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Design and Implementation of Dispenser Water Volume Monitoring System Based Internet of Things

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Abstract: ***This research describes the water dispenser volume monitoring system inside room H118. The volume of water is obtained from weight measurements uses a load cell. To determine the feasibility of the room used for weight measurement, DHT-11 is used to measure air temperature and humidity. Data in the form of water volume, air temperature, and humidity are sent to the Thing Speak database. Users can monitor the data through the Thing View application via smartphone.***
Keywords: Dispenser, load cell, DHT-11, Wemos D1 Mini, Thing Speak.

I. INTRODUCTION

Nowadays, people use dispenser to store and collect mineral water. But in its use, dispensers on the market still have limitations. Users can only monitor the volume of water by looking directly at the dispenser. This is happened because there is no long-range dispenser with water volume monitoring system that can convey information to users. For this reason, this research describe the design and implementation of dispenser water volume monitoring system based internet of things.

II. METDOHS

A. Mass to Volume Conversion

The volume of water is obtained from weight measurements. Then, the weight is convert using density equation. The density of water is 1000 kg/m³. [1]

$$\rho = \frac{m}{V} \quad (1)$$

with:
ρ = density (kg/m³)
m = mass (kg)
V = volume (m³)

B. Air Temperature and Humidity Requirements

In its implementation, the weight measurement must consider several factors such as air temperature and humidity in the system environment. The required air temperature is 10 – 40 °C and the required humidity is 20 - 80% RH. [2]

Table I
Air Temperature And Humidity Requirements

Air Temperature	Humidity
10 – 40 °C	20 – 80 %RH

III.COMPONENTS USED AND SYSTEM DESIGN

A. Load Cell

Load cell is sensors or transducers that convert weight into electrical signals. Load cell is used for weight measurements. Because the volume of water to be measured is 19 liters, then the load cell capacity used is 20 kg. [3]

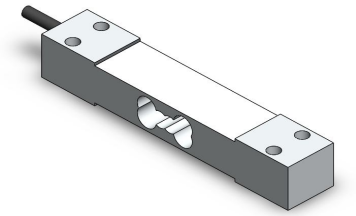

Fig. 1 Load Cell

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B. DHT-11

DHT-11 is sensors or transducers that convert air temperature and humidity into electrical signals. DHT-11 is used to measure air temperature and humidity to determine the feasibility of the room. [4]

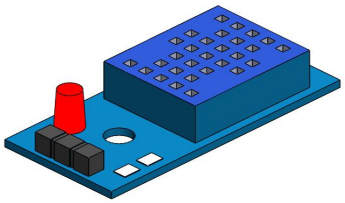

Fig. 2 DHT-11

C. Wemos D1 Mini

Wemos D1 mini is a wifi module with a 32-bit RISC CPU Xtensa LX106 Tensilica microcontroller which can be programmed using Arduino IDE software.

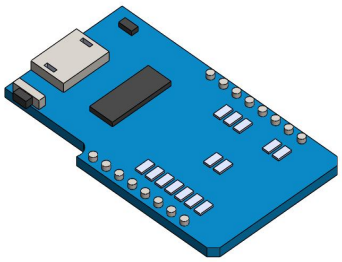

Fig. 3 Wemos D1 Mini

D. Sensor Layout

The load cell is placed under the gallon and DHT-11 is placed behind the gallon. Sensor layout design is shown in Fig. 4.

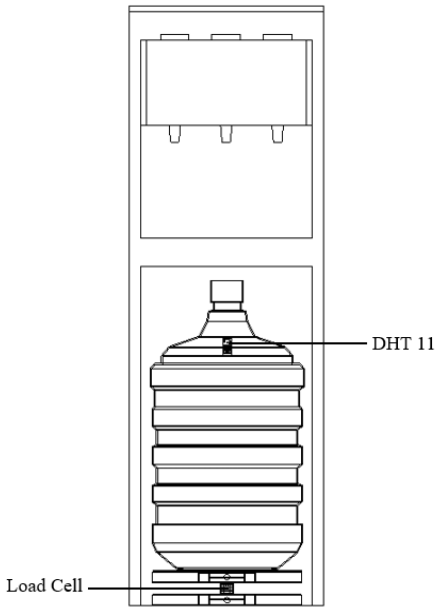

Fig. 4 Sensor Layout

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IV. RESULTS AND ANALYSIS

A. Measured Air Temperature

The measured air temperature compared to the required air temperature. From the results, the measured air temperature range in room H118 is 24 – 30 °C. Because the measured air temperature range is still within the required air temperature range, so room H118 is feasible to use in weight measurements.

