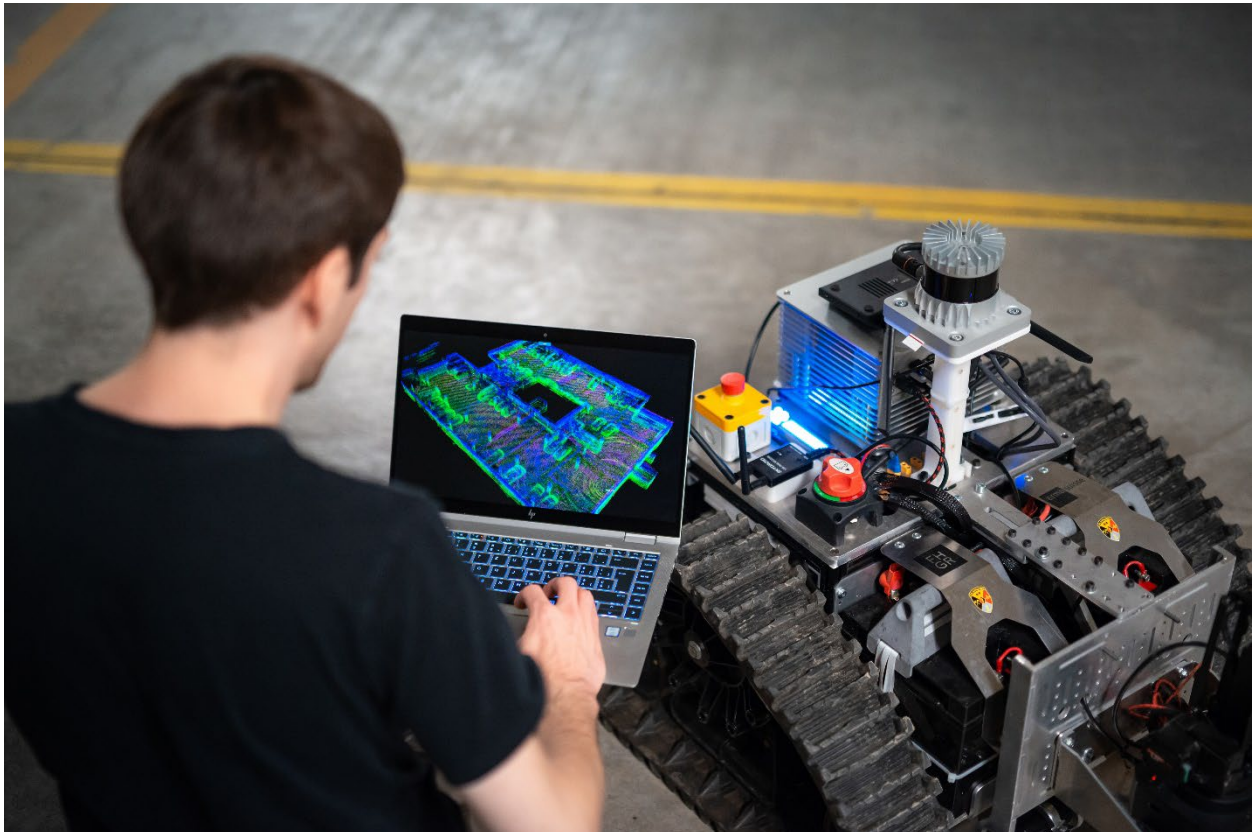


Original article published in the Bündner Woche, February 15, 2023, p. 27

Research in Graubünden

The robotic “boar”

The boarAI supports search and rescue missions



On the notebook display: The boarAI can record maps with its top-mounted LIDAR sensor. Image: Jan Schüssler

Since 2020, the University of Applied Sciences of the Grisons (FHGR) has been training bachelor students to become engineers in the “Mobile Robotics” study program. Director of Studies Christian Bermes has been involved from the beginning and is enthusiastic that the first class will graduate in late summer 2023: “As the first director of the course, I experience a lot of new things every day. I like the ‘groove’ at Swiss universities of applied sciences. Most of the students already come with a completed professional education and seem very mature and purposeful.” The professor teaches students in actuation, sensor and control technology and is also responsible for various applied research and development projects.

Bermes’ projects also include the ongoing development of the boarAI prototype – a ground robot for search and rescue missions. His research proposal was first approved by Armasuisse’s Swiss Drone and Robotics Center (SDRZ VBS) in 2018. The SDRZ offers research contracts to Swiss universities to build competencies in the field of drone and robotics technology. Since

2018, the numerous projects have been demonstrated annually at the ARCHE (Advanced Robotic Capabilities for Hazardous Environments) integration week in the Swiss Army's training village in Wangen an der Aare.

Bermes explains the concept of the boarAI: "Off-the-shelf components were also used in the self-built ground vehicle. For example, we ordered the boarAI's caterpillar tracks from a snow blower manufacturer. The boarAI is electrically powered and weighs about 40 kilograms. The challenge lies in integrating the various modules." This year, the FHGR team of five plans to present two projects at ARCHE. The first project is radiation measurement in combination with a drone, in which the boarAI autonomously targets radiation hotspots previously detected by the drone for more accurate measurements. The radiation measurement device was developed by ETH spin-off Arktis Radiation Detectors. The second project is the rescue of incapacitated persons from dangerous situations with the help of a towing hook.

Bermes explains: "In the previous project, the boarAI was controlled remotely with a direct line of sight. This year, we want to show how this can be done without a direct line of sight. With the help of a sophisticated camera system, the person remotely controlling the robot is able to hook a carabiner attached to the robot arm onto the clothing of the person to be rescued. When the carabiner is hooked in, a servo motor is triggered. The carabiner snaps shut and falls out of its holder, so instead of sending the traction force of this person, who can weigh between 50 and 100 kg, over the feeble robotic arm, we send the force directly to the chassis of the boarAI. You only get one shot at it. If it doesn't work, the boarAI must first be moved out of the danger zone and the hook reinserted. We see ourselves as idea givers and show Armasuisse what is technically possible. Based on this, Armasuisse can then deduce what their demands are."

Christian Bermes and Daniela Heinen

More information

The University of Applied Sciences of the Grisons trains future engineers in the bachelor's degree program Mobile Robotics: <https://www.fhgr.ch/en/study-programmes/bachelors-study-programmes/media-technology-and-it/mobile-robotics/>. Students learn to design robots and their actuators, to provide them with an electronic control system and to program the appropriate software.



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Christian Bermes

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