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IOT Based ICU Patients Monitoring System

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ABSTRACT: Intensive Care Unit or ICU is where the patients having critical conditions are admitted for treatment. For such critical conditions the doctors need to have an all time updated regarding the patient's health related parameters like their sweat, heartbeat rate, pulse and body temperature. Calculating manually, this is too difficult a task and also for multiple patients it becomes close to impossible. In this type of condition this IOT based system can bring about an automation that can keep the Doctors updated all time over the internet on firebase. IOT Based ICU Patient Monitoring System is a Raspberry Pi based system which collects patient's detailed information with the help of various sensors. It mainly uses Firebase to communicate this information through the internet. Here the Temperature sensor, sweat sensor and heart beat sensor modules which are electrically connected to the system and physically to be worn by the users. On the press of a button, the sensor senses the blood pressure in systolic and diastolic along with the heart beat and these all data sends it to the Firebase. The Temperature sensor senses the temperature and its ambience, so when this sensor is in close proximity to the user it reports the users body temperature. Thus, the doctor and nurses can get access to these various parameters pertaining to the patients health over the desktop using firebase server from anywhere over the world. In this way IOT Based ICU Patient Monitoring System is an effective system that is very helpful for monitoring ICU Patients without any manual intervention.

KEYWORDS: Raspberry pi board, Heartbeat Sensor, Temperature Sensor, sweat sensor, Firebase Server, Desktop, Internet of Things.

I. INTRODUCTION

IOT (Internet of Things) based ICU (Intensive Care Unit) patient monitoring system is a system which measures the patient heart beat rate, sweat and temperature continuously who is admitted in an ICU room. After measuring, this system also sends this information to the desktop through firebase. We can easily observe, in our society there are continuous patients in the hospitals and doctors need to take extra attention to the ICU patients. To look after these patients, it will need many staff members i.e. Doctors and nurses are required to observe their conditions which is not possible in every hospital. Beside this, looking after an individual patient specially who is admitted in an ICU room whose temperature and blood pressure, heart beats measurement reading is so much necessary in every single moment is also a big problem. To concentrate on these problems here we have proposed a system that is called IOT based ICU patient monitoring system with the help of temperature and sweat sensor, heartbeat sensor, IOT system and firebase. This system would automatically check the patient's body temperature, sweat, heart beats rate and send this measured data on a dedicated firebase. Where every respective doctor and nurses could easily see their respective patient data all the time from any place in the hospital. This system is less expensive and more precise as compared to the other system.

II. RELATED WORK

[1] In recent developments of applications in healthcare to observe the patient's health status, the internet of things makes medical tools more efficient by allowing real time observation of patient's health in which sensors acquired data of patients and reduced the human error. In IOT patients' parameters or data gets transmitted through medical devices Via gateway, where it is stored and analyzed. monitoring patient's respiration rate, body temperature, heart beat rate and body movement using Raspberry Pi.

[2] In this paper 21st century technology all humans just become working machines which just work like robots 24 hrs. on a daily basis to get two as much food. In this race he just forgets to focus on a very important part i.e., our health. Initially there are many systems developed, after reviewing all these systems we came to know about certain

shortcomings and features of previous work done. These systems work on the current trending technique i.e., IoT (Internet of Things). In these systems mainly consist of, generally persons have used Heart Beat sensor, temperature, ECG and Blood Pressure sensors with different microcontrollers to have readings from these elements and received by the server with which data can be shared with doctors and nurse as well as with the sufferer in the android app. which can aware the user regarding its new reading.

[3] In the big data analytics paper they proposed an IOT based health care system. They compare their system with the “Internet of health sensor things”. These systems produce a huge volume of data that cannot be handled by the physician. The physician plays an important role because they need to make critical decisions about their patient's health with the help of a huge volume of data information. The doctors can segregate the information of a particular patient from the flood of healthcare information this information arrives from the massive number of patients. IN these paper Intel Galileo Gen 2 is acting as IOT agent and they can deploy the patient health information into the cloud. The increasing volume of data is managed by the cloud and it can share the data across the healthcare system and provide ability to big data analytics. Their proposed work is the real time alerting of patient health information is an important exercise in big data. The response time of their system is very less and it is suitable for real time alerting.

