Patient Health Monitoring Using Edge Computing

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ABSTRACT: In modern days', health monitoring takes vital role in monitoring patients health.The internet of things (Iota), recently undergone improvements in technology, which interconnects everything to one another and subsequently regarded as new technology. The data taken from the patient needs internet connections to transmit, but not all patients can access good internet connectivity. With these modern technologies, the healthcare sector improves on rapidly with new innovations.With the help of edge technologies like wearables, wireless networks, and other remote instruments, health technologists and professionals have created a great, affordable healthcare monitoring system for people dealing with a variety of conditions.IoTbased health monitoring systems are used to collect and exchange patient data from hospital sensors. Here we use Temperature sensor, Pulse sensor. Tilt sensor and Flex sensors. All these sensors are combined in a one kit of Raspberry pi Pico w. When an input is drawn from the patients we can get out all the needed data's by using these sensors. Specially it also be used for choma patients which help in monitoring their movement

I. INTRODUCTION

Health monitoring system is an addition to the hospital's medical infrastructure that allows for the analysis of a patient's vital signs. It takes less time and energy to accurately diagnose the patient's illness.Adoption of technology in healthcare industries has led to the development of sensors and microcontrollers that are compact in size, rapid to access in various operations, consume very little power, and are reasonably priced.Additionally, it allows for the thorough allocation of computing resources across the entire edge computing network according to the level of health risk associated with each individual user.
Three layers can be seen in healthcare systems.
(i)The transmission layer
(ii)The collection layer and
(iii)The analysis layer.
Sensors, the collection layer initially assessed the patient's physical condition, and the sensors will gather data at a specified frequency (threshold value). It is possible to save the data in the cloud through the internet and evaluate all of the patient's information by applying data mining and machine learning algorithms. Eventually, after the system has finished its operation, it will determine the users' current health status and take the required action for that specific patient, providing medical care. Health surveillance can offer tangible data inside the house. This monitoring is more beneficial for older patients who are ill but cannot get to the hospital. Helps to take all the necessary precautions to avoid visiting hospitals. Healthcare sensors are essentially used to gather various real-time data from patient bodies and send those data or information to a designated cloud. Sensor will examine the entire programme and process while employing various sensors in accordance with the things you want to detect and designing algorithms to achieve your detection.A smart healthcare system built on edge cognitive computing is capable of using cognitive computing to assess and remotely monitor a patient's physical health. The suggested system obtains the patient's appropriate health risk grade in accordance with the disease under various health statuses in preparation for a health risk analysis.

II.LITERATURE SURVEY

In paper [1], ThirumalasettySivakanthpresented a Reconfigurable sensor network for critical health monitoring.Content and real-time health monitoring system lower the risk of patients collapsing and the life-threatening repercussions In paper [2], S. Jassay et al, suggested using the Raspberry Pi platform to measure the human body temperature.Send information to the nearby recipient.In this study, a Raspberry Pi is used to monitor the patient's body temperature. Data are then transmitted via WSN. The information was then added to the cloud.   In paper [3], Mansor et al discussed about LM35 sensor.This sensor uses an Arduino UNO board to measure body temperature and a SQL database format. The sensor for that webpage is connected to the Arduino UNO board. In paper [4], Nithin et al helps in monitoring the body's temperature, blood pressure, and heartbeat.These sensors had an inbuilt AT Mega 32 microcontroller. This microcontroller also produces a collection of data; we need to perform diagnosis. If the diagnostic value is lower than normal values, then the device can do an SMS to the doctor. In paper [5], P.kumaret al proposed Raspberry pi controlled healthcare system in monitoring patient's data. The patient's body movements are tracked, data's are gathered using sensors and is shown on putty programme. It doesn't offer the alert warning for requesting that family members or medical professionals administer therecommended medications to the patient, which is a part of our suggested solution.

III. PROPOSED SYSTEM

A. PROBLEM DESCRIPTION

Patients run over various difficulties in regular day to day existence. The devices received data from sensors, Raspberry pi is the major tool used here. One's health is too important to lead a peaceful life. In this paper we talked about the difficulties faced during monitoring patient's health and gives better result by working it regularly.

