Robintech

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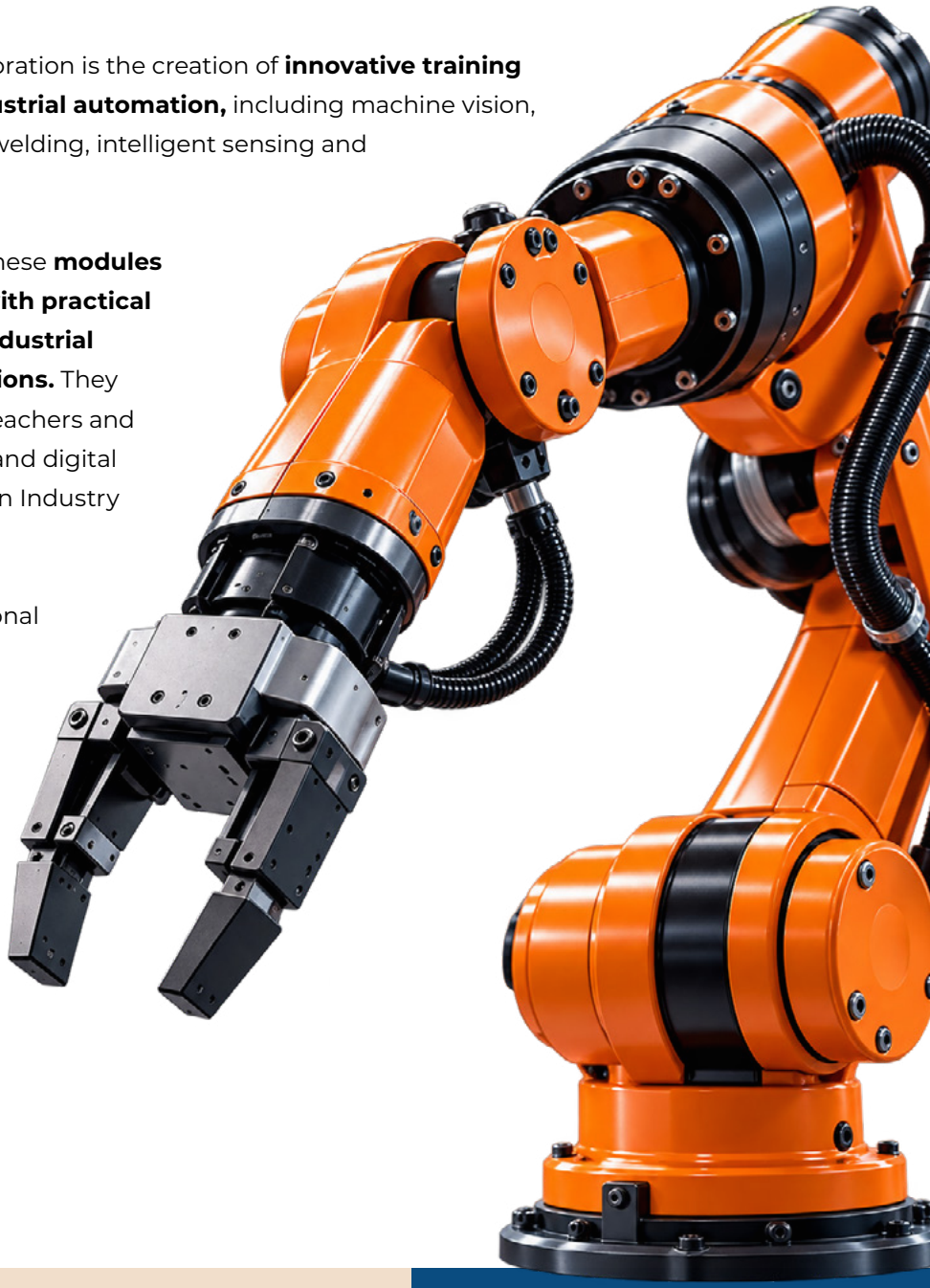
INNOVATIVE TRAINING MODULES FOR THE FUTURE OF INDUSTRIAL ROBOTICS AND AUTOMATION

ROBINTECH – Towards Networking and Collaborative Teaching Materials in the Field of Industrial Robotics is an Erasmus+ co-funded project which aims to strengthen cooperation between vocational education institutions and industrial companies, promoting the exchange of knowledge, technical expertise and innovative teaching practices in industrial robotics and automation. By connecting teachers with industry professionals, ROBINTECH seeks to ensure that vocational training remains aligned with technological developments and the evolving skills requirements of modern manufacturing.