[4] In the IOT based ICU patient monitoring system they use Raspberry Pi with the help of a few sensors to collect the patient information. They also use the Wi-Fi module for the communication to the doctors of patient health with the help of the internet. They used blood pressure and heart beat modules which are electrically connected to the system and physically connected to the user. On the press button the sensor senses these parameters of the patient when the button is in close state it will report to the user's parameters like temperature. Thus, the doctors can get access to patient health with the help of IoT Gecko web interface from anywhere.

[5] The traditional healthcare systems were precisely submissive. Every time the patient had to visit the doctor, even for minor problems or we can say complications. This would add to the cost of treatment of the patient in addition to a surge in applied lots of time and effort. Another scenario could be if a person is in a critical situation, then he/she was not able to claim instant help from earlier healthcare systems. But now with the advance of smart healthcare systems, this issue has been addressed, hence reducing the mortality rates around the globe. IOT (Internet of Things) healthcare services to grow and become more active, pervasive and smart healthcare platforms. As IOT is amplifying, and proportional to that, various development boards have been developed and are now being employed in the medical field to make the medical operations suitable for people. These IOT based boards reduce the development effort of the people, are less expensive and utilize low power. This paper gives us insights of IoT driven healthcare systems and the various development boards which enable connectivity between various devices and people.

III. METHODOLOGY

In this proposed system, important parameters like temperature, sweat and heartbeat readings which are monitored using raspberry pi. These sensor signals are sent to raspberry pi from there it'll update the patient's information on the firebase server. Desktop app will get notification if patients health conditions goes serious leads to take immediate actions on them. Here we use 5V USB adapter, we are using mobile charger for the same.

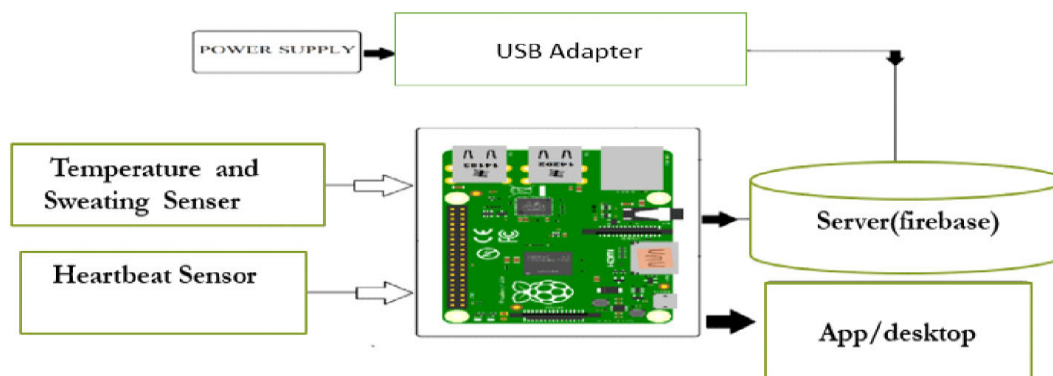


Fig1: Modules

IV. EXPERIMENTAL RESULTS

Figures show the results of ICU patient monitoring system fig2. normal parameters of patients and fig3. if any parameters fall down then it will change the colour. this helps doctor to know easily by only observing the colour that which patient needs immediate action.

