An IoT based Patient Monitoring System and Temperature Controlling System

Sudha Mercy S, Sivasubramanian A, Lokesh G , Bhuvan B Natesh, Jerald Vinfrank J

*Abstract***:** *Many tasks are being automated in various places like factories, hospitals and homes as India moves towards smarter cities. Thus, Patient Monitoring and Temperature Controlling System is a process of monitoring heart beats per minute (using a Pulse Sensor) and body temperature of the patient and as well as an automated operation to control the temperature of the room by opening and closing windows in houses, factories, schools, hospitals, etc. IoT to monitor the heartbeat, body temperature and temperature of the closed environment continuously will be used by this Prototype and adjust the temperature of that closed Environment by opening or closing the window accordingly. This process can also be controlled manually by using a mobile application to open or close the window from anywhere. We can easily retrieve the temperature of a closed environment from anywhere as the data is gathered and uploaded to a server. Appliances like air conditioning, fan, etc. will automatically start operating to adjust the room temperature for their needs if both the temperatures (inside & outside the room) are not suitable for the patient. Thus, this project will help us to control the temperature level in a closed environment(room) and we can do this without the help of manpower.*

*Keywords***:** *heartbeat monitor, IoT, Pulse Sensor, Sensing and Monitoring, Temperature and Humidity Sensor.*

I. INTRODUCTION

The Patient Monitoring and Temperature controlling system is a system to monitor the patient's heart rate and body temperature and make the room temperature suitable to them through supportable features by continuously monitoring their heart rate and body temperature, the Patient Monitoring System aims to prevent heart attacks. On the other hand, in a closed environment like rooms in hospitals, old age homes,

and even in homes, etc., the Temperature Controlling System'spurpose is to provide suitable environmental conditions for the patients according to their preferences. Because of the lack of ability of older people and disabled people to open their room windows or adjust appliances for maintaining the room temperature, this project will be helpful for them to automatically maintain their room temperature. A mobile application can also be used to control this manually by triggering these window operations. The Patient Monitoring and Temperature controlling System is a simple and real-time project that can be very useful for people to maintain their body temperature and room temperature.

Thus, this project alleviates the workload and stress of disabled and older people. This Project's purpose is to reduce the risk of getting heart attacks and maintain body temperature.

II. INTERNET OF THINGS

Internet of Things, also known as "IoT" is a system of inter-related devices like computers and sensorsthat can send their data to the network without any human interventions for further processing. IoT is just an application or User Interface that allows a user or client to connect all electronic devices to the internet so that they become an intelligent one. Because of their numerous applications in various fields,IoT is used by the majority of the industries nowadays.

All the appliances and gadgets in homes, offices, industries are connected to the internet and can be controlled by humans a wireless way using IoT. This leads to a development of "Smart Home" which covers all the devices and applications. These devices can be controlled via meansof Bluetooth, IR and in Wi-Fi. Various enterprises monitor their appliances and devices online using IoT and also used in the investigation of the collected data from client.

The only way to learn IoT is to use it by building small systems and learning at the same time.It is estimated that by 2020 there will be over 50 billion gadgets that will be associated with IoT.

III. HARDWARE USED

The Pulse and Temperature monitoring system is a simple project that can be used for many day-to-day life situations. It can be very useful at old age homes , hospitals, etc.The system maintains the room temperature at a constant temperature which is configured by the user, by constantly checking the temperature of the user and triggering the cooling appliances if necessary. The following hardware's are used in this project:

Retrieval Number: F4336049620/2020©BEIESP
DOI: 10.35940/ijitee.F4336.059720
Journal Website: www.ijitee.org

1172

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

An IoT based Patient Monitoring System Temperature Controlling System

1. Arduino IDE,
2. Temperature sensor (LM35/DHT11)
3. Arduino/NodeMCU
4. Pulse sensor
5. Stepper motor.

Arduino is a micro-controller which is used in electronic equipments. Arduino IDE helps to run code in a PC and to upload it to NodeMCU/Arduino. NodeMCU and Arduino are micro-controllers which has the ability interact with smartphones, televisions, speakers, LEDs, etc. They help in controlling these devices without any manual effort.