An important outcome of this collaboration is the creation of **innovative training modules covering key areas of industrial automation,** including machine vision, electrical engineering design, robot welding, intelligent sensing and industrial communication networks.

Developed by the project partners, these **modules combine theoretical foundations with practical exercises, professional software, industrial equipment and real-world applications.** They are designed to support vocational teachers and learners in developing the technical and digital competencies increasingly required in Industry 4.0 environments.

Through these collaborative educational resources, **ROBINTECH contributes to improving the quality and relevance of vocational education,** strengthening the relationship between schools and industry, and **preparing future technicians for the challenges of increasingly automated, connected and intelligent manufacturing systems.**



INTEGRATION OF CNC MACHINES AND ROBOTS

TARTU RAKENDUSLIK KOLLEDŽ
TARTU VOCATIONAL COLLEGE



TARTU VOCATIONAL COLLEGE, ESTONIA

Duration: 26 hours (16 hours of theoretical instruction and 10 hours of practical activities)

The training module **Integration of CNC Machines and Robots** introduces vocational education learners to the principles, technologies and practical applications of **CNC machines and industrial robots,** focusing on their integration into **automated manufacturing systems.**

This **26-hour module** combines theoretical knowledge with hands-on learning experiences, introducing participants to the operating principles of CNC machines, industrial robot technologies, control systems, programming methods and industrial communication protocols.

The training explores different CNC machine and robot manufacturers, their control solutions and programming languages, **with particular emphasis on ABB RAPID programming**. Participants also become familiar with industrial communication protocols, including **PROFINET, Modbus, OPC UA and EtherNet/IP**, learning how these technologies enable information exchange between CNC machines, robots and programmable logic controllers (PLCs).

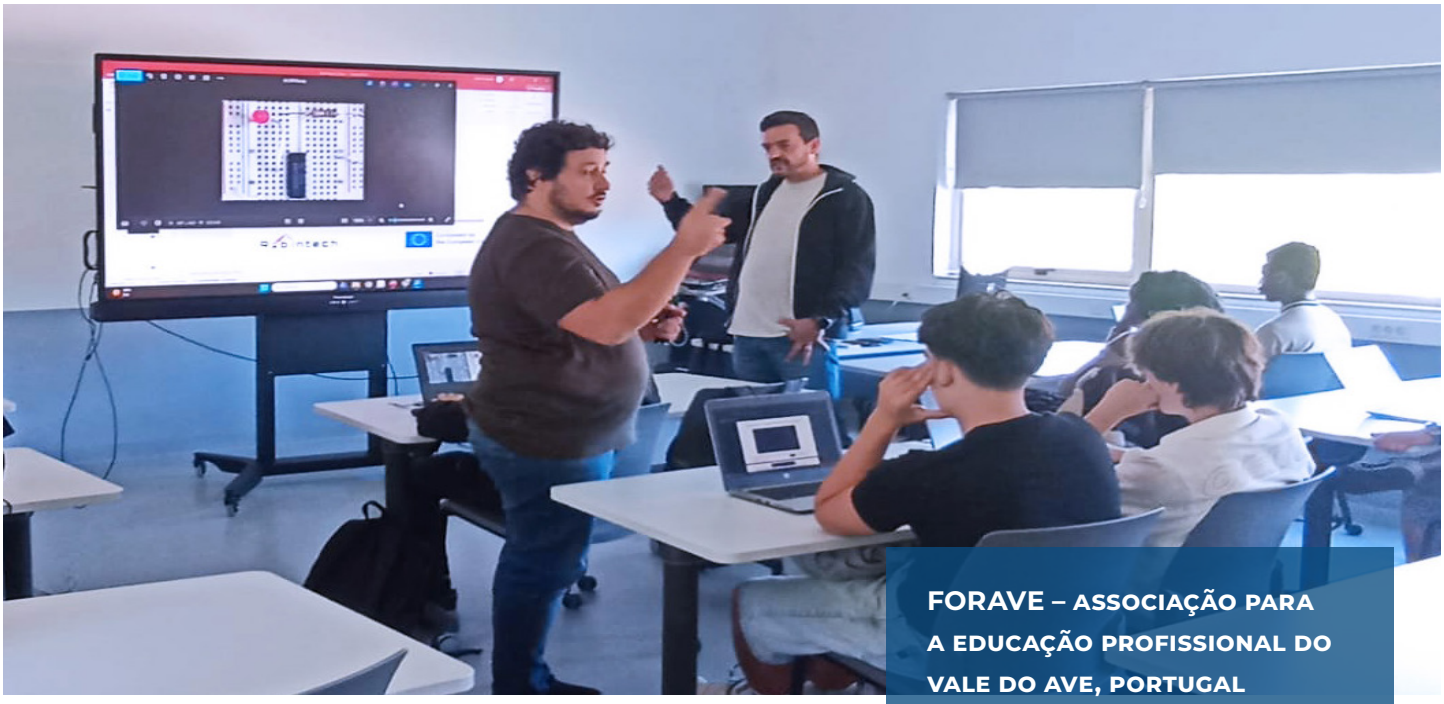
Practical activities involve the **safe operation and programming of ABB industrial robots,** including manual movement, position teaching and the development of basic RAPID programs. Learners also explore communication between an **ABB robot and a Siemens PLC** using digital input and output signals, developing the skills needed to coordinate robotic movements and perform automated operations, such as **pick-and-place tasks.**

