

Title: Cable-driven Parallel Robots and Industrial Applications

Abstract:

Cable-Driven Parallel Robots (CDPRs) form a particular class of parallel robots whose moving platform is connected to a fixed base frame by cables. The connection points between the cables and the base frame are referred to as exit points. The cables are coiled on motorized winches. Passive pulleys may guide the cables from the winches to the exit points. A central control system coordinates the motors actuating the winches. Thereby, the pose and the motion of the moving platform are controlled by modifying the cable lengths. CDPRs have several advantages such as a relatively low mass of moving parts, a potentially very large workspace due to size scalability, and reconfiguration capabilities. Therefore, they can be used in several applications, e.g. heavy payload handling and airplane painting, cargo handling, warehouse applications, large-scale assembly and handling operations, and fast pick-and-place operations. Other possible applications include the broadcasting of sporting events, haptic devices, support structures for giant telescopes, and search and rescue deployable platforms. This keynote will deal with the design, modeling, workspace analysis and control of CDPRs. A focus will be put on the development of CDPRs in Nantes, France, and their potential industrial applications.

Biography:

Stéphane Caro received the Engineering and M.Sc. degrees in mechanical engineering from Ecole Centrale Nantes (ECN), Nantes, France, in 2001, and the Doctorate degree in mechanical engineering from the University of Nantes in 2004. He was a Post-doctoral Fellow in the Centre for Intelligent Machines, McGill University, Montreal, QC, Canada from 2005 to 2006. He was awarded the accreditation to supervise research (HDR) in 2014. He is currently Research Director at the National Centre for Scientific Research (CNRS) and works in the Nantes Digital Science Laboratory (LS2N), UMR CNRS 6004, France. He is the head of the “Robots and Machines for Manufacturing Society and Services” (RoMaS) team at LS2N. He is also a part-time researcher at IRT Jules Verne, a mutualized industrial research institute. Moreover, he is a lecturer at Ecole Centrale de Nantes and IMT Atlantique Bretagne-Pays de la Loire, France. His research interests include design and modeling of cable-driven parallel robots, conceptual design of parallel robots, robust design, kinematic analysis, singularity analysis and type-synthesis of parallel robots, sensitivity analysis, tolerance synthesis, and design optimization. He is the author of 66 papers published in international journals, 155 papers presented in international conferences, 46 contributions in books and 5 patents.