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Gesture Based Health Monitoring System Using IoT

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Abstract : We are developing a system which is helpful for the doctors and caretakers to monitor the patient health at any time, It uses a Raspberry Pi and the Internet and is known as a health monitoring system. The Raspberry Pi is equipped with a few sensors that can provide information about health parameters of persons, such as their temperature and heart rate. The device transmits that data to a specialized, cloud-based computer. Then, medical professionals can assess patients' conditions and provide care as necessary. The fact that many individuals can use it and it isn't very pricey, makes it a nice machine presented to the World.

Index Terms **-Raspberry Pi 4, Max30102 Pulse Sensor, Internet of Things (IOT) , Ultrasonic Distance Sensor, DS18B20 Temperature Sensor.**

1. INTRODUCTION

The healthcare system needs a modern approach, and technology can help. Wearable sensors monitor vital signs in real-time, detect potential health problems early, and provide timely intervention. Raspberry Pi is a low-cost computer device, that can collect and analyze patient data, aid in accurate diagnoses and effective treatment plans, and enable remote medical consultations. Integrating wearable sensors and Raspberry Pi can enhance the efficiency and effectiveness of the healthcare system. It can create a more modern approach to healthcare, with real-time monitoring, accurate diagnoses, and effective treatment plans. It can also reduce the need for physical hospital visits. It is mainly useful for the people who cannot speak, where they can access this device by gestures, which is detected by pi camera.

2. RESEARCH METHODOLOGY

In this paper, an efficient method is proposed to measure health parameters. The main intent of the system is to measure the health parameters of individuals and store the information in the cloud, where it can be accessed by both caretakers and doctors. This system is particularly useful for individuals who are non-verbal and can communicate through gestures. The system uses a camera to capture the gestures, and the output is provided through speakers, making it easy to understand.

Overall, this system provides an efficient and accessible way to measure and store health information, making it easier for caretakers and doctors to monitor the health of their patients, especially those who cannot communicate verbally

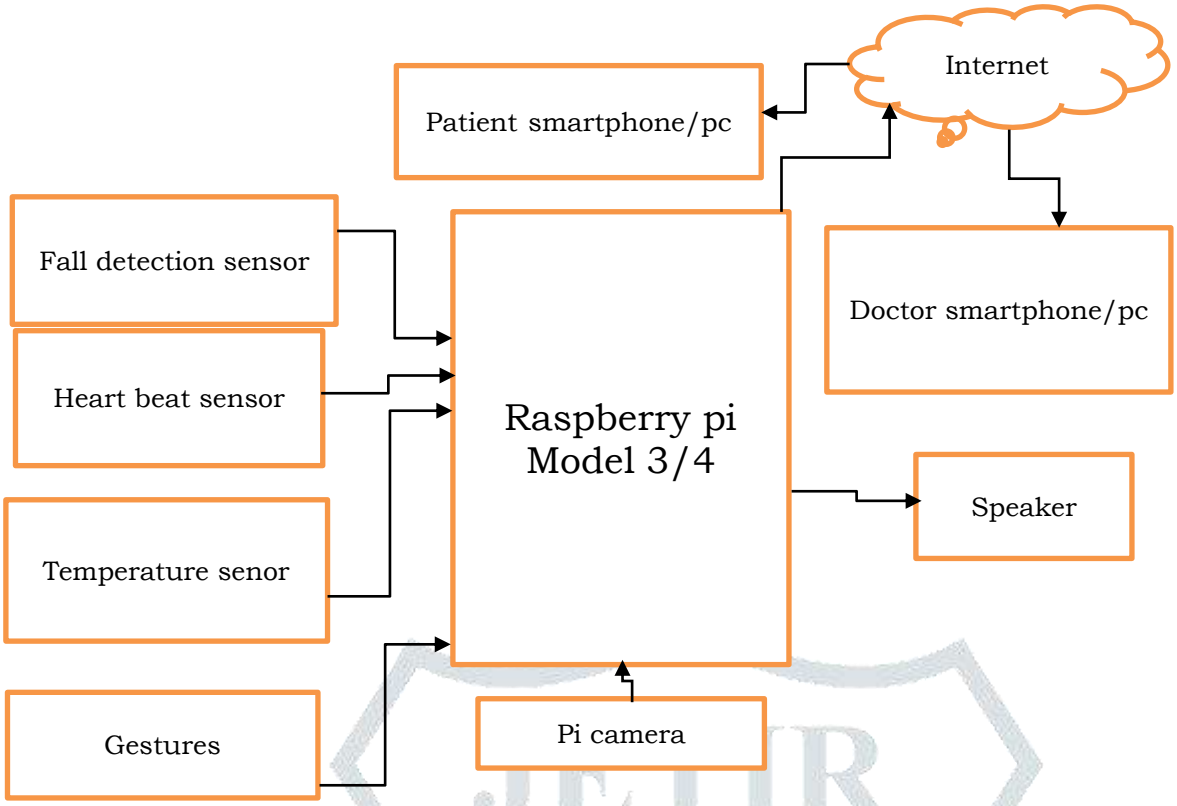


Figure1: Block Diagram of proposed design

2.1 COMPONENTS USED

Raspberry Pi – It is a low-cost, credit-card-sized computer that can be used for a variety of purposes, including programming, gaming, media playback, and even as a mini-server.

