Room Temperature Monitoring System

Mini Project Report submitted in partial fulfillment.

of the requirement for the degree of

T. E. (Information Technology)

Submitted By

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2021-22

CERTIFICATE OF APPROVAL

For

Mini Project Report

This is to Certify that

Shivani Parab

Swapnil Mundaware

Varad Birwatkar

Have successfully carried out Mini Project entitled

"**Room Temperature Monitoring System**"

In partial fulfillment of degree course in

Information Technology

As laid down by University of Mumbai during the academic year 2021-22

Under the Guidance of
"Prof. Vinita Bhandiwad"

Signature of Guide

Head of Department

Examiner 1

Examiner 2

Principal
Dr. S. A. Patekar

ACKNOWLEGEMENT

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We extend our sincere thanks to **Dr. Vipul Dalal**, Head of the Department of Information Technology for offering valuable advice at every stage of this undertaking. We would like to thank all the staff members who willingly helped us. We are grateful to VIDYALANKAR INSTITUTE OF TECHNOLOGY for giving us this opportunity.

The days we have spent in the institute will always be remembered and also be reckoned as guiding in our career.

1. **Shivani Parab**
2. **Swapnil Mundaware**
3. **Varad Birwatkar**

Table of Contents

Introduction

Internet of Things (IoT) plays a pivotal part in our daily life by controlling electronic devices using networks. The controlling is done by minutely observing the important parameters which generate vital pieces of information concerning the functioning of these electronic devices. Simultaneously, this information will transmit these vital statistics from the transmitting device as well as save the same on the cloud to access by the applications and supplementary procedures to use them. This scrutiny associates the outcomes of the environmental observances like the humidity and temperature measurements using sensors. The gathered information could be profitably used to produce actions like distantly dominant cooling, heating devices, or long-term statistics, which will be useful to control the same. The detected data are uploaded to the cloud storage through network and associate using android application. The system employs Nodemcu ESP8266 Wi-Fi module, DHT 11 Sensor, Breadboard and Jumping Wires. The experimental results show the live temperature and humidity of the surroundings. Nodemcu ESP8266 Wi-Fi module is mainly used here for checking the temperature and humidity through the DHT 11 Sensor element. The sensors are used for measuring the temperatures from the surroundings, storing displayed information with different devices. Here, the ESP8266 Wi-Fi module has been used for data storing purpose.

Aim & Objectives

The aim of the **Room Temperature Monitoring System project** was to automate and control temperature for a server room. The system is allowed entry of a desired room temperature within a prescribed range and to exhibit overshoot and steady-state temperature error of less than 1 degree displaying the value in real time. It can be applied in industries, auditoriums, green house buildings, server rooms and nuclear facilities. It is shown that the solution requires broad knowledge drawn from several engineering disciplines including electrical, mechanical, and control systems engineering.

A temperature sensor has been used to measure the temperature of the room using. The simulation of the system has been done on WI-FI Module and the graphs showing relationship between server room temperature and the digital value from the sensor to validate the accuracy of the system. Hardware implementation has been also done. The results of the research and Output waveforms have been investigated. Various design criteria, performance characteristics, comparison with different parameters.

