

Applied Robotics and AI at CRTA: From Science to Industrial Innovation

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Short description:

The Regional Center of Excellence for Robotic Technology, CRTA, at the University of Zagreb Faculty of Mechanical Engineering and Naval Architecture, is a national reference point for research, development, testing, and implementation of advanced robotic systems in industry and medicine. Its mission is not only to advance scientific excellence, but also to create a practical environment in which robotic technologies, artificial intelligence, and autonomous systems can be validated together with industrial partners, hospitals, and research institutions. CRTA's activities are focused on replacing rigid automation and demanding manual work with flexible, versatile, and adaptive robotic systems, while strengthening technology transfer and cooperation between academia and the economy.

The talk will present CRTA as an application-oriented research ecosystem, with examples from actual projects such as PRONOBIS, which develops a robot-assisted prostate biopsy system; ANDROMEDA, focused on autonomous robotic drilling for neurosurgical applications; INSPIRATION, addressing non-invasive patient registration for robotic neurosurgery; INSIGHT, a cooperation with the BMW Group on AI-based models for battery cell manufacturing and recycling; MARINERO, an autonomous robotic system for smart marinas; and ASAP, a robotic system for autonomous inspection and prediction of transport infrastructure integrity. These projects demonstrate how advanced robotics and AI can move beyond laboratory prototypes toward clinically relevant systems, industrial services, autonomous inspection platforms, sustainable tourism technologies, and safer human-centered environments.

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More about Marko Švaco:

Marko Švaco is an associate professor at the Department of Robotics and Production Systems Automation at the University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture (FSB). He is Head of the Chair of Autonomous Systems and Artificial Intelligence and Head of the Regional Center of Excellence for Robotic Technology (CRTA) at FSB. Since 2024, he has also headed the Mechatronics and Robotics program at FSB.

As a key member of the research team, he helped develop the RONNA robotic system for neurosurgery, the first robotic system for neuronavigation developed in the Republic of Croatia and in this part of Europe. Since 2021, he has been one of the co-founders of the MedTech startup RONNA Medical.

His scientific research is mainly focused on medical robotics and autonomous systems. He has been involved in more than 25 projects as collaborator, researcher, or principal investigator. As an author or co-author, he has published a number of articles in international journals and at international conferences.

He has received various national and international awards, including the "Vera Johanides" prize for the best young researcher, awarded by the Croatian Academy of Engineering (HATZ) in 2019. He is a member of the scientific and editorial boards of two scientific journals and participates in the organizational and program committees of several scientific conferences.