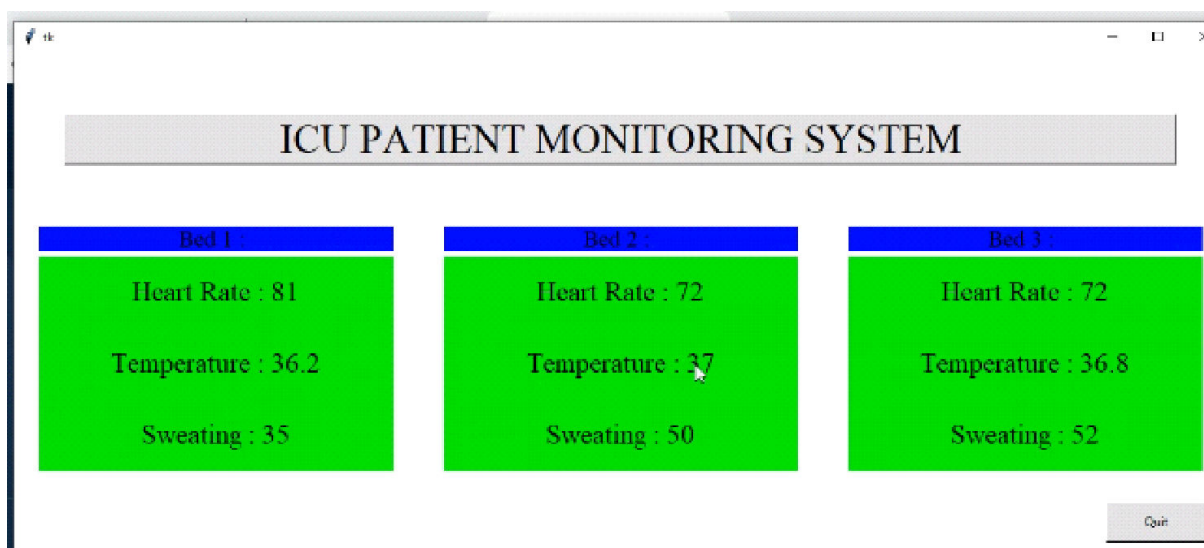


Fig 2. Normal Patients Parameters

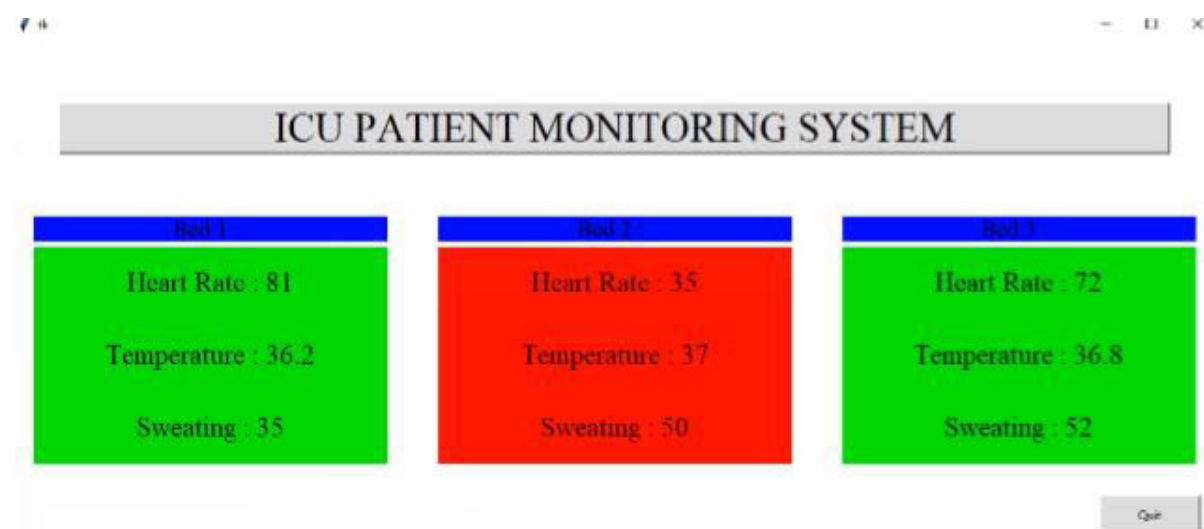


Fig 3: Fall down patients parameters

V. CONCLUSION

We are implementing the IOT based ICU patient health monitoring system. The health of humans plays a really important role in our society. Making these IOT systems will reduce the burden on humans and be easy to handle. The transparency of this system helps the patient to trust on them. When the threshold value falls down below the normal patient's conditions, the system is active and notification pops up on the desktop then the doctor can take immediate



actions thereon. The objective of the system is to reduce the healthcare cost and efforts within the hospitalization and diagnostics testing procedure.

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