

## IEEE UK&I RAS Chapter Prestige Lecture Series



Professor Jian S Dai

CEng, IEEE Fellow, ASME Fellow, IMechE Fellow

Chair of Mechanisms and Robotics

Advanced Kinematics and Reconfigurable Robotics Lab

Centre for Robotics Research

School of Natural and Mathematical Sciences

King's College London

### **Title: Robots of the Future That Are Shaped by Arts and Nature**

Having worked in the field of robotics for many years, Professor Jian Dai will give a philosophical overview of the entwinement between robotics and arts, present a new doctrine that innovative robotics could be shaped by the arts, and provide an intrinsic connection between arts and robot development, leading to decades of development in origami robots, arts robots, metamorphic robots, rehabilitation robots and reconfigurable robots. This entwinement is enlightened by mathematical tools, particularly the advanced kinematics with screw theory and its relations to Lie groups and Lie algebra through finite screws. With change of the order of a screw system, a robot mechanism changes its mobility and presents its different topologies for variable tasks.

Jian will present the kinematics entailed reconfigurable mechanisms and robots, and the intrinsic theory in the kinematics study, leading to a two-decade innovation in metamorphic mechanisms, reconfigurable robots and evolutionary parallel robots. With change of order of a kinematics system, the mechanism changes its mobility and presents its different topologies.

Various case-studies will reveal how the inspiration and aspiration were absorbed from arts and nature via advanced kinematics and how robot creation and innovation were made through this doctrine. A large number of applications of the evolutionary and reconfigurable robotic mechanisms will be explored in assembly, packaging, food industry, domestic robots, rehabilitation and manufacture, particularly with various scenarios for reconfigurable manufacturing from packaging to food manufacturing, from design to parallel kinematic machines for manufacturing, and from manufacturing costing framework to manufacturing error propagation. This leads to Robots of Future in the decades ahead.

**Venue:** Bush House Lecture Theatre 1 BH(S)1.01, Kings College London, UK, 30 Aldwych, London, WC2B 4BG

**Time:** 18:00-20:00, 7 Nov. 2018

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**Register:** [EventBrite](#)

## Biography

Professor Jian S. Dai, CEng, IEEE Fellow, ASME Fellow, IMechE Fellow, is Chair of Mechanisms and Robotics and a pioneer in reconfigurable mechanisms and robots, in origami robots, in ankle rehabilitation robots and in metamorphic robots. He established the field of reconfigurable mechanisms and the sub-field of metamorphic mechanisms in robotics, a concept that could bridge the gap between versatile but expensive robots, and efficient but non-flexible machines, and their applications to health, home and manufacture.

Professor Dai received a BEng in 1982 and an MSc in 1984 from Shanghai Jiao Tong University, and received a PhD in Advanced Kinematics and Robotics from the University of Salford in the UK in 1993.

Professor Dai is the recipient of 2015 ASME Mechanisms and Robotics Award that is an honor to engineers and scientists who have made a lifelong contribution to the fundamental theory, design and applications of mechanisms and robotic systems. He is the 27th recipient since the award was established in 1974. Professor Dai received many other awards including 2010 Overall Supervisory Excellence Award by King's College London, 2012 ASME Outstanding Service Award and 2012 Mechanisms Innovation Award, together with three best journal Paper awards and six conference best paper awards. Professor Dai was recognized by IEEE as IEEE Fellow with citation 'for contributions to reconfigurable and metamorphic mechanisms in robotics'.

Jian is Founder of the prestigious conference series ASME/IEEE International Conference on Reconfigurable Mechanisms and Robots (ReMAR) and organizer of a series of conferences, workshops and symposia with major scientific relevance (e.g., ASME M&R, IEEE ICRA)

Professor Dai has published over 500 peer-reviewed papers, 4 authored books, 3 edited books, 27 book chapters, and with 2 co-authored books to be published with Google h-index of 48, and i10 index of 172, and citation number over 8000 including a book on "Geometrical Foundations and Screw Algebra in Mechanisms and Robotics", a book on "Evolutionary Design of Parallel Mechanisms" and a book on "Screw Algebra and Lie Groups, Lie Algebra". He serves as Subject Editor of Mechanism and Machine Theory, Associate Editor of ASME Journal of Mechanisms and Robotics, and Journal of Mechanical Engineering Science.

Jian has graduated 27 PhD students who are now affiliated with world-leading universities (e.g., University College London, Queen Mary University London, University of Strathclyde, Wollongong University, Curtin University, Tecnológico de Monterrey (ITESM)), prestigious cooperative companies (e.g., Cambridge Consultants, Goldman Sachs) and successful entrepreneurs (e.g., Movendo Technology, AITREAT Pte Ltd, Novus Altair).