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ROCK-IT: automated sample handling for operando catalysis at synchrotron beamlines

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In the context of the ROCK-IT project*, an automated sample handling system was developed at beamline P65 (DESY) to streamline in-situ and operando catalysis experiments. It uses a UR10e robotic arm with a RobotIQ 2F-85 gripper to handle catalyst samples in standardized holders, each identified via QR codes. Upon Tango control system initiation, the robot scans a 6-sample magazine, locates the next sample using a vision system and Aruco markers, and positions it at the measurement station. The sample is clamped with pneumatic cylinders, connected to gas lines, leak-tested, and heated. ROS2 is used as the main control framework to hide the robotics complexity, enable modularity, and allow scaling to other beamlines. It interfaces with Tango controls, triggered by the Bluesky plan, creating a seamless pipeline from experiment planning to execution. This setup improves safety, reproducibility, and enables remote operation and replication across other beamlines.

Footnotes

* <https://www.rock-it-project.de/>

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