

Robots with a sense of Touch

Professor Perla Maiolino

University of Oxford

Monday 13 May 2019

2.00pm

MR4, IEB

Abstract:

Robots operating in dynamic and unstructured environments must exhibit advanced forms of interaction with objects and humans. “Sense of Touch” in robots can play a fundamental role in enhancing perceptual, cognitive and operative capabilities of robots, specifically when they physically interact with objects and humans in the environment.

Many solutions to design, engineer and manufacture tactile sensors have been presented, because the availability of appropriate sensing technologies is the first and necessary step, but the effective utilization of “sense of touch” in robots depends also on the understanding of tactile perception mechanism through which the robot builds an appropriate world model. Taking inspiration from the way in which biological systems acquire and process sensory data to control behaviour for solving this problem, we can notice that the sensory information that reaches the brain is critically shaped by the active generation of sensory stimuli (sensory-motor coordination) and by the compliance/softness of the body. Conventional robotic systems are usually made of rigid materials and although this makes them extremely powerful and precise, it limits their ability to adapt their shape to constraints present in an unpredictable environment, which makes them extremely specialized. Softness and the use of deformable materials in robotic systems can play a role in tactile perception and they are shown to be crucial for environment and task uncertainty (i.e., locomotion in rough terrains, grasping and manipulation of unknown objects), but the design and development of soft robots, as well as their control, is really challenging.

The seminar will present current tactile sensing technologies, challenges ahead for soft robots and all key aspects to take in account for providing robots with sense of touch.