OULU UNIVERSITY OF APPLIED SCIENCES

Weather station

Tomas Paananen, Taneli Huikari, Jani Heikkilä, TVT22spl
Information Technology, Electronics Application Project

Introduction

The purpose of this project was to create a functioning weather station using the ESP32 WROOM 32 microcontroller, displaying weather data on an OLED screen.

Objectives

The objective was to construct a weather station that measures humidity, temperature, atmospheric pressure, rainfall, and wind speed. The station is programmed using Arduino.

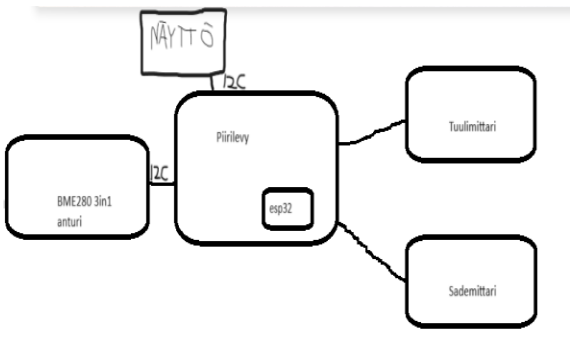

FIGURE 1. Block Diagram.

Methods

The microcontroller used in the project is the ESP32 WROOM 32. We employed BME280 and HC-SR04 sensors. The BME280 measures temperature, humidity, and atmospheric pressure. The HC-SR04 is an ultrasonic sensor that measures the water height in the rain gauge. A Hall sensor used in the anemometer measures the rotational speed of the blades' axis. The connection is shown in figure 1. The finished circuit board is shown in figure 3. A 12V voltage is supplied to the circuit board, which is converted to suitable levels for each component by LM7805 and MCP1700x voltage regulators. The LM7805 converts the voltage from 12V to 5V and the MCP1700x from 5V to 3.3V. See figure 2. The rain gauge automatically empties itself at set intervals or when the container is full.

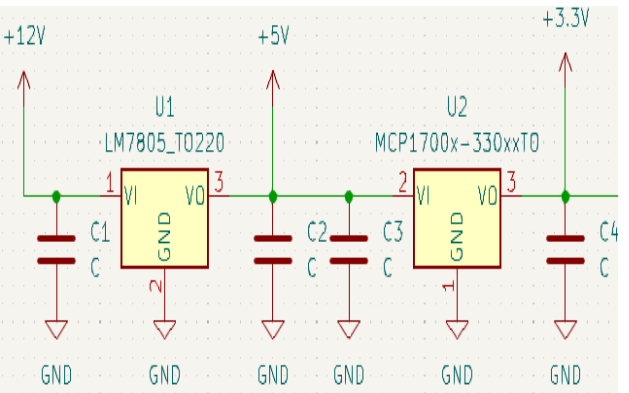

FIGURE 2. Voltage Regulator Assembly.

Results

The weather station functions exactly as we planned. The display shows weather data in real time, with

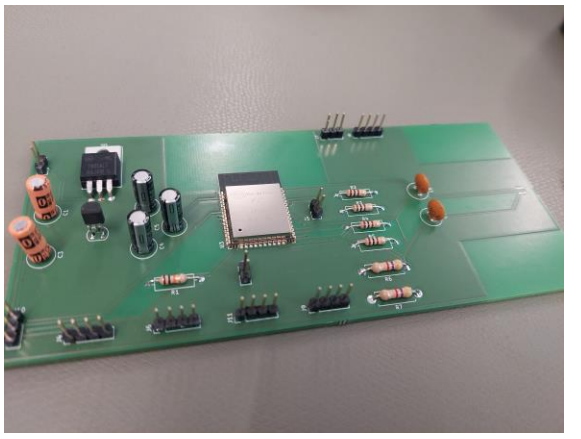

FIGURE 3. Circuit Board Without Sensors and Display.

Conclusions

In this project, we created a functional weather station that reliably measures weather data. Through careful planning and seamless teamwork, we achieved an excellent outcome. In summary, the project provided valuable learning experiences and demonstrated the potential of school projects in developing technical skills.

References

1.ESP32 WROOM 32 datasheet: https://www.espressif.com/sites/default/files/documentation/esp32-wroom-32_datasheet_en.pdf

2. BME280 datasheet: https://www.mouser.com/datasheet/2/783/BST-BME280-DS002-1509607.pdf

3. Hall-sensor datasheet: https://www.alldatasheet.com/datasheet-pdf/pdf/55092/ALLEGRO/A3144.html

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