

Application of Artificial Intelligence in Additive Technologies: Case Studies in Robotics and Medicine



Artificial intelligence (AI) is being used, among other methods, in the medical field to enhance additive manufacturing, resulting in personalized medicine and advanced surgical solutions. AI algorithms are utilized at various stages of planning, segmentation, and CAx to customize 3D-printed prosthetics and implants according to the unique anatomies of individual patients, leading to better outcomes and shorter recovery periods. AI-powered design tools and predictive models further advance regenerative medicine and surgical planning. To continue progressing in this field, interdisciplinary collaboration is necessary to address challenges and make the most of AI advancements for next-generation medical technologies. The integration of AI into robotics and medicine is revolutionizing the accurate and effective manufacture of 3D-printed components. AI-driven algorithms in robotics improve the accuracy and effectiveness of 3D-printed parts, allowing for the creation of advanced robotic systems that have enhanced functionality and flexibility. Case examples demonstrate how AI models enhance the optimization of design parameters and accurately forecast material behaviors, resulting in the development of more resilient and adaptable robotic systems.

Keywords: Additive manufacturing, biomodeling, artificial intelligence, CAD

Sven Maričić, born 1978, Rijeka. An exceptionally committed and recognized researcher with a recognized history of excellence in education, research, and innovation. Assistan prof. (2015), associated prof. (2019), full professor (2025), presently a professor at the University of Juraj Dobrila in Pula and the Faculty of Medicine at the University of Rijeka.

He has significant expertise in creating and presenting compelling lectures and courses, with a focus on the application of additive technologies, robotics, and artificial intelligence in the health sector.

He has shown proficiency in establishing collaborative research environments, including research grants and EU H2020 initiatives. The European Commission awarded his 3D and VR Technology for VET project with the European Innovative Teaching Award (EITA). From 2024 member of Biomedix project consortium (Erasmus+ project) in area of additive technologies, biomodeling and 3D printing of medical models. Presently serving as the Head of the Centre for Biomodeling and Innovations in Medicine at the Faculty of Medicine, University of Rijeka, and as the Head of the Laboratory for Robotics and Artificial Intelligence.

AWARDS:

- Awards 2014 City of Rijeka Award for Scientific Contribution
- 2018 State Award of the Republic of Croatia for Science
- 2018 Gold Medal at the 16th International Innovation Exhibition, uSCOPE – the first Croatian 3D printed microscope, ARCA 2018.

- 2019 Special mention of the journal VIDI e-NOVATION award for the best domestic startup in the field of social innovation
- 2021 Silver Medal for Innovation, iENNA, Nuremberg, Germany
- 2022 Gold Medal for Innovation, iENNA, Nuremberg, Germany
- 2023 Bronze Medal for Innovation, ARCA2023, Zagreb, Croatia
- 2023 European Innovative Teaching Award 2023 (EITA), European Commission, Brussels
- 2024 Bronze Medal for Innovation of the Biomodeled Massager, ARCA2024, Zagreb, Croatia