Through technical demonstrations, programming exercises and practical system integration activities, learners develop competencies in **robot control, industrial communication and automated production processes,** preparing them for the technological requirements of modern manufacturing environments.



MACHINE VISION SYSTEMS – PRACTICAL APPLICATIONS OF ARTIFICIAL VISION IN ENGINEERING AND INDUSTRY

escola profissional forave



FORAVE – ASSOCIAÇÃO PARA A EDUCAÇÃO PROFISSIONAL DO VALE DO AVE, PORTUGAL

Duration: 20hours

The training module ***Machine Vision Systems – Practical Applications of Artificial Vision in Engineering and Industry*** introduces vocational education learners to the principles, technologies and industrial applications of artificial vision.

As manufacturing processes become increasingly automated, **machine vision systems** play an essential role in quality inspection, component identification, dimensional measurement, product traceability and robotic guidance. By enabling machines to acquire, process and interpret visual information, these technologies support more accurate, flexible and efficient production systems.

This **20-hour module** combines theoretical knowledge with hands-on learning experiences, introducing participants to the complete **machine vision workflow,** from image acquisition and digital image processing to industrial camera configuration and integration with robotic systems.

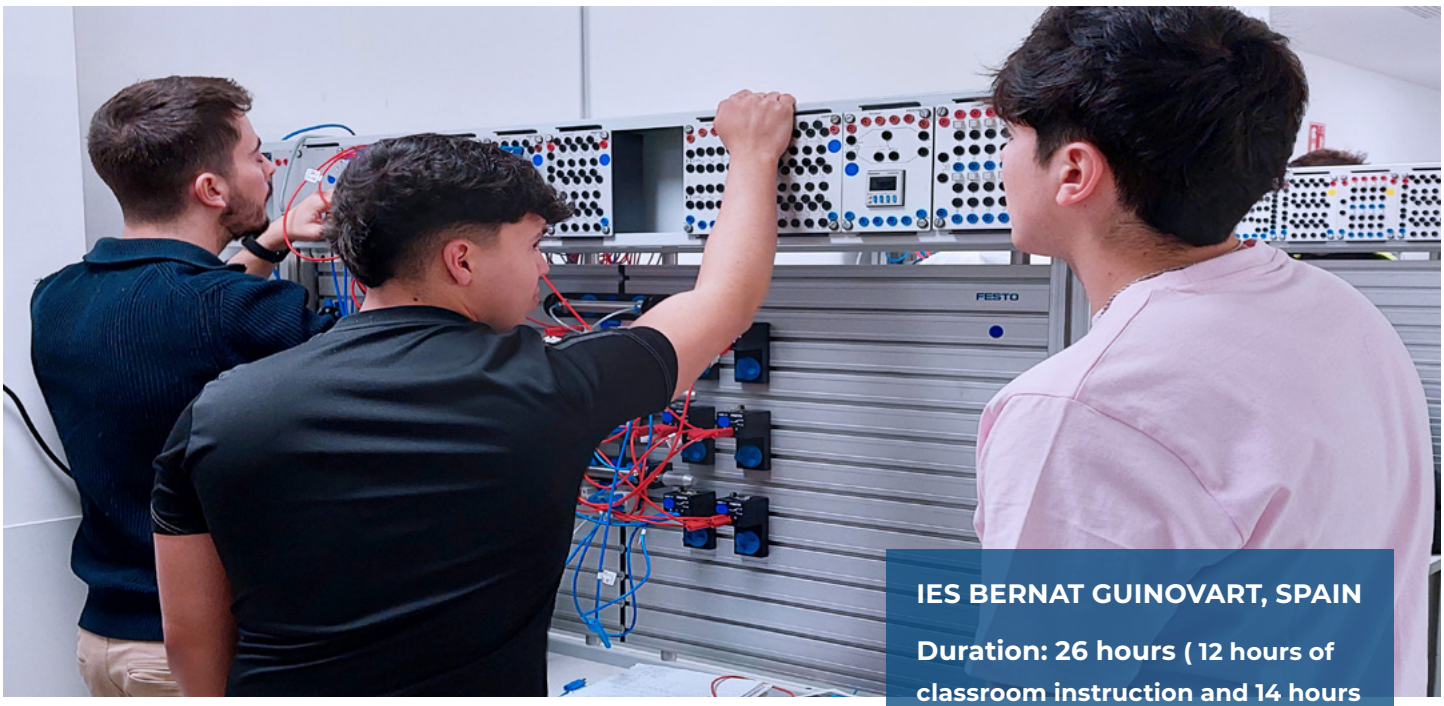
The training incorporates **Python programming and the OpenCV library,** alongside practical activities involving **Omron FQ2-S15100N and Turck VE202G1A** industrial smart cameras. Participants also explore the integration of machine vision with the **FANUC ER-4iA industrial robot,** learning how visual information can guide robotic movements and support automated handling operations.

Through demonstrations, programming exercises, industrial study visits and a collaborative final project, learners develop **practical competencies** that reflect the technological requirements of modern industrial environments.



GETTING STARTED WITH EPLAN ELECTRIC 2025: FUNDAMENTALS FOR ELECTRICAL DESIGN

IES Bernat Guinovart



IES BERNAT GUINOVART, SPAIN

Duration: 26 hours (12 hours of classroom instruction and 14 hours of practical activities)