Problem Definition

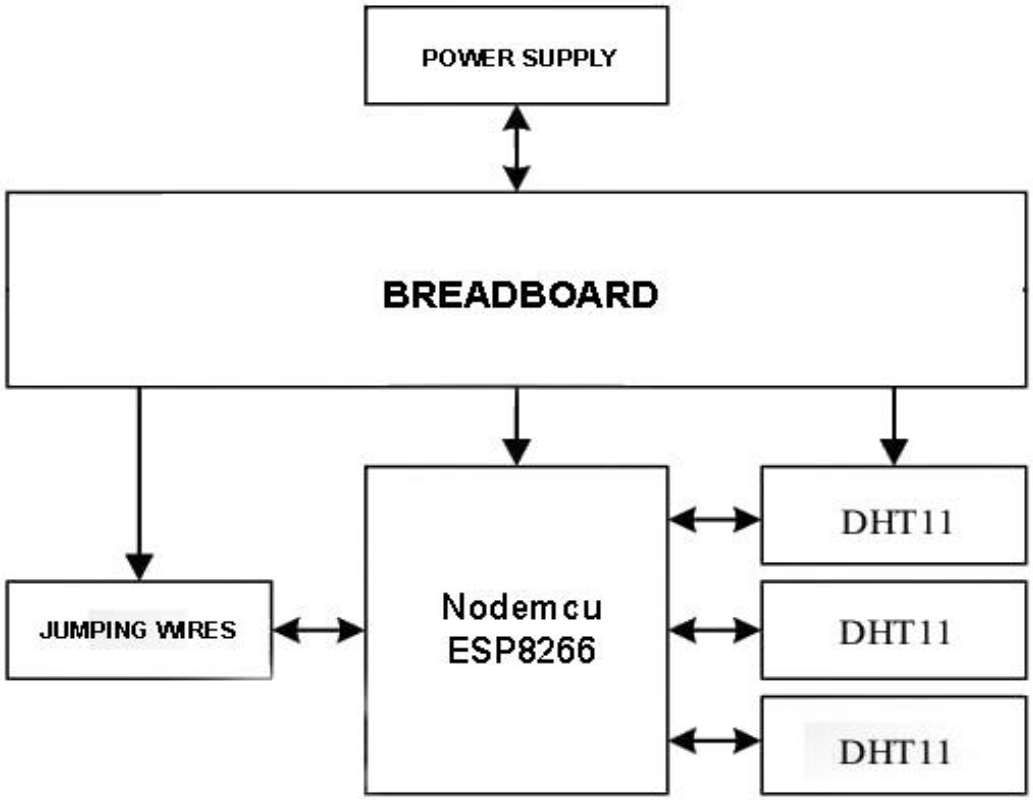
In a Room, at every corner we may find different temperature. If we take an example of server room. Computing equipment generates a lot of heat. Therefore, cooling systems are needed to maintain a lower temperature and ensure the safety of the machinery. Temperature monitoring can help managers achieve this goal. For instance, Computer Weekly contributor Clive Longbottom noted that monitoring for hotspots within the data center is critical to the prevention of fires.

So That's Why, Monitoring the temperature in the server room can make a difference when companies are trying to both save money and reduce their carbon footprint in the long term. Temperature sensors placed at strategic locations around the server room can help provide data center managers with real-time information about how hot, cool or humid the facility is. With this data, IT staff will know whether to adjust cooling mechanisms, potentially eliminating hot spots and preventing costly server room fires.

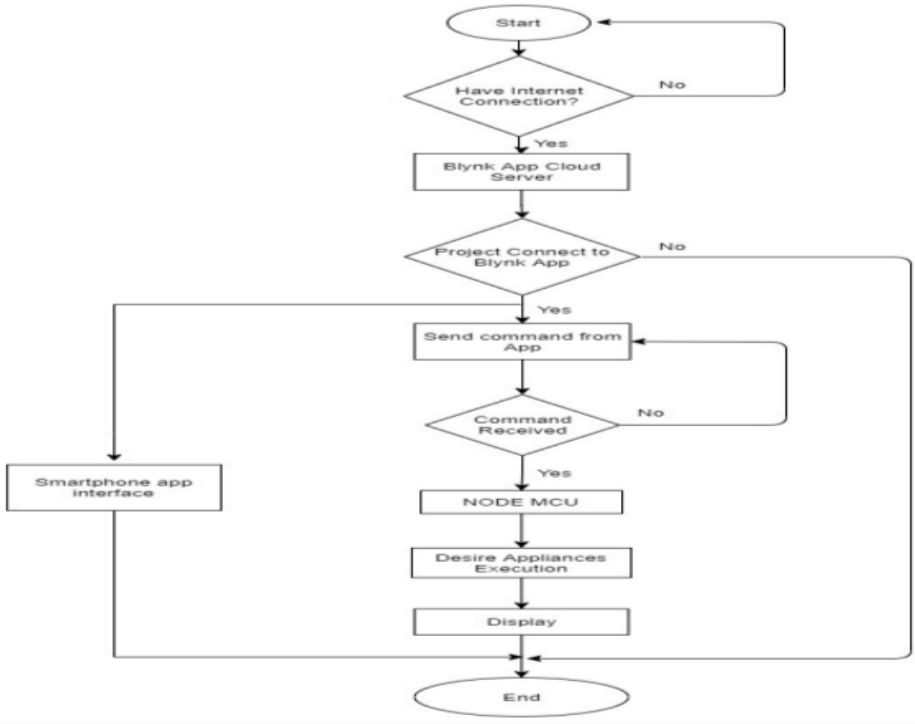
When companies invest in data center monitoring technologies like the ones offered by Vertiv, it can make a difference in the long run for both energy efficiency and cost savings. Our humidity and temperature monitoring systems come with built-in alerts so that IT staff members know when to modify equipment. In this way, via alerts and tweaks of cooling systems, server room temperature can be easily managed, and data centers can achieve maximum efficiency.

