

# An IoT based Automatic Room Temperature and Health Monitoring System



Hemanth Kumar V, Padma Priya D

**Abstract:** *There are so many tasks being automated nowadays. Likewise, the automatic room temperature and health monitoring system is a process to monitor heart beats using pulse sensor and the body temperature of patient. [3] There is also an automated operation to control the room temperature by closing and opening of windows in old age homes, hospitals, factories, etc. [5] Using IoT the heart beat of patient is monitored, room temperature and patient's body temperature is continuously monitored. [6] The temperature can also be adjusted accordingly. These features can also be manually controlled through a mobile application from anywhere. As the data's are gathered and uploaded to a server the temperature of a closed environment can be easily retrieved. The appliances that are connected like fan and air conditioner will automatically adjust to the temperature [1] in and out of the room according to the patient's body. Thus, this project helps us to control the room (closed environment) temperature without manpower. [1]*

**Keywords:** *IoT, Heart monitoring sensor, Pulse sensor, Temperature and humidity sensor.*

## I. INTRODUCTION

The room temperature and health monitoring system is used to monitor the heart beat of the patient it also adjusts the temperature of the room suitable to the need of the patient by continuous monitoring of heart rate and room temperature. [4] The system aims to prevent attack for heart patients. The system also provides suitable environmental conditions according to the preferences in hotels, Old age homes, hospitals, etc. [5] The system is mostly used for people with lack of ability like old age people and disabled people to open/close the windows and on/off of the appliances like fan, air conditioner automatically to maintain the room temperature according to their need. This device can also be used manually by triggering the window operations through a mobile application. Thus, this project make less severe the stress and workload of older and disabled people. The purpose of this project is to maintain the body temperature and reduce the risks of heart attack. [6]

## II. IOT (INTERNET OF THINGS)

### A. Power of an Internet

The Internet of Things are about extending the power of the internet. It also describes the network of physical objects that are fixed with sensors and other technologies. [7]

### B. Business Intelligent

To exchange the data's with other devices that are connected to the internet IoT is used. Once all the relevant things are connected effective business intelligence is built through the data's collected. [7]

### C. Industrial Tool

These IOT devices ranges from normal house hold objects to highly developed industrial tools.

## III. HARDWARE USED

The temperature and Pulse monitoring system is a real time and simple project that can be used in day-to-day life. [3] The system is mainly more useful in hospitals, at old age homes, etc. [5] A temperature that is configured by the user is constantly maintained as the room temperature through triggering the cooling appliances if necessary.

The hardware's that are used in this project are as follows:

- A. ESP32 Microcontroller:
- B. Relay
- C. Max30100 Pulse sensor
- D. Temperature Sensor (LM35, DHT11)
- E. Stepper motor
- F. Sim 900A GSM module
- G. Neo-6m GPS module

### A. ESP32 Microcontroller:

ESP32 chip microcontroller is a low power system that are with dual-mode Bluetooth and integrated wi-fi. The ESP32 microcontroller is well suited for the IOT projects. As ESP32 is a game changer, there will be no need to connect a separate device for cloud communication.



Fig 1. ESP32

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\* Correspondence Author

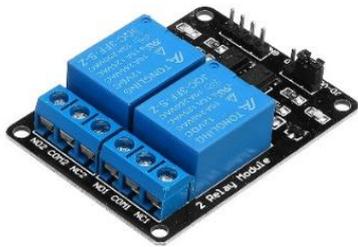
**Hemanth Kumar V**, Assistant Professor, Department of Physics, Bharath Institute of Higher Education and Research (BIHER), Selaiyur, Chennai (Tamil Nadu), India. Email: [hemmatsci@gmail.com](mailto:hemmatsci@gmail.com)

**Padma Priya D\***, Masters, Department of Physics, Bharath Institute of Higher Education and Research (BIHER), Selaiyur, Chennai (Tamil Nadu), India. Email: [padmadurai.07@gmail.com](mailto:padmadurai.07@gmail.com)

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**B. Relay:**

Relay modules are the electronic components that are found everywhere. Wherever, the low voltage microcontrollers are used the relay modules are required. The device detects the intolerable conditions in the assigned area. It also gives commands to disconnect the affected area to the circuit breaker which protects the system from damage.