The training module ***Getting Started with EPLAN Electric 2025: Fundamentals for Electrical Design*** introduces vocational education students to professional computer-aided electrical design and technical documentation for industrial automation systems.

Electrical engineering documentation plays a fundamental role in the design, installation, operation and maintenance of industrial equipment. Accurate electrical schematics, consistent device identification and standardised project structures are essential for ensuring the reliability, traceability and efficiency of automated systems.

This **26-hour module** provides learners with the **knowledge and practical competencies required to use EPLAN Electric P8,** a professional engineering software environment widely applied in electrical design and industrial automation.

The training combines theoretical explanations, software demonstrations, video tutorials, guided exercises and practical assessments. Participants progressively develop an electrical engineering project, beginning with basic project creation and advancing towards electrical schematic development, reusable templates, PLC integration and device identification.

The module is particularly relevant for students in electrical engineering, mechatronics and automation, offering an introduction to professional documentation practices used in industrial environments.



ROBOT WELDING: FROM WELDING FUNDAMENTALS TO ROBOTIC SIMULATION AND PROGRAMMING



KOULUTUSKUNTAYHTYMÄ OSAO, FINLAND

Duration: **Flexible training formats of 13, 26 or 39 hours. The 26-hour format includes 2 hours of theoretical instruction and 24 hours of practical activities.**

The ***Robot Welding*** training module introduces learners to the principles, technologies and practical applications of robot welding in modern manufacturing.

Robotic welding has become an increasingly important technology in the metalworking and mechanical engineering industries, contributing to improved productivity, consistent manufacturing quality and more efficient production processes. This module combines fundamental welding knowledge with industrial robotics, digital simulation and robot programming, allowing participants to understand how automated welding systems are designed, configured and operated.

