Intelligent Automation Lab

Intelligent Automation Lab is a modular teaching and research laboratory designed for education and research in intelligent automation. It combines a robotic manipulator, an autonomous mobile robot, and a conveyor system into a single platform for developing, testing, and validating industrial automation and multi-agent robotics applications.

Laboratory Configuration

Intelligent Automation Lab includes the following components:

Component	Description
QArm Research	Research-grade 6-DOF robotic manipulator equipped with the QBrain computing platform and a digital twin (Digital Twin).
QBot Platform	Autonomous mobile robotic platform with a digital twin, designed for research and education in mobile robotics, navigation, and multi-agent systems.
Quanser Conveyor	Intelligent conveyor system supporting material handling and industrial automation scenarios.
QLabs	Digital twins of the QBot Platform and Quanser Conveyor for designing, testing, and validating algorithms before deployment on physical hardware.
QUARC® Complete	Laboratory license of the QUARC® Complete real-time development environment.
Router	Network infrastructure component providing communication between all laboratory devices.
Application Examples	Ready-to-use demonstrations and end-to-end application examples for intelligent automation and multi-agent robotics.

Optional Add-ons

The laboratory can be expanded with additional hardware modules to support advanced teaching and research activities.

Module	Description
Ground Control Station (GCS)	Operator workstation for monitoring, supervising, and controlling robotic systems.
Haptic Robot	Haptic interface for research in teleoperation, force feedback, and human–robot interaction.
QArm/QArm Mini	Additional robotic manipulators for expanding laboratory exercises and research capabilities.
Force/Torque Transducer	Force and torque sensor supporting force-controlled manipulation and precision robotics applications.
Mechatronics Design Lab	Extension module for the design, analysis, and testing of mechatronic systems.