Max30102 pulse sensor - It is a wearable, non-invasive device that can measure heart rate and blood oxygen levels. It uses infrared light to detect changes in blood volume and delivers accurate readings in real-time.

Ultrasonic distance sensor - It uses sound waves to measure the distance between objects. It emits high-frequency sound waves and measures the time taken for them to bounce back to determine the distance accurately.

DS18B20 temperature sensor – It is a digital thermometer that can measure temperatures ranging from -55°C to +125°C with an accuracy of ±0.5°C. It communicates with a microcontroller using a single wire protocol.

Pie camera – It can help non-verbal individuals to communicate with their caretakers and doctors by capturing their gestures and translating them into actionable information, making healthcare more accessible for everyone.

2.2 WORKING

The project is focused on helping caregivers and doctors monitor the health of their patients remotely using sensors and technology. The first part of the project involves collecting data from sensors like the Fall detection sensor, heartbeat sensor, temperature sensor, and the Raspberry pi 3 or 4 model with a pi camera. This data is then sent to the cloud, where it can be accessed by caregivers and doctors using an app.

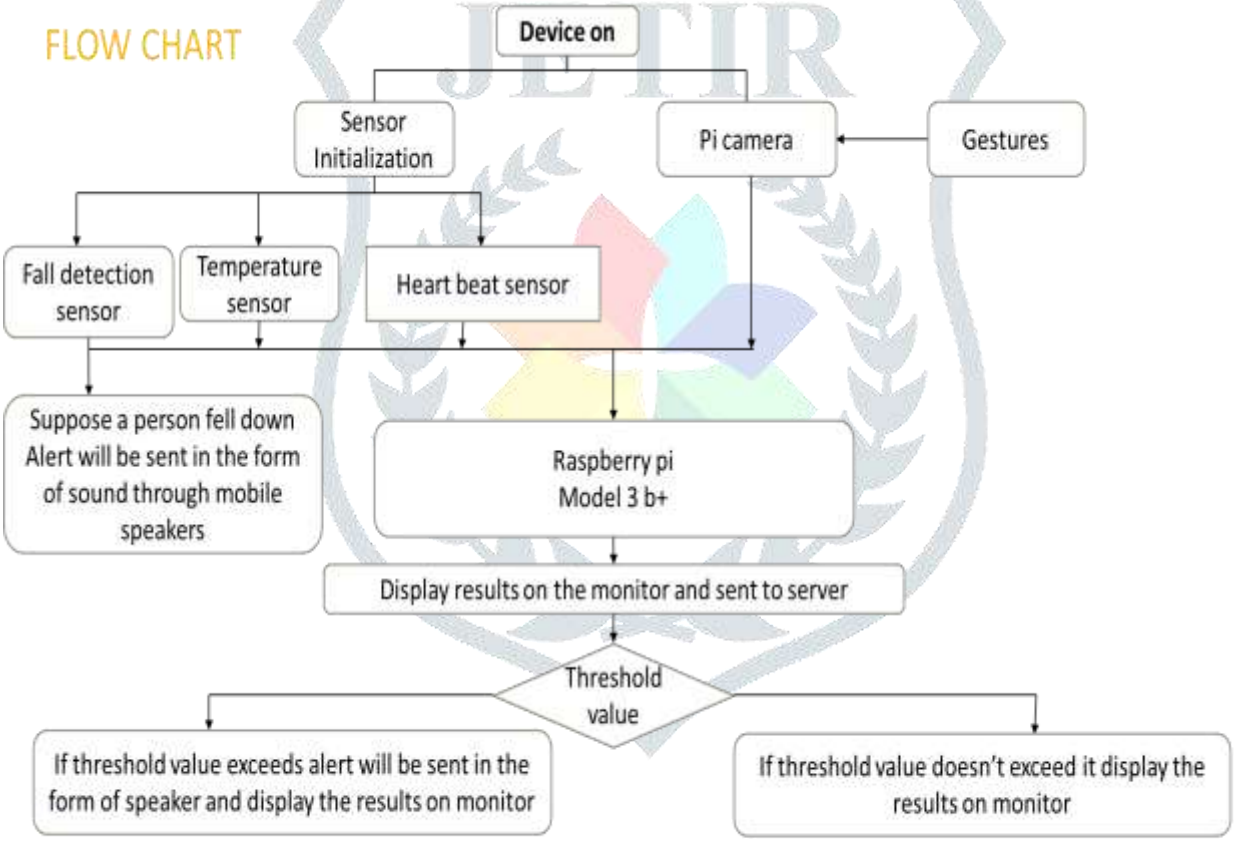
To ensure that the caregivers are alerted in case of an emergency, we will set a threshold value for the patient's health parameters. If the value crosses the threshold, an email alert will be sent to the caregivers' mobile phones and an alert will be sent through mobile speakers. For example, if the patient falls, the fall detection sensor will detect it and alert the caregiver through their mobile speakers.

