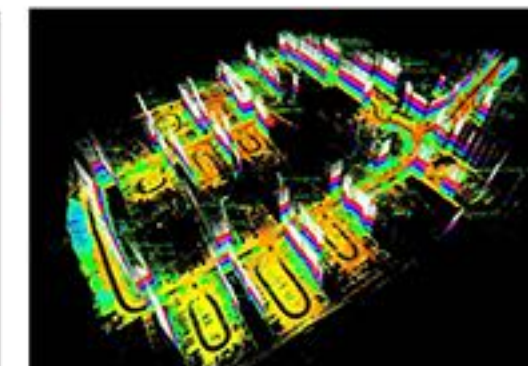
(b) Top-down view (Complex)



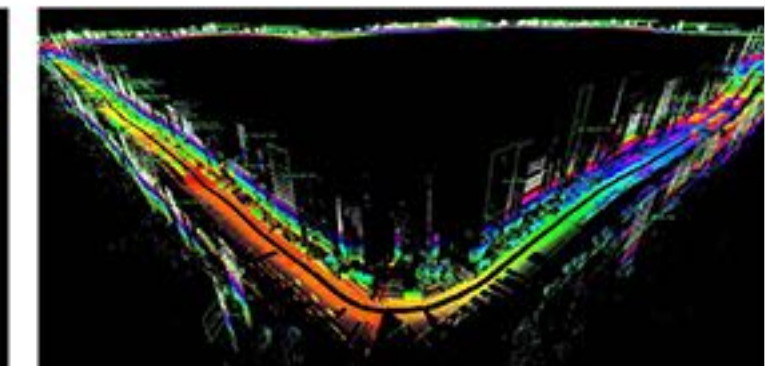
(c) Top-down view (Metropolitan)



(d) Perspective view of 3D map (Campus)



(e) Perspective view of 3D map (Complex)



(f) Perspective view of 3D map (Metropolitan)

Additional Activities

- The Robotics Club helps to boost **school and university** students' interest in robotics and STEM sciences.
- It welcomes school students to its facilities and, in collaboration with the **Robotics Research Group** and the **Robots@UP team**, introduces students to the world of robotics.
- It co-organizes the annual **Robotics Summer School** with the Robotics Research Group and the Robots@UP team, thus contributing to the promotion of knowledge among students and pupils.
- It holds **workshops** for students on topics related to all areas of robot and systems design.



We Are Always on the Lookout for New and Bigger
Challenges



Thanks for Attending

Image Sources

- Robotics Club Archive
- Slide 11: Pic1, Pic2, Pic3