



Project ID: 2023-1-HU01-KA210-VET-000156243

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Classroom Utilization

Project Details and Disclaimer:

- **Project Title:** Discover the Green Life with Robots.
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The utilization plan details which technological modules are integrated into which targeted subjects for the two professional fields (which typically cover the 12th and 13th grades in vocational training). To ensure proper processing and understanding of the modules, it is recommended to allocate **at least 10 class hours per module** within the framework of the subjects.

1. Electrotechnician Classes

For these classes, the emphasis is on **physical control, cabling, hardware interventions**, and PLC technology. The project elements (MCU, PLC, Robotics) can be used in the following subjects:

| Module | Targeted Subjects | Content and Utilization Method |
|---|----------------------------------|--|
| B. PLC and Industrial Control | Automation, Control Engineering. | Understanding the concept of PLC (industrial computers), and the cyclic operational principle (input sensing, program execution, output modification). Programming practices in Ladder Diagram, FBD, and Structured Text languages, in the Zelio Soft 2 environment (FBD mode). |
| A. MCU basics (Microcontrollers) | Digital Technology, | Understanding control circuits. Simulating the Arduino UNO-based Heating/Cooling project (which can serve as a simplified climate control base for the |



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| | Embedded Systems. | smart greenhouse) in Tinkercad . Understanding physical wiring (e.g., TMP36 sensor) and the control logic (e.g., heating below 18°C). |
| D. Robotics and Assembly | Workshop Practice, Basic Electronics. | Hardware execution, soldering , and assembly practices using the Line Follower robot building guide. Special attention is paid to the polarity of components (LED, capacitor, transistor) and the setting of motor control. |

2. Industrial IT Specialist Classes

For these classes, the emphasis is on **software, network communication, data management**, and the complex programming of microcontrollers. The project elements (IoT, MCU, Robotics) can be used in the following subjects:

| Module | Targeted Subjects | Content and Utilization Method |
|---------------------------------------|--|--|
| C. IoT and Database Management | Network Knowledge, Database Management, Programming. | System integration and IoT topics. Full processing of the Weather Station project (similar data collection is required for the smart greenhouse). Client-side development (ESP32/Arduino) for transmitting DHT11 sensor data via network (HTTP POST request). Server-side development through analyzing PHP code and saving to an SQL database , as well as web display using HTML/CSS/PHP (GET method). |
| A. MCU basics and History | Computer Architectures, Programming. | Microcontroller theory and the history of microprocessors (e.g., Intel 4004, 8080). Introduction to modern devices (Raspberry Pi Pico, Arduino, ESP32/ESP8266) suitable for IoT projects. Usage of programming environments (Thonny MicroPython and Arduino IDE). |



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| D. Robotics and Control | Embedded Systems Programming, Algorithmization. | Analysis of control algorithms, for example, understanding the Assembly language program code for the ROBIKA PIC line-follower robot , and analyzing the role of the PWM signal in motor control. |
|--------------------------------|---|--|

Summary

The common general objective for both professional fields is the **deepening of practical knowledge** through the application of microcontrollers and PLCs, which are the fundamental tools of industrial automation. Furthermore, emphasis is placed on developing **transversal competencies**, such as hardware (soldering, wiring) and software (programming, database management) skills within the framework of professional subjects.