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## Robotic Technologies for Operations in Extreme Environments (Inspection, Maintenance, Repair and Upgrade of the FCC)

*Thursday 2 June 2022 09:00 (25 minutes)*

The world (both natural and man-made) is a complex, unstructured, cluttered and dynamically changing environment, in which humans and animals move across varying terrain (towns/cities, industrial infrastructures, countryside, forest, mountains, etc.) easily changing their gait, behaviours and motions, while performing simple and complex tasks involving coordination of the arms, body and legs.

Robots that have the potential to assist, augment or replace humans performing inspection, upgrades, maintenance and ensuring safe operation particularly in the complex, hazardous infrastructures that are typical at CERN, form one of the holy grails of robotics.

For robots to operate in these complex facilities using tools designed for humans, requires human/animal inspired agility, compliance, dexterity, robustness, reliability and movement/locomotion (loco-manipulation). However, there remain many fundamental robotic questions in areas such as: robot design, actuation, power and energy efficiency, motion and locomotion control, gait generation, perception, sensing, etc.

At the Italian Institute of Technology (IIT), research over many years has led to the development of a wide range of mechatronic systems designed with a focus on inspection, maintenance, repair and upgrading of hazardous sites. Robots developed at IIT include: the HyQ quadruped family, humanoids such as iCub, cCub, COMAN, WALKMAN, and COMAN+, the centaur robot PHOLUS, and continuum and small space investigation robots. This presentation will start to explore the potential of these and future generations of robots for applications around the development and operation of the FCC.

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