REMOTE HEALTH MONITORING, HOME AUTOMATION AND ALARM SYSTEM USING RASPBERRY PI

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Abstract - Now a day's people are busy with their schedules. Due to an irregular lifestyle, the health hazard is not an age-dependent factor in recent days. They have no time for regular health checkups. Doctors suggest the elderly and ill patients who are not in hospitals, for periodic checkups but it is a wastage of time for a simple health checkup and spending a lot of money. For this problem we find a solution using IoT. IoT is an internet-connected thing that can collect and share data. There are many things present in our daily life. These things sense and collect data and send to the internet. This data can be accessible by other things also. This project proposes the remote real-time health monitoring of patients from home only. Which monitors the vital parameters of the patient such as temperature, heartbeat, blood pressure, respiration rate using sensors that are connected to Raspberry pi. The unique part of this proposed system is all these vital parameters are sending SMS to the doctor. Another advantage of this system is it occupies less space and also creates the optimum surrounding as per the patient's health condition.

Key Words: Heartbeat sensor, Respiration sensor, Blood pressure sensor, Temperature sensor, Raspberry Pi, Internet of things.

1. INTRODUCTION

Internet of things and home automation are combined to create a great revolution in modern technology. Internet of things pushes our day to day life forward to home automation. IoT is a network of internet-connected objects like physical systems, vehicles, computing devices, mechanical and digital machines that are embedded with sensors, software, and network connectivity. These sensors sense and collect data and send them to the internet using processors and microcontrollers. Various industries, companies are using IoT to operate more efficiently, to better understand the customers to deliver intensify customer services, improve decision-making, and in turn increase the value of the business.

Health care is one of the most important issues. The Internet of things reduces the difficulty faced by patients and doctors. The automatic homecare is provided instead of the expensive hospital service. without visiting the hospitals for regular health checkup IOT technology find the solution that is from home only IOT combined smart health monitoring system using Raspberry pi is used.In this proposed system patient temperature, blood pressure, heartbeat, respiration rate all these parameters are collected from sensors. These sensors are interfaced with Raspberry pi through general-purpose input-output pins. Raspberry pi process all values collected from the sensors according to the instructions and display output on LCD in the human-understandable language. Raspberry pi supports python software and it has an inbuilt wifi module also. The health information of the patient is conveyed instantly through GSM to the doctor by sending an SMS. This system is employed in hospitals as well as in-home. The cost of the health observance and the space of the room is decreased. We develop a real-time health monitoring system to acquire the data and share the information with the doctor and relatives by remotely monitoring through the internet.

2. LITERATURE SURVEY

Jayeeta Saha has demonstrated a health monitoring system for hospital management to send SMS to relatives and doctors to remotely monitor the health condition of a patient via the internet using Raspberry pi with E-health sensor shield kit. But unlike our solution, it does not provide email and SMS alert to an emergency contact list.

Mohd. Abdul Muqeet has proposed that patient health conditions are continuously monitored if the required emergency alert is given. IoT also allows us to store patient's data on the cloud and the data is also visible anywhere from the world. patient history will be available for doctors to access from everywhere.
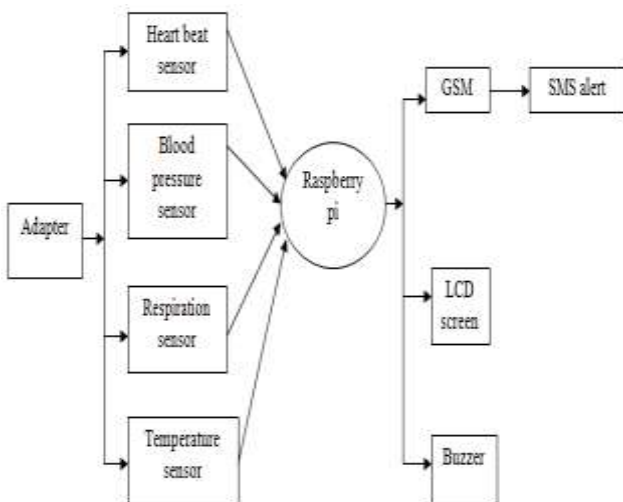
3. PROPOSED SYSTEM

