



**Institute** of  
**mathematics**  
& its applications



*In cooperation with*

Society for Industrial and  
Applied Mathematics

# 2ND IMA CONFERENCE ON MATHEMATICS OF ROBOTICS

ONLINE EVENT VIA ZOOM, 8 - 10 SEPTEMBER 2021

# CONFERENCE PROGRAMME

# DAY ONE – 8 SEPTEMBER, 2021

10.55 - 11.00	Welcome, Introduction and Housekeeping
11.00 - 12.00	Invited Talk - Prof Stefano Stramigioli (University of Twente, The Netherlands) <b>Port-Based Concepts in Robotics: From Simple Electric Drives to Complex Fluid-Solid Dynamics Interaction in Flapping Flight</b>
12.00 - 12.30	Short Break
12.30 - 12.55	Abolfazl Zarakı ( <i>School of Biological Sciences, University of Reading, UK</i> ) <b>Developing a Leader-Follower Kinematic-Based Control System for a Cable-driven Hyper-Redundant Serial Manipulator</b>
12.55 – 13.20	Christopher Deeks ( <i>Centre for Complexity Science, The University of Warwick, UK</i> ) <b>Adapting Multi-Agent Swarm Robotics to Achieve Synchronised Behaviour From Production Line Automata</b>
13.20 - 13.30	Short Break
13.30 - 13.55	Kahina Louadj ( <i>Toulouse Research Institute in Computer Science (IRIT – ENSEEIHT), France</i> ) <b>Using A Direct Multiple Shooting Method to Control a Quadrotor</b>
13.55 - 14.20	Georg Nawratil ( <i>Institute of Discrete Mathematics and Geometry &amp; Center for Geometry and Computational Design, TU Wien, Austria</i> ) <b>On the Snappability and Singularity-Distance of Frameworks with Bars and Triangular Plates</b>
14.20 - 14.40	Networking Session
14.40 - 15.05	Christoforos Spartalis ( <i>University of Innsbruck, Austria</i> ) <b>Analysis of the Topology of the Singularity Set of Planar 3-RPR Parallel Robots with Linear Platforms</b>
15.05 - 15.30	Jonathan Hauenstein ( <i>University of Notre Dame, USA</i> ) <b>Using Monodromy to Statistically Estimate the Number of Solutions</b>
15.30 - 15.40	Break
15.40 - 16.05	Bertold Bongardt ( <i>The Institute of Robotics and Process Control, TU Braunschweig, Germany</i> ) <b>On Orientation, Position, and Attitude Singularities of General 3R Chains</b>
16.05 - 16.30	Aravind Baskar ( <i>University of Notre Dame, USA</i> ) <b>Optimization-Based Kinematic Synthesis Using Homotopy Continuation</b>
16.30	Conference Ends

# DAY 2 - 9 SEPTEMBER, 2021

10.55 - 11.00	Welcome, Introduction and Housekeeping
11.00 - 12.00	Dr Mini C. Saaj – (University of Surrey, UK) <b>Mathematics of Robotic Manipulators: Theory and Applications</b>
12.00 - 12.30	Break
12.30 - 12.55	Felix Wiebe ( <i>German Research Center for Artificial Intelligence (GmbH), Robotics Innovation Center, Germany</i> ) <b>Combinatorics of a Discrete Trajectory Space for Robot Motion Planning</b>
12.55 – 13.20	Vincent Strong ( <i>School of Biological Sciences, University of Reading, UK</i> ) <b>Active Matter as a Path Planning Interpreter</b>
13.20 - 13.30	Break
13.30 - 13.55	Roberto Orozco ( <i>Department of Cybernetics and Robotics Wroclaw University of Science and Technology, Poland</i> ) <b>Linear Registration and Robot Motion Planning</b>
13.55 - 14.20	Mila Zovko ( <i>Faculty of Science and Education, University of Mostar, Bosnia and Herzegovina</i> ) <b>Real-Time Planning for Cooperative Maze Exploration</b>
14.20 - 14.40	Networking Session
14.40 - 15.05	Sean Dewar ( <i>Johann Radon Institute for Computational and Applied Mathematics, Austrian Academy of Sciences, Austria</i> ) <b>Flexible Placements of Graphs with Rotational Symmetry</b>
15.05 - 15.30	Abhilash Nayak ( <i>Laboratory of Digital Sciences of Nantes, France</i> ) <b>C-Space Analysis Using Tropical Geometry</b>
15.30 - 15.40	Break
15.40 - 16.05	Hans-Peter Schröcker ( <i>Department of Basic Sciences in Engineering Sciences, University of Innsbruck, Austria</i> ) <b>A Remarkable 8r-Mechanism</b>
16.05 - 16.30	Robert Read ( <i>Public Invention, USA</i> ) <b>Calculating the Segmented Helix Formed by Repetitions of Identical Subunit</b>
16.30	Conference Ends

# DAY 3 - 10 SEPTEMBER, 2021

10.55 - 11.00	Welcome, Introduction and Housekeeping
11.00 - 12.00	Invited Talk - Roger Powell (UK Atomic Energy Authority) <b>Big Robotics</b>
12.00 - 12.30	Short Break
12.30 - 12.55	Jon Selig ( <i>School of Engineering, London South Bank University, UK</i> ) <b>On the Geometry of Some Localisation Problems in Robotics</b>
12.55 – 13.20	Matteo Gallet ( <i>Johann Radon Institute for Computational and Applied Mathematics, Austrian Academy of Sciences, Austria</i> ) <b>Zero-Sum Cycles in Flexible Non-Triangular Polyhedral</b>
13.20 - 13.30	Short Break
13.30 - 13.55	Jon Selig ( <i>School of Engineering, London South Bank University, UK</i> ) <b>Synthesis of Planar Stiffness</b>
13.55 - 14.20	Martin Weiß ( <i>The Regensburg University of Applied Sciences, Germany</i> ) <b>Optimization of Cartesian Tasks with Configuration Selection</b>
14.20	Closing Speech and Conference Close