14:45   La robotique au service de l'Homme
Human-centered robotics
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Robotics is rapidly expanding into human environments and vigorously engaged in its new emerging challenges. Interacting and working with humans, the new generation of robots will increasingly touch people and their lives. The successful introduction of robots in human environments will rely on the development of competent and practical systems that are dependable, safe, and easy to use. This presentation focuses on our ongoing effort to develop human-friendly robotic systems that combine the essential characteristics of safety, human-compatibility, and performance. In the area of human-friendly robot design, we present new design concepts for the development of intrinsically safe robotic systems that possess the requisite capabilities and performance to interact and work with humans. Our study of human-motion brought together models from robotics and biomechanics to develop efficient models of human musculoskeletal dynamics and used extensive experimental studies of human subjects. The results of this investigation revealed the dominant role human physiology plays in shaping human motion and provided the fundamental characteristics to effectively encode some basic human motion behaviors. To implement these behaviors on robots with complex human-like structures, we developed a whole-body task-oriented control architecture that addresses dynamics in the context of multiple tasks, multi-point contacts, and multiple constraints. The performance and effectiveness of the new framework are demonstrated through extensive robot dynamic simulations and implementations on physical robots.

Oussama Khatib received his Doctorate degree in Electrical Engineering from Sup'Aero, Toulouse, France, in 1980. He is Professor of Computer Science at Stanford University. His current research, which focuses on human-centered robotics, is concerned with human motion synthesis, humanoid robotics, haptic teleoperation, medical robotics, and human-friendly robot design. His research in these areas builds on a large body of studies he pursued over the past 25 years and published in over 200 contributions. Professor Khatib has delivered over 50 keynote presentations and several hundreds of colloquia and seminars at institutions around the world. He served as the Director of the Stanford Computer Forum, a corporate affiliate program. He is Co-Editor of the STAR series, the Springer Handbook of Robotics, and has served on the Advisory and Editorial Boards of prestigious institutions and journals, as well as Chair or Co-Chair for numerous international conferences. He is a Fellow of IEEE and has served RAS as a Distinguished Lecturer and as a member of the Administrative Committee. Professor Khatib is the President of the International Foundation of Robotics Research (IFRR) and a recipient of the Japan Robot Association (JARA) Award in Research and Development.