RV College of Engineering®

# CENTRE OF COMPETENCE
# RVCE-BOSCH REXROTH -AUTOMATION TECHNOLOGIES

The RVCE-Bosch Rexroth Center for Automation Technologies, also known as the Bosch-RVCE Centre of Excellence in Automation Technologies, is a joint collaboration between RV College of Engineering and Bosch Rexroth, established in 2010. This state-of-the-art facility aims to provide hands-on training in automation technologies to undergraduate (UG) and postgraduate (PG) students, with a focus on both theoretical and practical applications. It also serves as a platform for interdisciplinary learning, coordinated by the Department of Mechanical Engineering. The center plays a crucial role in equipping students with the knowledge to design and operate complex automation systems, especially in the fields of hydraulics, pneumatics, and programmable logic controllers (PLCs).

## Objectives

The vision of the RVCE-Bosch Rexroth Centre is to foster innovation in automation and mechatronics systems, with an emphasis on real-world applications. The center seeks to:

1. Offer comprehensive training on hydraulic and pneumatic circuits.
2. Train students to design ladder logic circuits using PLCs.
3. Demonstrate the practical applications of automated assembly systems using mechatronics.

## Key Infrastructure and Training

The Bosch Rexroth Centre is equipped with cutting-edge hardware training kits, high-end PLCs that support internet gateway for cloud communication, motion control systems, and CNC simulators (MTX). It has also been upgraded to support the Industrial Internet of Things (IIoT), with high-end XM PLCs, L65 PLCs, and Industry 4.0 kits.

1. The lab is extensively used to deliver training in various domains, including:
2. Hydraulic and Pneumatic Systems: Students learn to build hydraulic and pneumatic circuits for industrial applications such as speed control, motor control, and safety circuits. These systems range from basic manual systems to advanced PLC-controlled hydraulic and pneumatic systems.
3. Mechatronics and PLC Training: The lab also provides hands-on experience in developing mechatronics systems for automation. Students engage with ladder logic and gain expertise in using modern PLCs, preparing them for industry-specific automation challenges.
4. Industry 4.0 and IIoT: The center integrates advanced technologies to train students in Industrial Automation. The upgraded facilities enable projects related to smart manufacturing, cloud communication, and remote diagnostics using SCADA-HMI systems.

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## Notable Projects and Achievements

Several significant student and consultancy projects have been executed at the center, showcasing the application of automation technologies in real-world scenarios. Some key projects include:

1. Design and Development of a Collaborative Robot: This robot, with 4 degrees of freedom and the capacity to lift 3 kg, is designed to operate within a 550mm reach.
2. Development of Cartesian Robots: The center has developed robots using both electric and pneumatic actuators for pick and place operations.
3. Robotic Arm for Conveyor Systems: A robotic arm was developed to automate the placement of toys on a conveyor belt, demonstrating practical industrial applications.

## Industrial Automation and Control Systems

The center's Industrial Automation section focuses on training students in process measurement and control systems, which are widely used in industries to improve production efficiency and optimize processes. The center covers all functional levels of automation, including:

1. Field Level: Training in sensors and actuators.
2. Control Level: Students learn to use PLCs for automated control functions.
3. Supervisory and Production Control: This level involves training in SCADA systems, enabling remote monitoring and control of industrial processes.
4. Information Level: Students are introduced to top-level industrial automation, which involves data integration and decision-making through IIoT systems.

## Training Programs and Skill Development

The center runs specialized training programs on:

1. PLC Programming: Students are trained in ladder logic programming, learning to develop complete automation solutions for industrial processes.
2. SCADA Development: Hands-on training is provided in SCADA, enabling students to design visualization screens for real-time process control.

Students participating in these training programs gain not only technical expertise but also an understanding of Industry 4.0 concepts, such as real-time machine control and data acquisition for remote diagnostics.

## Conclusion and Impact

The RVCE-Bosch Rexroth Centre of Excellence has become a vital resource for students, offering them practical experience in automation technologies that align with current industrial needs. By collaborating with industry leaders like Bosch Rexroth, the center has successfully bridged the gap between academia and industry, preparing students for future challenges in the fields of automation, robotics, and smart manufacturing. The center continues to evolve, incorporating the latest technol.ogies and practices, thereby ensuring its place at the forefront of automation education.

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