XFEL R&D Project
MARWIN Development

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MARWIN Robot Platform

MARWIN3

Mobile Autonomous Robot for Maintenance and Inspection

- Use case: Routine radiation measurements with the EuXFEL accelerator switched on
- Radiation sensor: Pandora mounted on the robot chassis

Goal: Making MARWIN more flexible

- Mounting a modular sensor interface on the tip of a robot arm
- Integration of the robot arm and the modular sensor interface into the robot operation system software
- Development of control algorithms to avoid collisions when moving the manipulator arm
- Evaluation of a Human-Machine-Interface based on immersive interface technologies

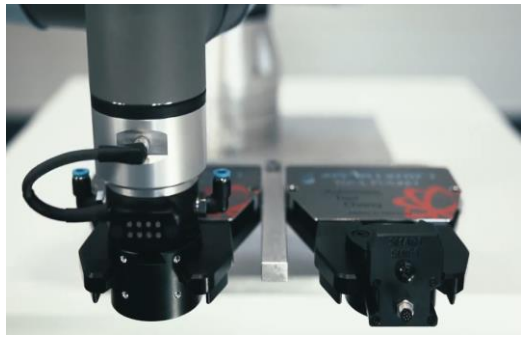
Problems encountered

- Covid 19 pandemic:
  - Access to the laboratory and the university campus was restricted
- Tool changing tool:
  - Selling of originally selected tool canceled by the manufacturer
  - Search for an alternative solution

Achievements

- Testing of a stand-alone prototype installation at hs21 consisting of a
  - UR5 robot arm from Universal Robots
  - Modular tool changing system from Smartshift Robotics
  - Raspberry Pi single-board computer attached to a electrical coupling (analogue and digital hardware interfaces, control system server)

UR5 Robot arm

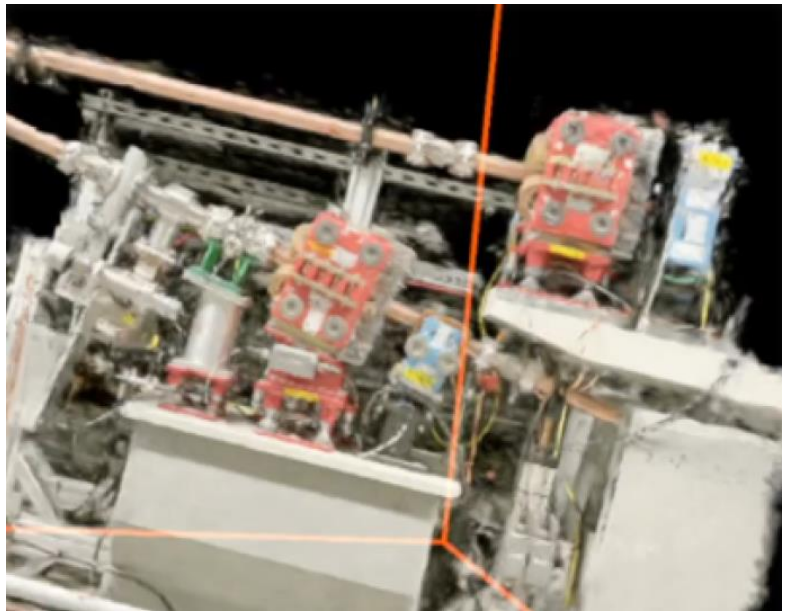


Smartshift Robotics tool changer system equipped with two couplings

Electrical coupling: power and network (PoE: Power over Ethernet)

Achievements

- Developing of a Virtual Reality environment based on so-called instant neural graphics primitives that can be used for planning and performing measurement tasks



Quasi-realistic component visualization generated by a neural graphical network trained with a set of 2D images