Proposed System

4.1 Block Diagram :



4.2 Flow Chart :



Components

5.1 Hardware:

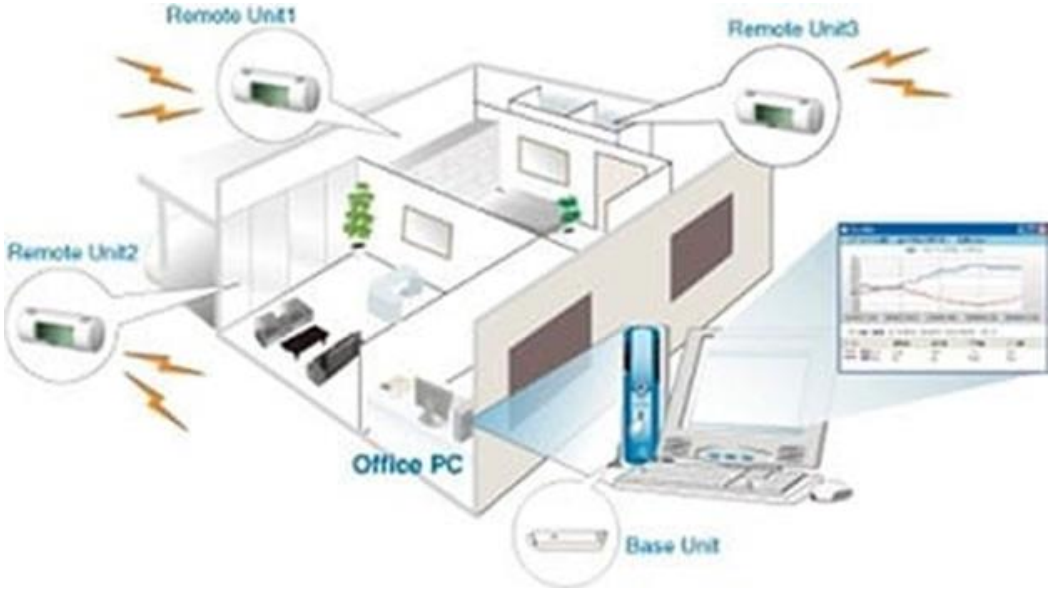
1. Nodemcu (ESP8266) board x 1
2. DHT 11 Sensor x 1
3. Breadboard x 1
4. Jumper Wires

5.2 Software:

Thingspeak

Project Architecture

In following Architecture, each sensor will be placed at every corner of the room, by which we get current room temperature and calculate average of it and we get average current temperature in room. After that, we can put instruction to maintain temperate at specific temperature in this way The project "**Room Temperature Monitoring System**" takes place.



Code

```
/*Temperature and Humidity monitoring system with Thingspeak
 * http://srituhobby.com
 */

#include <ESP8266WiFi.h>
#include "DHT.h"

String apiKey = "X25MXCVQ5ODHSQJH";
const char *ssid =  "Rushikesh";
const char *pass =  "12345678";
const char* server = "api.thingspeak.com";

DHT dht(D2, DHT11);
DHT dht1(D3p, DHT11);
WiFiClient client;

void setup() {
  Serial.begin(115200);
  delay(10);
  dht.begin();
  WiFi.begin(ssid, pass);

  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
```

```
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
}

void loop() {
  float h1 = dht.readHumidity();
  float t1= dht.readTemperature();
  float h2 = dht1.readHumidity();
  float t2= dht1.readTemperature();

  if (isnan(h1) || isnan(t1)) {
    Serial.println("Failed to read from DHT 1 sensor!");
    return;
  }

  if (isnan(h2) || isnan(t2)) {
    Serial.println("Failed to read from DHT 2 sensor!");
    return;
  }

  float temp = ((t1+t2)/2);
  float hum = ((h1+h2)/2);
  if (client.connect(server, 80)) {
    String postStr = apiKey;
    postStr += "&field1=";
```