NodeMCU is an open source firmware which is based on Lua. It has an inbuilt ESP8266 module and TCP/IP protocol which is used to connect to the internet.
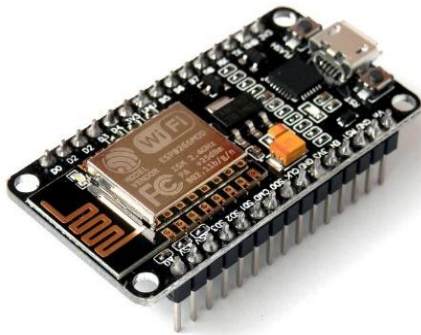

Fig 1. Nodemcu

Temperature sensor helps in constantly monitoring the temperature of an object and it's surrounding. DHT11(fig 2) sensor is used to monitor moisture and temperature level of surroundings. It has the capacity to measure up to 50deg Celsius. On the other hand LM35 (fig 2) sensor is used to monitor body temperature and it has the capacity to measure up to 150deg Celsius. If calculates the temperature by measuring the change in resistance and can be successfully integrated with NodeMCU.
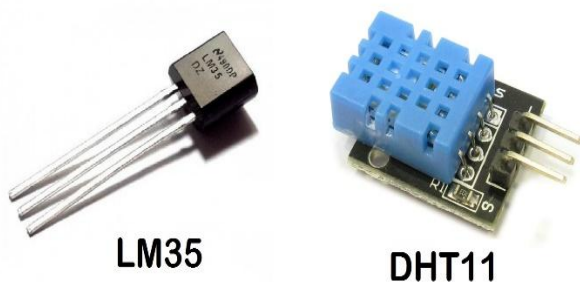

Fig 2. Temperature Sensors

Stepper motor (fig. 3) is a DC motor that splits a full rotation into several equal steps. It works by converting electrical impulses into moments. Unlike other motors like the servo motor which can only turn up to 180deg, the stepper motor has the capacity to rotate up to 360deg, therefore it can be used to move the window to any specific angle.
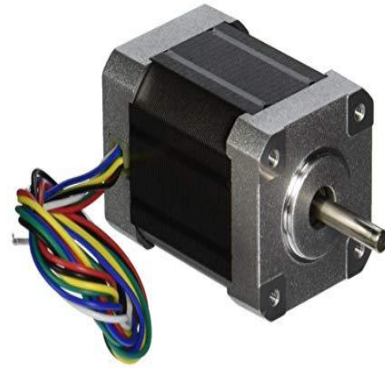

Fig 3. Stepper Motor

Pulse sensor measures the heart rate by calculating the light intensity changes in various organs and the blood flow changes through those organs. This process is also known as "PHOTO PHLETHYSMOGRAPHY". It contains a photodiode and a LED. The photodiode absorbs the light which is reflected when it passes through the blood. This is measured as an electric signal that can be processed by a micro-controller.

Fig 4. Pulse Sensor

IV. WORKING

In this prototype, we connect the Pulse sensor and temperature sensor (LM35) to the NodeMCU to collect body temperature and pulse rate. The stepper motor is attached to the window and helps in maintain the room temperature by opening/closing of the window. It is also connected to the NodeMCU which triggers it when needed. Two DHT11 sensors are used - one is attached inside the room and the other one will be attached outside the room - these sensors monitor the surrounding temperature continuously. If outside temperature is more suitable, the window is opened automatically, else if inside temperature is already suitable then window is closed automatically. When both inside and outside temperature are not suitable, the cooling appliances are turned on/off to maintain room temperature.

