FUTURE CIRCULAR COLLIDER

Contribution ID: **270**   Type: **Oral presentation (by invitation only)**

Robotics for accelerator maintenance

Thursday, 8 June 2023 16:10 (20 minutes)

The fourth industrial revolution, the current trend of automation and data interconnection in industrial technologies, is becoming an essential tool to boost maintenance and availability for space applications, warehouse logistics, particle accelerators and for harsh environments in general. The main pillars of Industry 4.0 are Internet of Things (IoT), Wireless Sensors, Cloud Computing, Artificial Intelligence (AI), Machine Learning and Robotics. Core to success and future growth in this field is the use of robots to perform various tasks, particularly repetitive, unplanned or dangerous, which humans either prefer to avoid or are unable to carry out due to hazards, size constraints, or the extreme environments in which they take place. During the last years at CERN, robotic technologies have been developed and integrated within the accelerators to support maintenance tasks reducing human exposure to hazards and boosting machines availability. Extrapolating the state of robotic solutions by about two decades, the time when robotics solutions could be applied in the FCC tunnels, such systems will be able to handle most of the planned interventions, that are currently mainly conducted manually, and many of the unplanned or emergency situations. Additionally, most of the manually performed interventions in the LHC complex cannot be applied to the three times longer FCC tunnel, without either increasing efforts in workforce and costs or accepting longer machine down times. The work presents the current state of the art in industrial robotics and applied robotics in big science facilities, providing a future vision on how these technologies could fulfil maintenance tasks within the FCC accelerator complex, underlying current aspects that should be further developed to guarantee robust remote operations of future cybernetic systems for FCC.

Primary author: Dr DI CASTRO, Mario (CERN)

Co-authors: MASI, Alessandro (CERN); GAMPER, Hannes (Johannes Kepler University (AT))

Presenter: Dr DI CASTRO, Mario (CERN)

Session Classification: Technology R&D

Track Classification: FCC-ee technologies R&D