



University of Calcutta

Institute of Radio Physics and Electronics

Project report of Mini Project on IoT

Topic: Design an IoT based Smart room temperature-controlling mechanism for thermal comfort

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GROUP MEMBERS

ARKA MAIKUP

CLASS ROLL- 428

UNIVERSITY ROLL- T91/ECE/204060

REGISTRATION NO- D01-1111-0086-20

SAYAN MONDAL

CLASS ROLL- 429

UNIVERSITY ROLL-T91/ECE/204070

REGISTRATION NO-D01-1111-0094-20

SOURADEEP DAS

CLASS ROLL- 433

UNIVERSITY ROLL- T91/ECE/204078

REGISTRATION NO- D01-1111-0096-20

DECLARATION BY GROUP **MEMBERS**

We, the group members solemnly declare that the project is based on our own under the supervision of our Professor Dr Sumitra Mukhopadhyay and Dr. Anisha Halder Roy. We also want to thank Mr. Prithwijit Mukherjee to help us regarding this project. We assert the statements made and conclusions drawn are an outcome of our project work. We further certify that: • The work contained in the report is original and has been done by us under the general supervision of our supervisor. • Whenever we have used materials (text, diagrams, etc) from other sources, we have given due credit to them in the text of the report and giving their details in references.

ACKNOWLEDGEMENT

We would like to thank all our faculty members and our coordinator Professor Dr. Kaushik Mandal for providing us this opportunity to undertake the project on electronic design. We would like to thank Professor Dr Sumitra Mukhopadhyay and Dr. Anisha Halder Roy for their guidance. We also want to thank Mr. Prithwijit Mukherjee to help us regarding this project and finally all our classmates who have helped us in making our project a success.

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ABSTRACT

In today's world, where energy conservation and automation are becoming increasingly important, this topic is highly relevant. By the end of this presentation, you will have a clear understanding of how we have used IoT and Arduino to create an efficient and effective smart room temperature control system.

We are using Arduino Uno, DHT11 sensor, ESP32, Power supply, Light Sensor, HC SR04, Rain Sensor for the circuit design. We are using Thingspeak to analyse data collected from the sensors. We have designed a mobile app using MIT APP INVENTOR.

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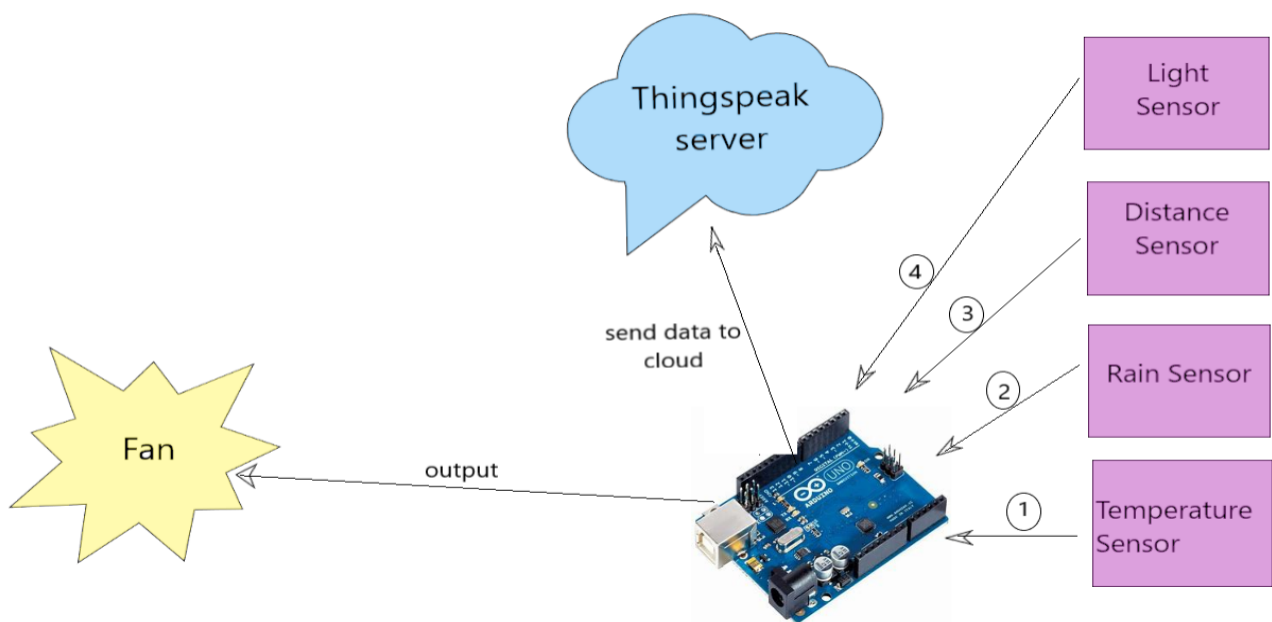
THEORY AND WORKING