Fig -1: Block diagram

4. DIFFERENT COMPONENTS USED FOR THE PROPOSED SYSTEM

4.1 Raspberry pi

Raspberry Pi 3 Model B is used in the proposed system. It is also called as minicomputer or system on chip with credit card size and has replaced the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. The Raspberry Pi 3B model has a more powerful processor, 10x faster than the first generation Raspberry Pi. The extra features of 3rd generation Raspberry pi has wireless LAN and Bluetooth connectivity. The hard drive for the board is SD card it is inserted in the slot present backside of Raspberry pi. In the Micro SD card, we install the python software. connect the Raspberry pi to monitor using HDMI to VGA convertor .keyboard and mouse is also connected to USB ports.
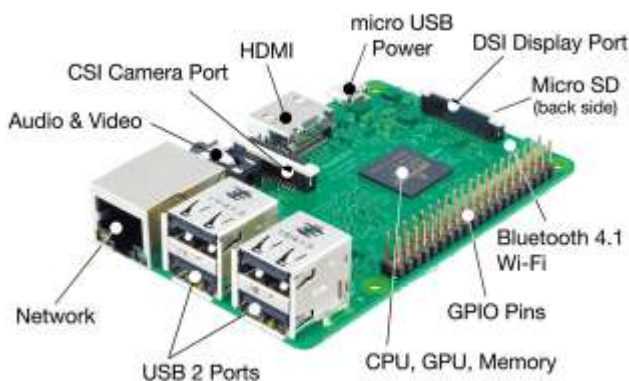

Fig -2: Raspberry pi

4.2 GSM

GSM stands for global system for mobile communication. It is a digital mobile network widely used by mobile phone users. GSM uses time division multiple access techniques. In this proposed system GSM has an adapter for power supply and it has RDX, TXD, GND pins.In our project, we use the GSM for sending SMS to doctors and relatives. The instruction for sending SMS IS written in the python program.

Fig -3: GSM

Features of GSM

- High-quality speech
- Short message service
- International roaming
- Compatibility with ISDN
- Fixed dialed number

4.3 Heartbeat sensor

It is an electronic device and it is used to measure the heart rate i.e. speed of the heartbeat. Heart rate can be monitored in two ways one way is to by hand check the pulse either at wrists or neck and the other way is to use a heartbeat sensor. In this project the basic heartbeat sensor consists of a light-emitting diode and a detector like a photodiode. Light-emitting diode emits light and it is pass through finger some light is absorbed by blood and some is reflected and that is absorbed by the light detector. The output of the light detector is proportional to the heart beat rate. It has three pins they are Vcc, output, GND pins these are connected to Raspberry pi.
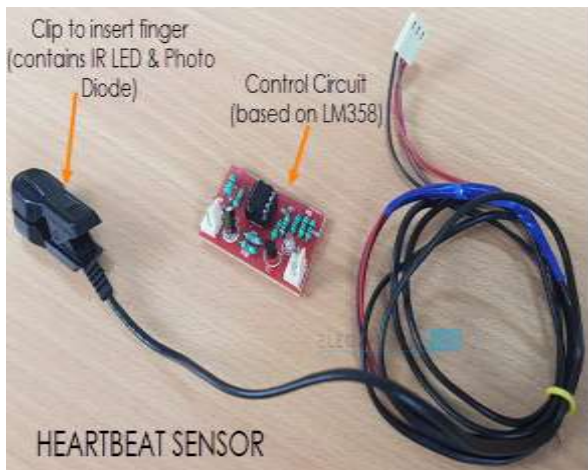
Fig -4: Heart beat sensor

4.4 Blood pressure sensor

Blood pressure is the pressure exerted on the walls of blood vessels or arteries. When the heart is pumping the blood through arteries during contraction of your heart muscle the pressure exerted on arteries called systolic pressure. Relaxation of the heart muscle is called diastolic pressure

In an oscillatory device, a cuff is inflated over the wrist. When the cuff is filled with pressure, no blood flow through the artery. As the cuff is released the air below the systolic pressure, the falling pressure exerted on the artery allows blood to flow through it and set up observable vibrations in the arterial barrier. When the cuff pressure falls below the patient's diastolic pressure, blood flows easily through the artery in the common pulses, the vibration is set up in the wall. sensations take place at any position where the cuff pressure is adequately high that the blood pushes arterial barrier release for the blood to flow through the artery. The sensations are a shift from the arterial wall through the air in the cuff, into a transducer in the examine that converts the measurements into electrical signals. It has three pins 5V, TXD, GND these are connected to processor pins.

Fig -5: Blood pressure sensor

4.5 Temperature sensor

The temperature sensor is a device that collects data from a source and converts data into understandable language. It is an RTD sensor. Temperature sensor measures temperature through electrical signal it requires resistance temperature detector. RTD requires an external current source.