A central feature of the training is the use of ABB RobotStudio, a professional simulation and offline programming environment that enables learners to develop and test robotic applications in a virtual setting before implementation on physical equipment.

Participants also explore ABB RAPID programming, robot movement commands, welding parameters and the configuration of robotic welding cells.

The module adopts a strongly practical approach, supported by technical demonstrations, simulation exercises, instructional videos and an integrated final assignment. It is primarily intended for vocational education students from their second year onwards, as well as professionals seeking to update their competencies in industrial robotics and welding automation.



SMART SENSING & INDUSTRIAL NETWORKS: CONNECTING INTELLIGENT SENSORS TO INDUSTRIAL AUTOMATION



ROC Mondriaan, The Netherlands

Duration: 26 hours

The ***Smart Sensing & Industrial Networks*** training module introduces vocational education learners to intelligent sensor technologies, industrial communication networks and their integration into modern automation systems.

As manufacturing environments become increasingly connected and data-driven, intelligent sensors play a fundamental role in monitoring production processes, collecting operational information and supporting automated decision-making.

Unlike conventional sensors that provide simple switching signals or analogue measurements, smart sensors can communicate detailed process data, device status and diagnostic information, contributing to more flexible and efficient industrial operations.

This module focuses particularly on IO-Link technology, decentralised industrial networks, sensor configuration and communication with programmable logic controllers.
Using a Pepperl+Fuchs UC250 ultrasonic sensor, Turck industrial network modules, Turck Automation Suite and the CODESYS programming environment, participants explore how sensor information travels from field devices to PLCs and human-machine interfaces.

The training combines theoretical explanations with practical equipment configuration, PLC programming, industrial network troubleshooting and application-based problem-solving.

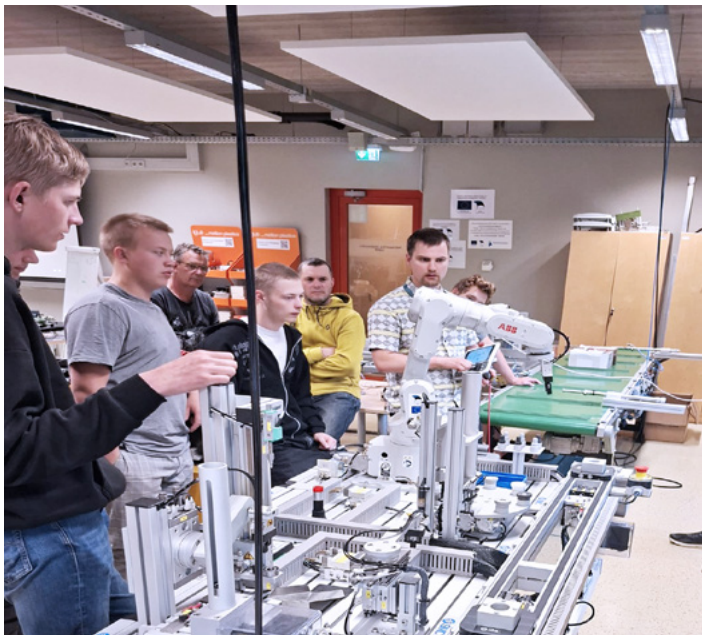


PILOTING PROVED THE SUCCESS OF NEW TRAINING MODULES

During the first half of 2026, the ROBINTECH project successfully piloted industrial robotics modules in real classroom settings. All new modules: **EPLAN 2025, Machine Vision Systems, CNC-robot integration, Robot Welding, and Smart Sensors (RFID), were tested.**



Student feedback across all partner schools was exceptionally high, validating both the practical focus and instructional quality of the materials. **Learners praised the hands-on approach using real equipment, step-by-step guides, and instructional videos.** Across the evaluated criteria, such as course usefulness, material clarity, and practical real-world application, average student ratings consistently ranged between 4.15 and 5.0 out of 5.



The stand-out metric from the piloting phase was the endorsement rate: 100% of participating students stated they would recommend their course to others. This unanimous recommendation far surpassed project benchmarks and gave the green light to publish open educational modules.

PARTNERS