This entire process is captured and uploaded to a server. This data is shown in a mobile application and is updated real-time. The user also has the option to control the window/cooling appliances using the app.
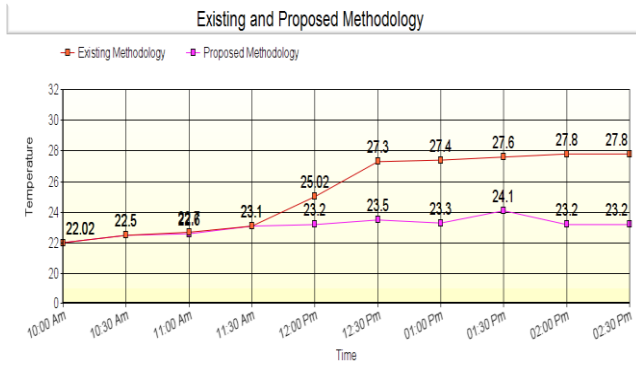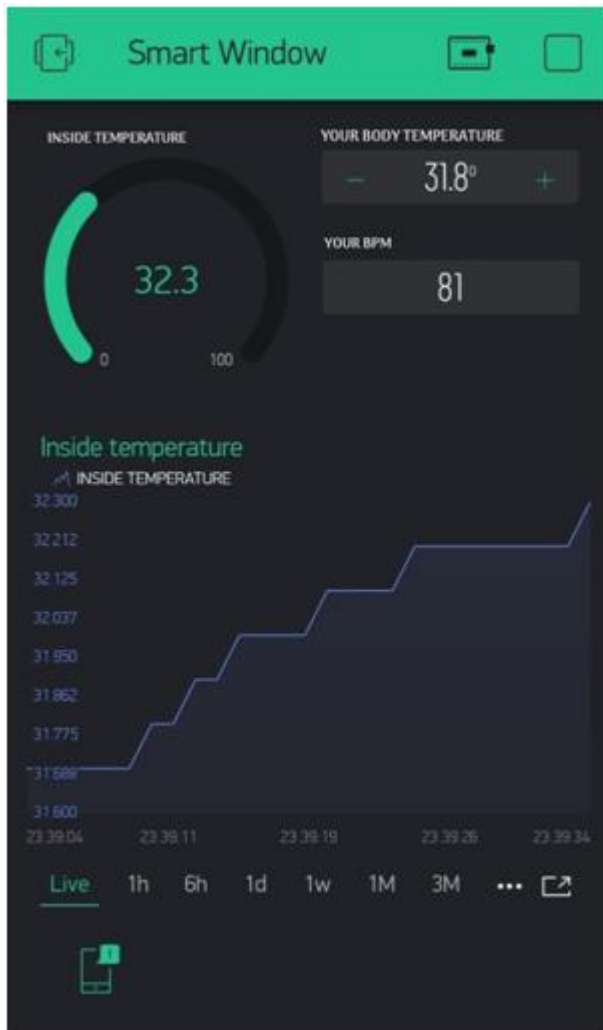
V. RESULT

Fig 1. Monitored Data

Fig 2. Mobile Application

VI. CONCLUSION

The Patient Monitoring and Temperature controlling system helps in serving vulnerable people by reducing fatal cases of heart attacks and other medical emergencies by constant monitoring and maintaining a constant surrounding temperature. It does all these tasks automatically and also has option to control them manually if needed.

This can serve old age people, patients, specially disabled people, etc and has good scope in hospitals, old age homes and orphanages, etc.