**Fig 2. Relay**

**C. MAX30100 Pulse sensor:**

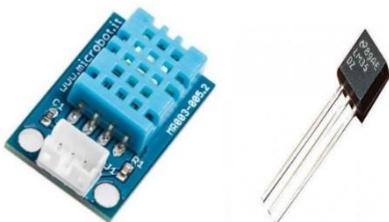
MAX30100 sensor is used to monitor the heart rate with pulse oximeter. To measure the heart rate by calculating light intensity changes in various organs and blood flow changes through those organs is known as pulse sensor and it is also called as photoplethysmography. The pulse sensor contains LED and photodiode where the photodiode absorbs the light which is reflected when it passes through blood. This is measured as an electric signal that is processed by a microcontroller.



**Fig 3. MAX30100**

**D. Temperature Sensors (LM35, DHT11):**

A sensor called temperature sensor is used to monitor an object and its surroundings. Here to measure body temperature LM35 sensor is used the capacity to measure is up to 150 degree Celsius. Another sensor called DHT11 is used to monitor moisture and temperature of surroundings. The temperature by measuring the change in resistance can be successfully integrated with Node MCU.



**Fig 4. Temperature sensors (DHT11 and LM35)**

**E. Stepper Motor:**

A motor which converts electrical to mechanical power is called stepper motor also known as DC motor. It has a capacity to rotate in 360 degree and other motors like servo motors has capability only to rotate at 180 degree and the stepper motor is used to move the window to any angle.



**Fig 5. Stepper Motor**

**F. SIM900A Gsm Module:**

The module SIM900a is a readily available GPRS/GSM module that are used in PDA and many mobile phones. This module is also used to develop IOT and Embedded Applications. The SIM900 module looks like a single chip but in total there are 68 pins that helps to build the applications.



**Fig 6. SIM900A GSM**

**G. NEO-6M Gps Module:**

This module is a GPS receiver that is able to locate all the locations on Earth. Also, it is able to roughly track about 22 satellites. The NEO-6M GPS module works with low power consumption. The module has EEPROM for storing the configuration settings and also has a battery for power backup.



**Fig 7. Neo-6m GPS**

#### IV. WORKING

- This project is based on the ESP32 Micro-controller, which has an inbuilt Wi-Fi module for sending data over TCP/IP.
- The role of this microcontroller is to gather data from all the sensors, aggregate them, and perform assigned tasks efficiently.
- The first scope of this project is Automatic/Manual room temperature controlling and monitoring. [2] For gathering the temperature of the room and the environment, we'll be using DHT11 sensors.
- The user will set his/her suitable temperature for the room using the cloud platform.
- Once the ESP32 micro-controller gets the user's temperature, it will analyze the user's temperature with room and environment temperatures.
- If the room temperature is not suitable with the user's room temperature, but the outside(environment) temperature is suitable, we'll open the window using a stepper motor, so that the room temperature will be adjusted with the user's temperature.
- If the temperature is not suitable even after opening the window, we'll turn on the fan to adjust the temperature and AC even further to adjust the temperature. On this basis, the room temperature will be adjusted automatically with the user's temperature.
- The user can also be able to control them manually. The second scope of application will be patient monitoring [2], where we monitor the user's body temperature, heart rate, and blood oxygen level using Lm35 and Max30100 sensors. [6]
- If the user's health is critical, it will send an automatic alert message to the closed ones, using the cloud platform. [4] Here we've added GSM and GPS services so that we'll get the location of the user and using GSM, we can send the status of the user to neighbors and the local hospital/police station when the user has critical health status. [5] [8].