FUZZY LOGIC

Fuzzy logic is a form of logic that deals with partial truth and imprecise information. It allows variables to have real values between 0 and 1, instead of just true or false. Fuzzy logic is based on fuzzy sets and fuzzy rules that can model vagueness and uncertainty 1,2,3.

Some examples of fuzzy logic applications are:

- Temperature control systems that adjust the heating or cooling based on fuzzy inputs like “warm” or “cool”.
- Image processing algorithms that enhance or reduce the sharpness of images based on fuzzy parameters like “blurry” or “clear”.



Process Flow

MATERIALS

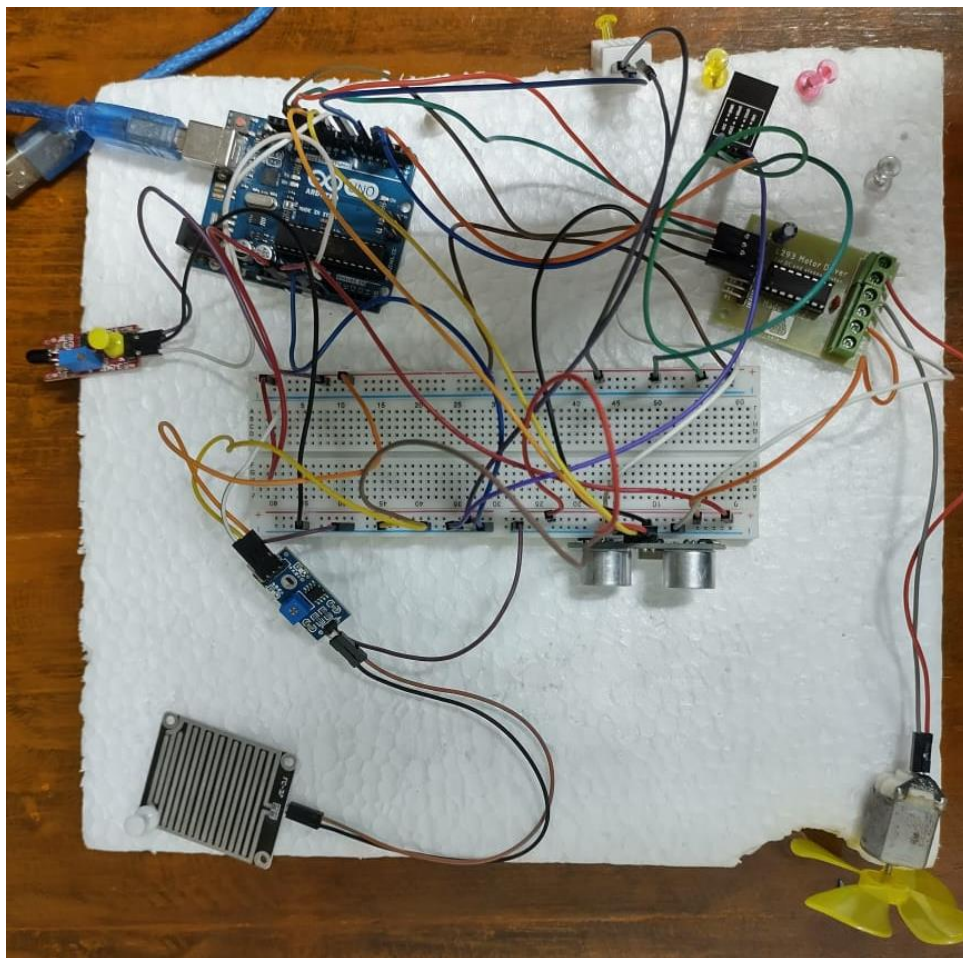
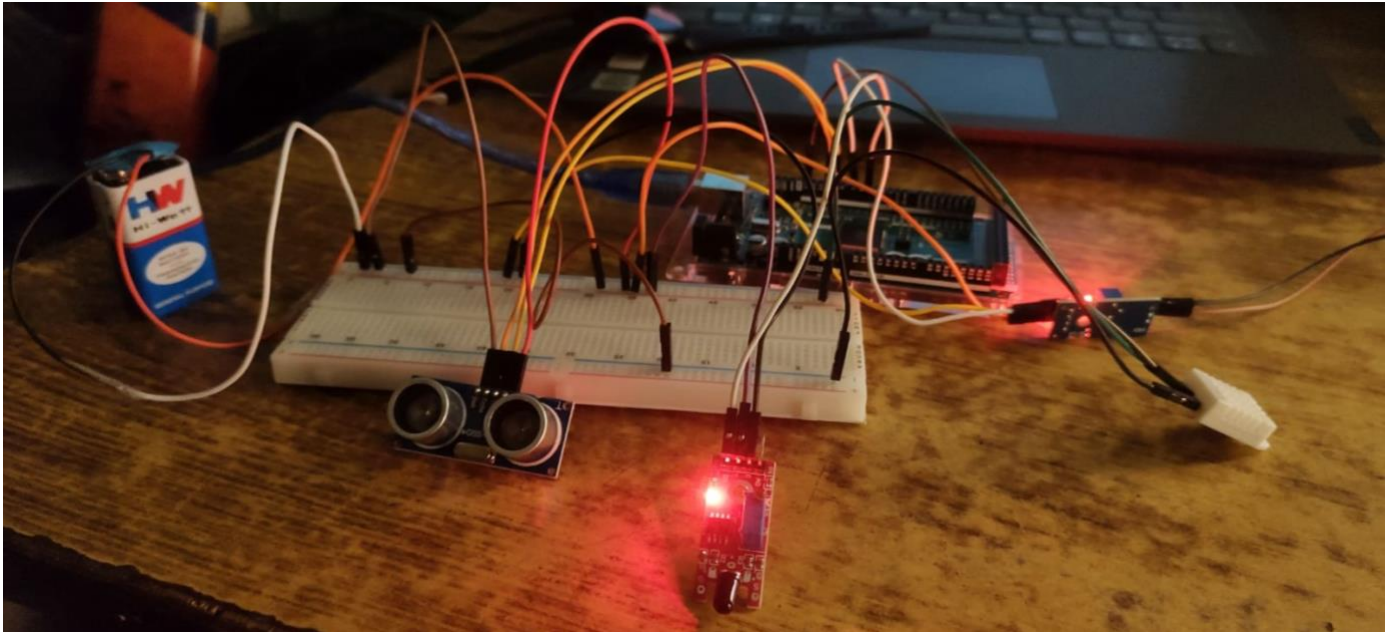
COMPONENTS

- Arduino Uno
- DHT 11 Sensor
- ESP 32
- Light Sensor
- HC-SR04
- Rain Sensor
- Motor Driver
- Fan