REFERENCES

1. MedhaKulkarni ,Vinod Choudhary, Satyajit Bhapkar, Neetesh Jha, Aniket Parab (2016),"Desgin and Implementation of Wi-Fi based Smart Home System" in International Journal Of Engineering And Computer Science.
2. Cheng-Ying Chou, Joe-Air Jiang, Meng-Fu Chen, Kai-Sheng Tseng, Huan-Chieh Chiu , Yu-Cheng Yan(2019). "An IoT-based Temperature Monitoring System for Underground Cable Tunnels" in Grand International Conference and Exposition Asia (GTD Asia).
3. Yingjie Li, Yong Xue , Jing Dong, Hui Xu , Ziqiang Chen (2011). "Analysis of Remote Sensing Quantitative Inversion in Cloud Computing" On IEEE International Geo-science and Remote Sensing.
4. Suren Sharan Navalgi,S. Parameshwara, Vinay Mahadev Hunachyal,Manu S Manjunath (2016), "Power windows using touch screen", International Research Journal of Engineering and Technology (IRJET).
5. SubhranilSom, Sunil Kumar Khatri, Rahul Dagar (2018). Smart Farming – IoT in Agriculture of Inventive Research in Computing Applications (ICIRCA), International Conference on IEEE.
6. Chenthur PandianS, Thillaiarasu, N (2016). Enforcing security and privacy over multi-cloud framework using assessment techniques. In Intelligent Systems and Control (ISCO), International Conference on IEEE.
7. Vinay Maitry,Parth Das , Gaurav Waradkar, TejasviAnsurkar, Hitesh Ramina, Asha Rawat(2016), "Automated room light controller with visitor counter", Imperial Journal of Interdisciplinary Research (IJIR).
8. Jing Selena He ,AmirAtabekov, Dan Chia-Tien Le, Marcel Starosielsky (2015). "Temperature Tracking System Using IOT" on, IEEE.
9. Jia Liu , Limin Wang , Qing Huang , Zhongxin Chen Qingbo Zhou , Hui Deng , Li Zhang, Jianqiang Ren (2011). "Charms – China Agricultural Remote Sensing Monitoring" on International Conference on IEEE.
10. Rahul Johari ,Alok Kumar Gupta (2019). "IOT based Electrical Device Surveillance and Control System of Internet of Things": Smart Innovation and Usages, International Conference On IEEE.
11. Raffaele Giaffreda, Abdur Rahim Biswas (2014). "IoT and cloud convergence: Opportunities and challenges of Internet of Things (WF-IoT)", IEEE.

AUTHORS PROFILE

Ms.S.Sudha Mercy is currently working as Assistant Professor in the Department of Computer Science and Engineering, at Jeppiaar Institute of Technology, Kunnam. She completed her B.Tech(IT) at Anna University in 2011 and Post-Graduation M.E(CSE) at Anna University in 2013. She is currently pursing Ph.D (CSE) at Anna University. She has 3.7 years of Teaching Experience. Her Area of Interest include Wireless Sensor Networks, IOT, Data Structures and Design and Analysis of Algorithm.

Sivasubramanian A is currently undergoing his bachelor's degree in Computer Science and Engineering in Jeppiaar Institute of Technology (JIT), Kanchipuram, Tamil Nadu, India. He did his schooling in Chennai. He is particularly interested in Internet of Things and Cloud Computing.

Bhuvan B. is currently undergoing his bachelor's degree in Computer Science and Engineering in Jeppiaar Institute of Technology (JIT), Kanchipuram, Tamil Nadu, India. He is particularly interested in web development and cloud computing.

Jerald Vinfrank. J is currently undergoing his bachelor's degree in Computer Science and Engineering in Jeppiaar Institute of Technology (JIT), Kanchipuram, Tamil Nadu, India. He hails from the same city and did his entire school there. Currently he is also an Intern at Coviam Technologies, Bangalore, India where he works as a Frontend developer since May 2019.

His academic interests include Web development, competitive coding in Algorithm and Data Structures, Java, Math, Problem Solving, etc. Some of his non-academic interests include watching sports like Tennis, Cricket, Following day-to-day news updates, scientific developments, etc.

Lokesh G is currently undergoing his bachelor's degree in Computer Science and Engineering in Jeppiaar Institute of Technology (JIT), Kanchipuram, Tamil Nadu, India. He is particularly interested in Management, Analytical and Problem Solving Skills.