B. SYSTEM ARCHITECHTURE
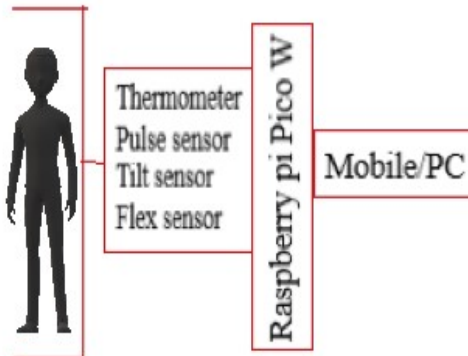
C.MODULES
1. Raspberry pi Pico W:
Its built on silicon designed raspberry pi.To support the RP2040 processor, the Raspberry Pi Pico W offers a simple but adaptable external circuitry consisting of flash memory(Win bond W25Q16JV), a crystal, power supplies and decoupling, and a USB connector. The I/O pins on the left and right edges of the board are where the majority of the RP2040 microcontroller pins are connected. It offers2.4 GHz wireless single band connection.
It comes with an Infineon CYW43439 2.4GHz of Wi-Fi chip and which also has onboard antenna.

2. Temperature sensor:
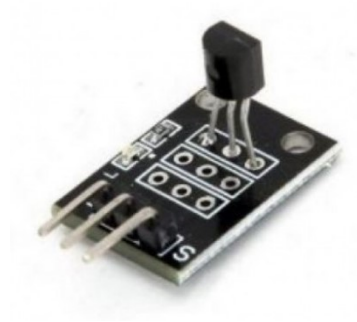
The device used here is DS18B20. It's a digital thermometer which has an alarm functions, upper and lower trigger points. They are non-volatile. The temperature measured is of range 9-12 bit Celsius. They are accurate and easy to take measurements. Their outputs are connected to GPIO22 Pico board.
3. Pulse Sensor

The volume of the blood changes according to the heart pumping and this can be detected by using pulse sensor. The heart rate can be measured by four methods includes ECG, Photoelectric pulse wave, blood pressure readings and phonocardiography. Pulse sensor uses photoelectric technique. The techniques used for


heart rate measurement depends on transmission and reflection of sensors.

4. Flex sensor:

It is used to gauge how much deflection, or bending, has occurred. The material used to design this sensor is carbon, plastic. It's so called as Bend Sensor.When the plastic strip holding the carbon surface is turned aside, the resistance of the sensor will change.It can also be used as a goniometer because of how its fluctuating resistance can be exactly related to the amount of turn. The bending strip concept, which underlies this sensor's operation, causes a change in resistance anytime the strip is twisted. Since this sensor operates on the bending strip concept, every time the strip is twisted, its resistance will increase.

5. Tilt sensor:
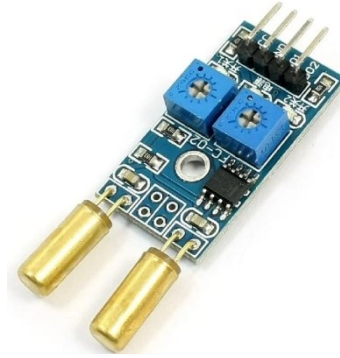
Inclinometers are another name for tilt sensors. These are a particular class of position sensor used to calculate an object's slope or angle.The most popular forms of position sensors is the inclinometer, which is utilised in a variety of sectors.There are various kinds of tilt sensors, and they all operate on slightly different principals. Basic tilt sensors function by moving a metallic ball that connects two pins. The sensor tilts when the ball moves into position, connecting the circuit and turning the sensor "on" or "off". More sophisticated tilt sensors employ an inbuilt gyroscope to monitor the force of gravity and identify the device's orientation.

IV. METHODOLOGY

This application utilises the inbuilt Wi-Fi technology to recognize all the movements of the patients. This device be used for general patients and even for bed ridden patients too. Once the device starts to monitor the patient, their details be stored in the cloud through Wi-Fi and it be accessed either through mobile phones or PC connections. It has an inbuilt firm which be more reliable. We use Micro python language to communicate with the sensors used.

V.CONCLUSION

The result of the project is observed that the values taken from each patients are transfer automatically to the cloud which has inbuilt Wi-Fi technology. The data taken from can't be accessed by others than the health professionals. This be used for be ridden patients. We can monitor the temperature, pulse and body movements using this kit.

VI.FUTURE SCOPE

In future, the proposed frame work be implemented we can have good Wi-Fi connections for data transmission without the need for lots of wires. It can be done by using micro python which is the easiest to get online.

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