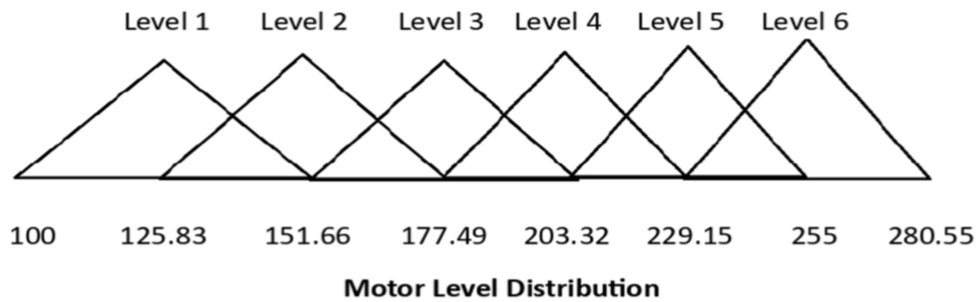
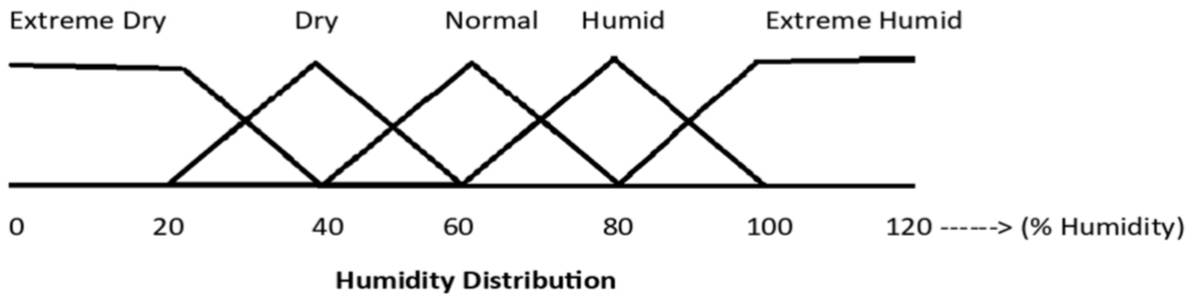
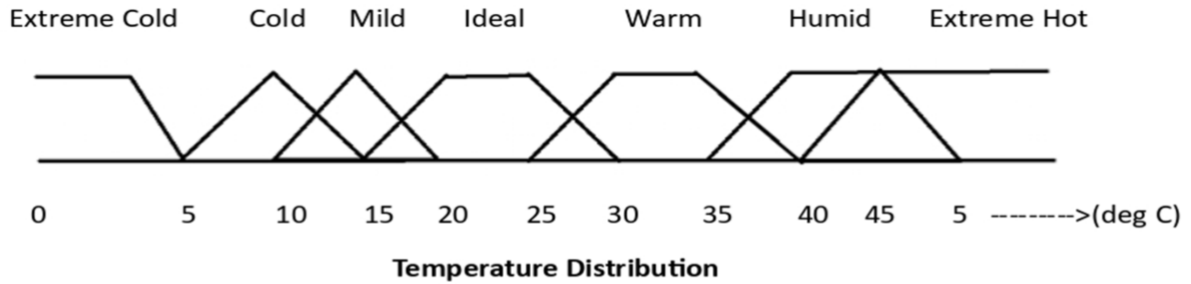
SOFTWARES

