

# Space Robotics: Towards Use-Driven Missions

## Abstract

Advances in Space Engineering and Technology have dramatically revolutionised the way we work and live today. Similarly, intelligent robots have revolutionised terrestrial assembly and servicing processes. Innovative design engineering solutions are enabling Space robots to undertake unmanned operations in Earth orbits as well as on the surface of the Moon, Mars and beyond. In this presentation, Dr. Saaj will talk about her journey through space and her vibrant portfolio of challenging use-driven projects for orbital and planetary exploration missions. Furthermore, she will present how she succeeded in securing new research opportunities through spinning-out technology from Space Robotics to Medical robotics.

## Speaker Biography

Dr. Mini C. Saaj is a Reader and the Head of Robotics and Control research group at the Surrey Space Centre. She is working in partnership with various companies and agencies on future Space robotic missions aimed at protecting the ecosystem of space. Her core expertise is in Robotics, Mechatronics, Automation, and Systems and Control Engineering. Current research focus includes: mechanism design (rigid/flexible/modular); modeling and control of space robots for in-orbit assembly of large space telescopes; active debris removal (cooperative and uncooperative targets); orbit maintenance and servicing (repair & refueling) of satellites; chassis design and mobility analysis of planetary rovers (wheeled, legged and hybrid); design of innovative soil sensors for rover-terrain interaction studies; Model-Based Systems Engineering; bio-robotics, mechanism design and control of flexible medical robots.

Dr. Saaj has raised over £3.8M, as PI and Co-I, on Robotics research funded by European Commission, Airbus Defence and Space, Surrey Satellite Technology Ltd, Engineering and Physical Science Research Council, European Space Agency, CEOI, Royal Society, Royal Academy of Engineering, the Nigerian Space Agency and other sources. Her industrial secondments with Airbus and Surrey Satellite Technology Ltd enabled her to attract funding for mission-oriented projects. She has successfully supervised 10 full-time post-doctoral Research Fellows and 11 PhD students; in addition, she is an external reviewer to funding agencies and she has published 99 peer-reviewed articles.

At the University of Surrey, Dr. Saaj served as the Director of Post Graduate Research at Surrey Space Centre for three years (2015-2018) and at the department level, she was also the Programme Coordinator for the Electrical and Electronic Engineering Degree programme launched in 2013. Being an internationally leading Space engineer, Roboticist, Control Engineer and a Chartered Engineer, she actively promotes Space Engineering education. She was a Flying Lecturer with the EngineeringUK for the 'Engineers make it happen' campaign (2008-2010), won the Airbus - Royal Academy of Engineering Secondment award (2009) and the University of Surrey Vice Chancellor's Teaching Excellence award in 2013. More details can be found at – <https://www.surrey.ac.uk/people/chakravarthini-mini-saaj>