AI & SUSTAINABILITY IN VET EDUCATION

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Title of WP: WP3 – AI-SAVES@ProjectHub

Activity Reference: Irrigation system

Logo:

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1. Project Title:

IOT-Driven Agriculture for Vocational Education: A Practical Approach

2. Project Category:

IOT

3. Project Description:

This project aims to design and implement a smart irrigation system that automatically controls water flow depending on soil humidity and environmental conditions.

The system uses a soil moisture sensor to monitor the humidity level in the soil, and a relay-controlled pump to irrigate only when the soil is considered DRY. A temperature and humidity sensor (DHT11) helps to adapt watering cycles to climate conditions; the water pump will work for a longer time if the air humidity is lower than 50%. Data collected by the sensors can be logged and visualized, helping students understand how automation contributes to efficient water management and environmental care.

From a sustainability perspective, the system reduces unnecessary energy consumption through automated irrigation, and activating the system only when needed. This leads to significant energy and water savings and aligns with sustainable agriculture principles.

4. Keywords:

IOT, Vocational Education, Automation, Hands-on Learning

5. Target Audience:

Both educators and Students

6. Project Objectives:

- Develop practical knowledge in IOT.
- Understand how to design and implement an automatic irrigation system.
- Gain hands-on experience in programming microcomputers.

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- Understand system-level design: connecting sensors, controlling actuators, and managing data flow.
- Improve teamwork, documentation, and presentation skills.
- Explore sustainability through energy-efficient design choices

7. Project Timeline:

Task	Estimated Hours
Raspberry hardware and programming	6 hours
Practice and validation	6 hours
Documentation and presentation preparation	3 hours
Total	**15 hours**

8. Resources Provided:

- Raspberry Pi and sensor kits (AI-SAVES Kit)
- Python programming guides
- Needed software and hardware

9. Tools and Technologies Used:

- Raspberry PI 4

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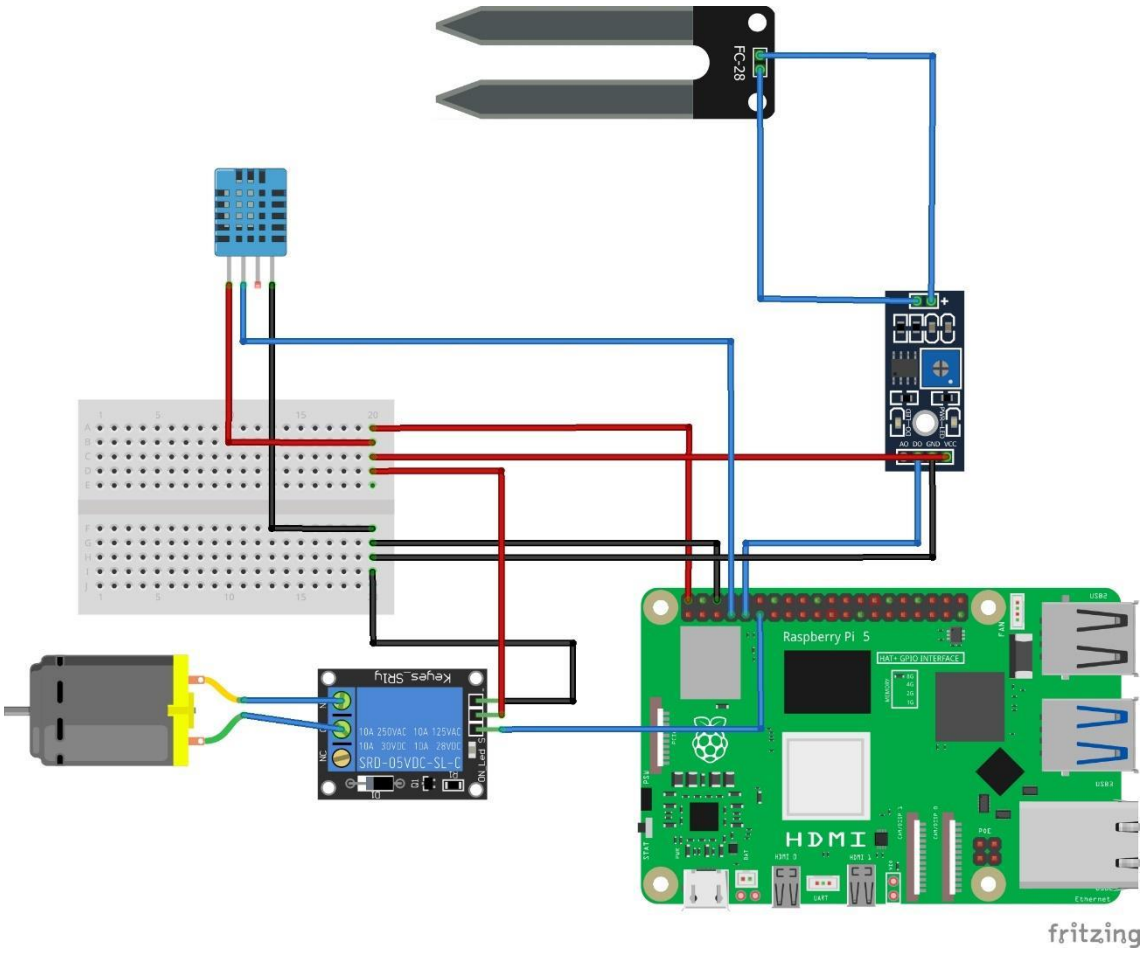
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- Hardware: DHT11 humidity sensor, soil moisture sensor, 5 volt relay, water micropump (5 Vdc)
- Python programming language
- GitHub for version control and project collaboration
- Fritzing for circuit design and testing

10. Step-by-Step Implementation Plan:

1. Set up the Raspberry Pi with the necessary software (Raspbian OS, Python).
2. Conduct practical sessions where students build and program the IOT driven domotic system.

a. Assemble circuit according to the GPIO mapping.



b. Activate Python virtual environment:

cd project_folder_path

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python -m venv .venv

source .venv/bin/activate

c. Install required libraries:

pip install gpiozero adafruit-blinka adafruit-circuitpython-dht rpi-lgpio

d. Run the script using Geany

python watering-higro-dht11.py

e. Use the different inputs/outputs to check the system is running properly

3. Evaluate student understanding through project demonstrations.

11. Evaluation Criteria:

- **Hardware Implementation (25%):** Properly connected circuit, no loose wires, correct sensor placement.
- **Code Functionality (40%):** Script runs without errors, correctly detects temperature changes, including MQTT funcionality.
- **Understanding & Explanation (20%):** Ability to explain how the system works and its real-world applications.
- **Creativity & Optimization (15%):** Suggestions for improvements, such as adding additional automation features.

12. Languages Available:

English

13. Contributors:

- **Jokin Goioaga (Project Lead)** – Lead educator responsible for project development and coordination.
- **Aitor Rey (Technical Expert)** – Provided expertise in IOT.

14. Feedback and Continuous Improvement:

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- **Surveys**: At the end of each milestone, students and educators will complete feedback surveys to assess the effectiveness of the project.
- **Project Reviews**: After project completion, a final review meeting will be held to discuss potential improvements for future AI-based projects.
- **Data Analysis**: Feedback data will be analyzed to identify strengths and areas for improvement, informing future projects.

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