#### V. RESULT

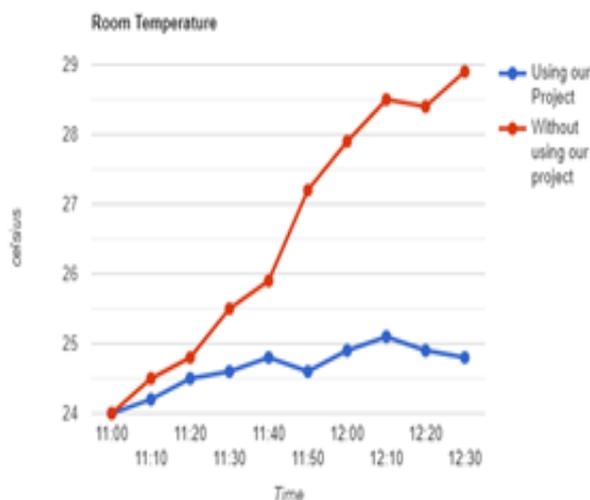


Fig 1. Monitored Data

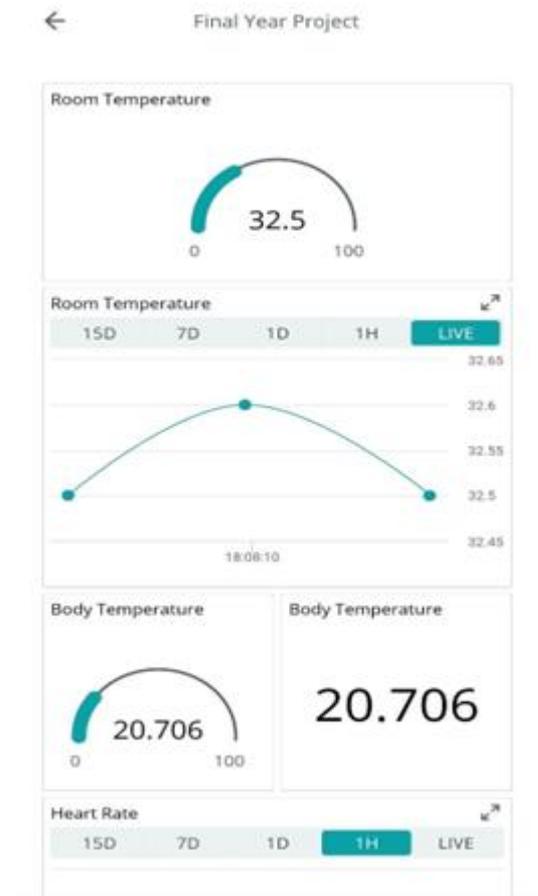


Fig 2. Mobile Application

#### VI. CONCLUSION

The temperature controlling and patient monitoring system helps in serving people at risk by reducing cases of heart attacks. [2] The system also reduces other medical emergencies as it maintains and constantly monitors the temperatures in and around of the patient. [5] All these tasks that the system does are automated and it also has an option to control it manually if needed. [8] Thus, this project perform duties for Patients, Old-aged people and especially for the people with disability, etc. [6]

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### AUTHORS PROFILE



**Hemanth Kumar V**, is working as an assistant professor in the department of Physics at Bharath Institute of Higher Education and Research (BIHER), Selaiyur, Chennai, India. He has completed M.sc college of Engineering from National Institute of Technology, Karnataka, Surathkal. He has completed his Ph.D in Metallurgical and Materials Engineering from National Institute of Technology, Karnataka, Surathkal. He has 5 years of teaching experience in the field of Science and Physics. Also, he is a Talented Sociological professor driven to inspire students to pursue academic and personal excellence. He consistently strive to create a challenging and engaging learning in which students become life-long scholar. Email: [hemmatsci@gmail.com](mailto:hemmatsci@gmail.com)



**Padma Priya D**, is currently doing her Masters in the department of Physics in Bharath Institute of Higher Education and Research (BIHER), Selaiyur, Chennai, India. She has completed her Bachelor's Degree in the department of Physics in Bharath Institute of Higher Education and Research (BIHER), Selaiyur, Chennai, India. She did her schoolings in Jeeva Velu Residential School (JVRS) at Tiruvannamalai. She is most particularly interested in Internet of Things (IoT) automation. Email: [padmadurai.07@gmail.com](mailto:padmadurai.07@gmail.com).