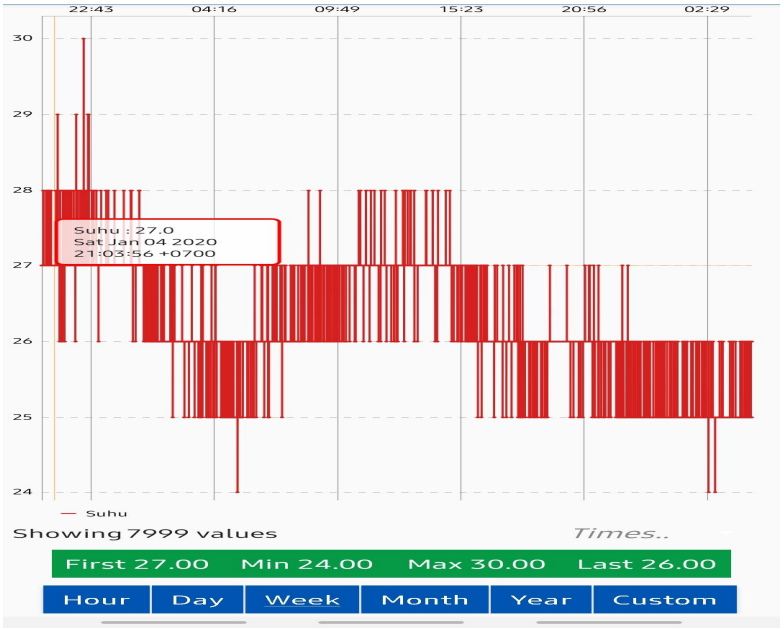

Fig. 5. Measured Air Temperature in Room H118

B. Measured Humidity

The measured humidity compared to the required humidity. From the results, the detected air humidity range in room H118 is 56 – 75 %RH. Because the measured humidity range is still within the required humidity range, so room H118 is feasible to use in weight measurements.

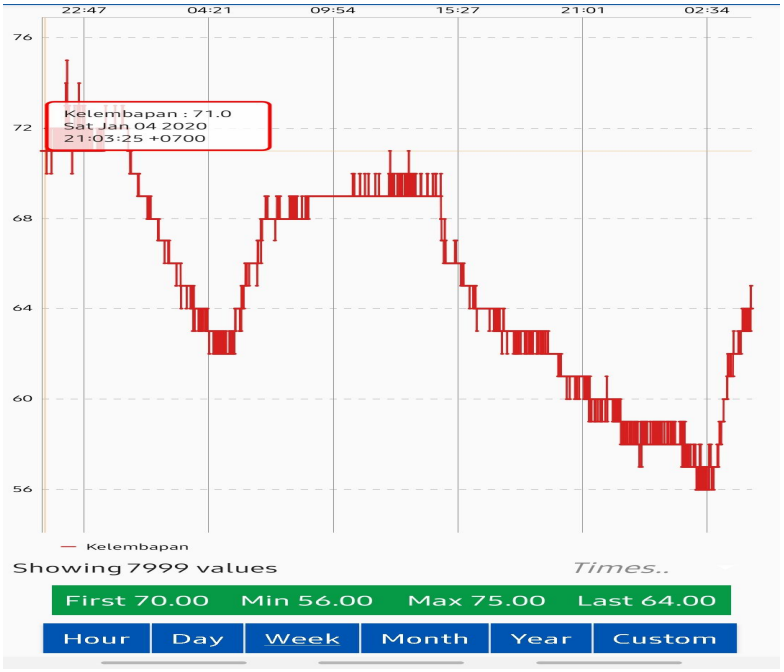

Fig. 6. Measured Humidity in Room H118

C. Water Consumption

The amount of water consumption can be calculated from the volume of water measured in a certain period. The amount of water consumed in room H118 with a population of 6 people is 9.4 liters in 24 hours.

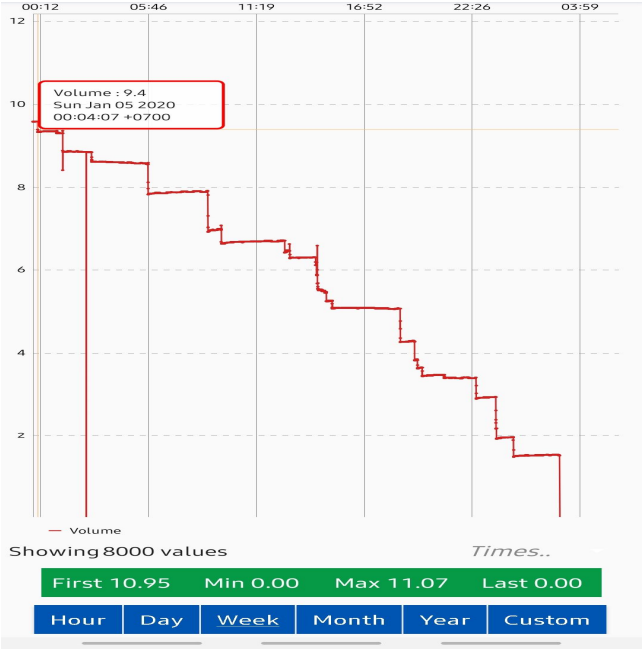

Fig. 7. Water Consumption in Room H118

V. CONCLUCIONS

The dispenser water volume monitoring system must work at the required air temperature and humidity. Room H118 as the place for implementing the system meets the required temperature and humidity, so the dispenser water volume monitoring system can be implemented in this room. The amount of water consumption can be calculated from the volume of water measured in a certain period. The amount of water consumed in room H118 with a population of 6 people is 9.4 liters in 24 hours.