Fig -6: Temperature sensor

4.6 Gas sensor

The gas sensor is a device that finds the presence of gases in the atmosphere. The gas sensor has 4 pins out of which two are digital output and analog output and two are Vcc and GND pins. The digital output pin gives an output of either 0 or 1. It means the presence of any toxic or combustible gas near the sensor. The analog output gives an output of continuous voltage which varies based on the concentration of gas that is applied to the gas sensor.

Fig -7: Gas sensor

4.7 Adapter

Here adapter is used for the power supply of Raspberry pi.

4.8 LCD

LCD is liquid crystal display is used as an electronic display module.
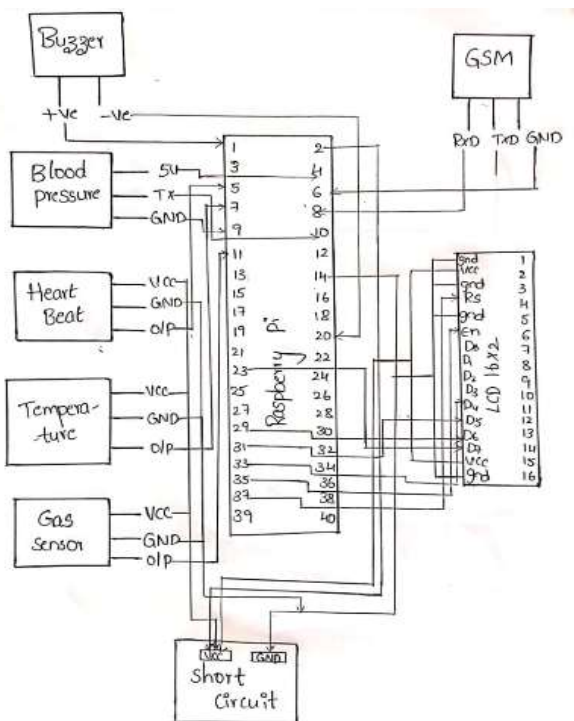
5. CIRCUIT DIAGRAM

Fig -8: Circuit diagram

6. STEPS FOLLOWED FOR THE PROPOSED SYSTEM

1. Firstly take a 16GB memory card and insert it in the Raspberry pi board. In that install the Raspbian Pi OS.
2. Raspberry pi supports python software. Python is used as a programming language for system implementation in raspberry pi.
3. Connect all sensors, LCD, adapter, GSM to Raspberry pi and also connect keyboard and mouse using 2USB ports.
4. Through HDMI to VGA converter cable Raspberry is connected to monitor then it acts as a mini-computer.
5. By using Sudo idle command new file is open for writing the program.
6. Libraries for sensors are downloaded from the internet and lined to the command prompt.
7. Write the code for all components present in the project and declare the GPIO pins for corresponding component pins.
8. After running the program the output is temperature, blood pressure, heartbeat, respiration values of a patient are send SMS to doctor or relatives that means which mobile number is given the code receives SMS and also displayed on LCD.

7. ADVANTAGES

1. The proposed system is used in rural areas because they have no availability of hospitals for regular health checkups.
2. It is very helpful in emergency times.
3. It is very useful in hospitals.

8. EXPERIMENTAL RESULTS
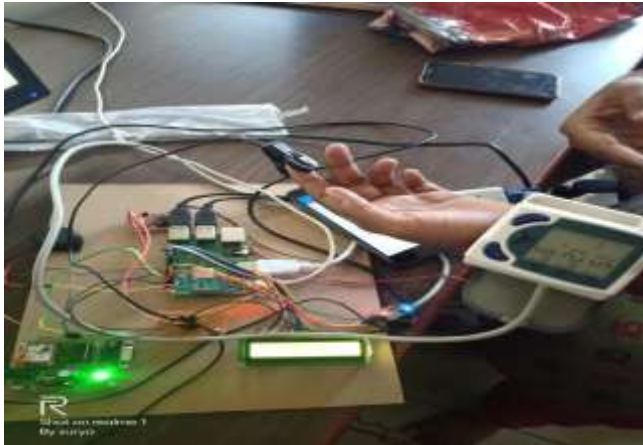
9 CONCLUSION

To avoid regular health checkups from costly clinic's we designed a health monitoring system using raspberry pi. we check our health conditions frequently from our home only like temperature, heartbeat, blood pressure, respiration values and send SMS to doctor or relatives. The automatic system makes the patient feel in a more comfortable environment.

In the future, the mobile app can be made to store the data of all sensors and other devices. The current status of the patient will send the notification in an efficient way and to make data storage in the cloud. A phone video call or phone call service can be included to inform the doctor, medical helper and family members about the situation of the patient and the patient also able to communicate with them.

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