- Arduino Uno IDE
- THINGSPEAK
- MIT APP INVENTOR

CIRCUIT CONNECTIONS



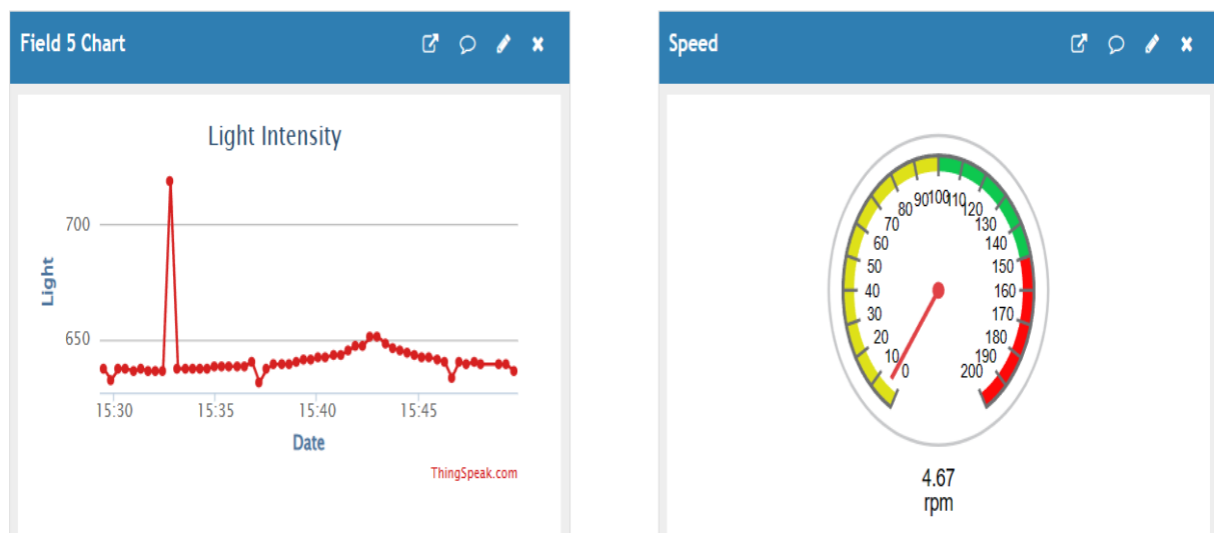
FUZZY MODEL



	Extreme Cold	Cold	Mild	Ideal	Warm	Humid	Extreme Humid
Extreme Dry	L0	L0	L1	L2	L2	L4	L6
Dry	L0	L0	L1	L3	L3	L5	L6
Normal	L0	L0	L1	L4	L4	L5	L6
Humid	L0	L1	L2	L5	L5	L5	L6
Extreme Humid	L0	L1	L3	L6	L6	L6	L6

Fuzzy Logic

THINGSPEAK CLOUD



Data stored on Thingspeak

MIT APP INVENTER

Mobile app is built on MIT APP INVENTER. The Thingspeak data is connected to the mobile app. The user can operate the whole system using the mobile app.



App Display

APPLICATIONS

1. One real-life application of IoT-based smart room temperature control is in hospitals. Maintaining a consistent temperature is crucial for patient comfort and recovery, and IoT-based systems can ensure that the temperature remains within a safe and comfortable range. These systems can also alert staff if there are any fluctuations in temperature, allowing them to take action before any harm is done.

2. Another example is in commercial buildings, such as offices and hotels. IoT-based smart room temperature control can help reduce energy consumption and costs by automatically adjusting the temperature and switch off and on the appliance based on occupancy and usage patterns. This not only saves money but also reduces the carbon footprint of the building.

3. Maintaining an optimum temperature allows hospitals and other healthcare facilities to protect medicines from damage, keep patients safe and comply with strict industry regulation. To be fully compliant with all national regulatory bodies, including the Medicines and Healthcare products Regulatory Agency (MHRA), Food and Drug Administration (FDA), and NHS, healthcare facilities must demonstrate a comprehensive regimen of temperature monitoring and accurate record-keeping.

CONCLUSION

In conclusion, we have learned about the importance of smart room temperature control and how IoT technology can be used to achieve it. We have explored the components required for an IoT-based smart room temperature controlling mechanism using Arduino, and how they work together to regulate the room temperature. We have also discussed the application of this technology and how it helps to reduce the consumption of energy.

As we move towards a more connected world, it is important to stay up-to-date with contemporary technological advancements. By learning more about IoT-based smart room temperature control, you can not only improve your own living or working conditions but also contribute to a more sustainable future.

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