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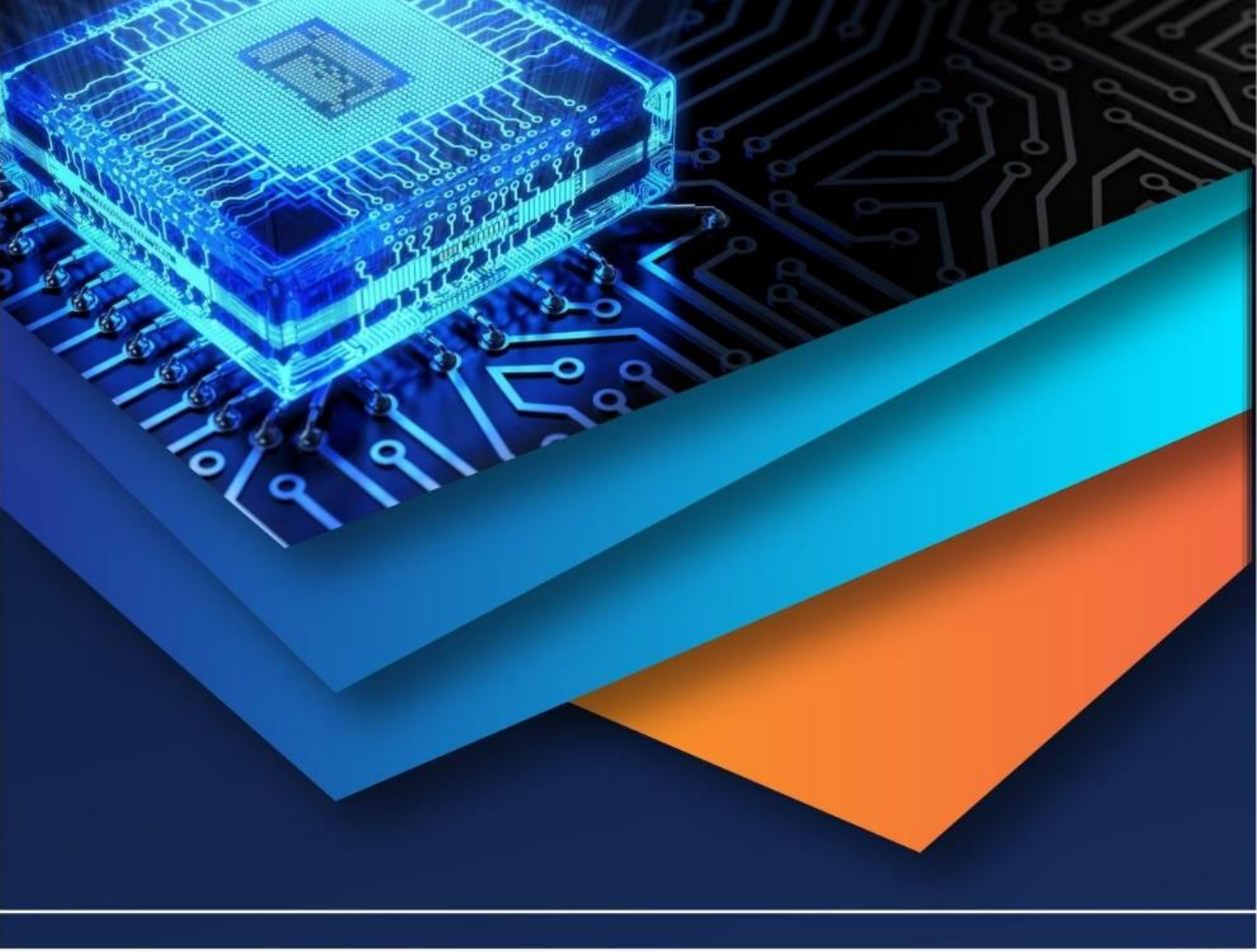
REFERENCES

[1] Halliday, R. Resnick and J. Walker, Fundamentals of Physics Extended, 10th ed., Danvers: John Wiley & Sons, 2014, p. 7.
[2] S. V. Gupta, Mass Metrology The Newly Defined Kilogram, 2nd ed., Delhi: Springer, 2019, pp. 117-121.
[3] G. Korotcenkov, Handbook of Humidity Measurement: Methods, Materials, and Technologies, vol. I, Florida: CRC Press, 2018, p.
[4] Rice Lake Weighing System, Load Cell and Weigh Module Handbook, Wisconsin: Rice Lake Weighing System, 2017, pp. 20-22.



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