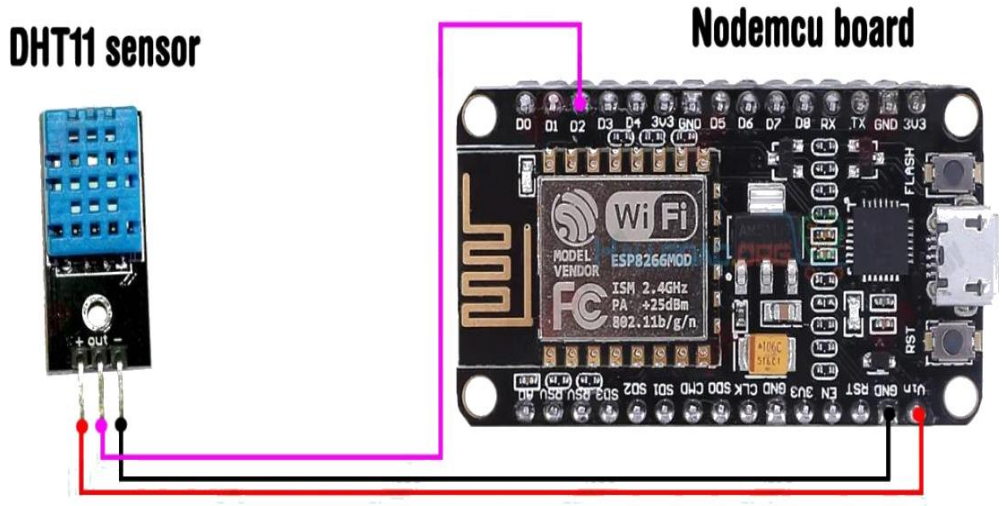
```
    postStr += String(temp);
    postStr += "&field2=";
    postStr += String(hum);
    postStr += "\r\n\r\n";

    client.print("POST /update HTTP/1.1\n");
    client.print("Host: api.thingspeak.com\n");
    client.print("Connection: close\n");
    client.print("X-THINGSPEAKAPIKEY: " + apiKey + "\n");
    client.print("Content-Type: application/x-www-form-urlencoded\n");
    client.print("Content-Length: ");
    client.print(postStr.length());
    client.print("\n\n");
    client.print(postStr);

    Serial.print("Temperature: ");
    Serial.print(temp);
    Serial.print("\t");
    Serial.print("Humidity: ");
    Serial.println(hum);

  }
  client.stop();
  delay(1000);
}
```

Implementation

8.1 Working

A temperature sensor has been used to measure the temperature of the room using. The simulation of the system has been done on WI-FI Module and the graphs showing relationship between server room temperature and the digital value from the sensor to validate the accuracy of the system. When power on this system, the Nodemcu board connect to the algorithm development system called MATLAB via the Thingspeak cloud. Through this, the values obtained from the DHT11 sensor can be viewed on the thingspeak interface as it is real time visualize.

8.2 Circuit Diagram



Results

The testing was done stage by stage as each stage construction was completed. This approach is best as it enables one to quickly identify stages that are not working properly and those to be corrected. The power supply was connected first of all and tested to ensure proper supply voltages. The temperature sensor output was measured also followed by the ADC, and microcontroller. The test carried out was heating up of the sensor and observing the cooling of the server room. The test result recorded was that for the temperature readout value and the digital measurement from sensor.

Table of Temperature Control test report

S/No	Temperature readout in °C	Controlled with sensor (Digital)
1	30	22
2	36	25
3	47	25
4	29	23
5	35	22
6	38	30
7	32	23
8	45	25

Conclusion and Future Scope

Conclusion :

The aim of the **Room Temperature Monitoring System project** was to automate and control temperature for a server room. The system is allowed entry of a desired room temperature within a prescribed range and to exhibit overshoot and steady-state temperature error of less than 1 degree displaying the value in real time. It can be applied in industries, auditoriums, green house buildings, server rooms and nuclear facilities. It is shown that the solution requires broad knowledge drawn from several engineering disciplines including electrical, mechanical, and control systems engineering.

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Future Scope:

The future scope of this project is to integrate a current system with the various other sensors. So, that we can make project better compatible and fast as Possible.