The second part of the proposed design involves creating a program for patients who cannot speak or move, such as bedridden patients. We will use gestures to convey their needs, and the program will recognize and interpret these gestures. For instance, if the patient makes a gesture representing hunger, the program will recognize it and generate a voice output through the Raspberry pi connected to the 3.5mm jack speakers.

To implement this program, we will use image processing techniques and the open cv and mediapipe libraries. The program will use Image processing with SVM (support vector machines) to recognize the different gestures made by the patients.

Overall, the proposed design aims to provide caregivers and doctors with real-time health monitoring for their patients, enabling them to respond promptly in case of an emergency or patient needs.

2.3 FLOW CHART



3. RESULTS

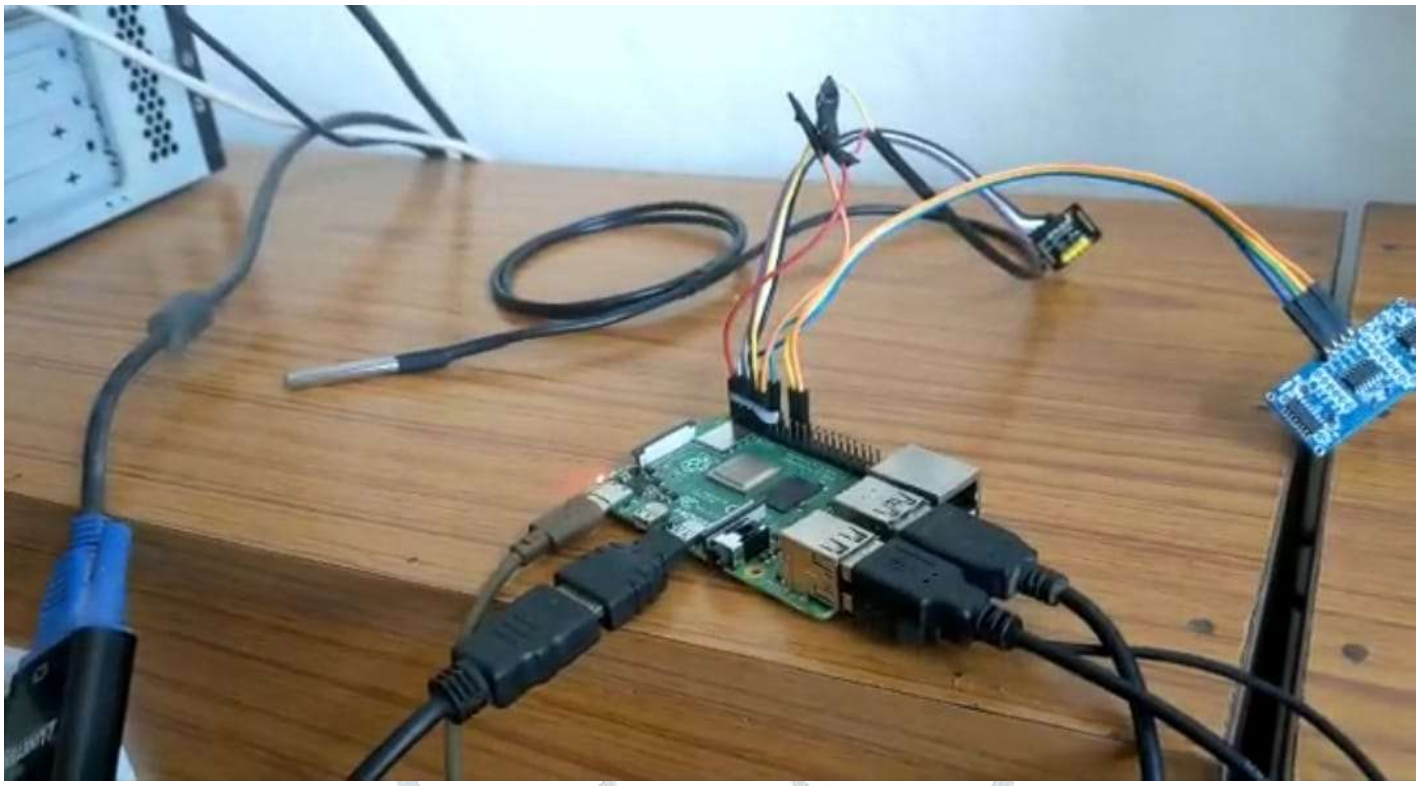


Figure2: Setup of Raspberry pi connected to pc

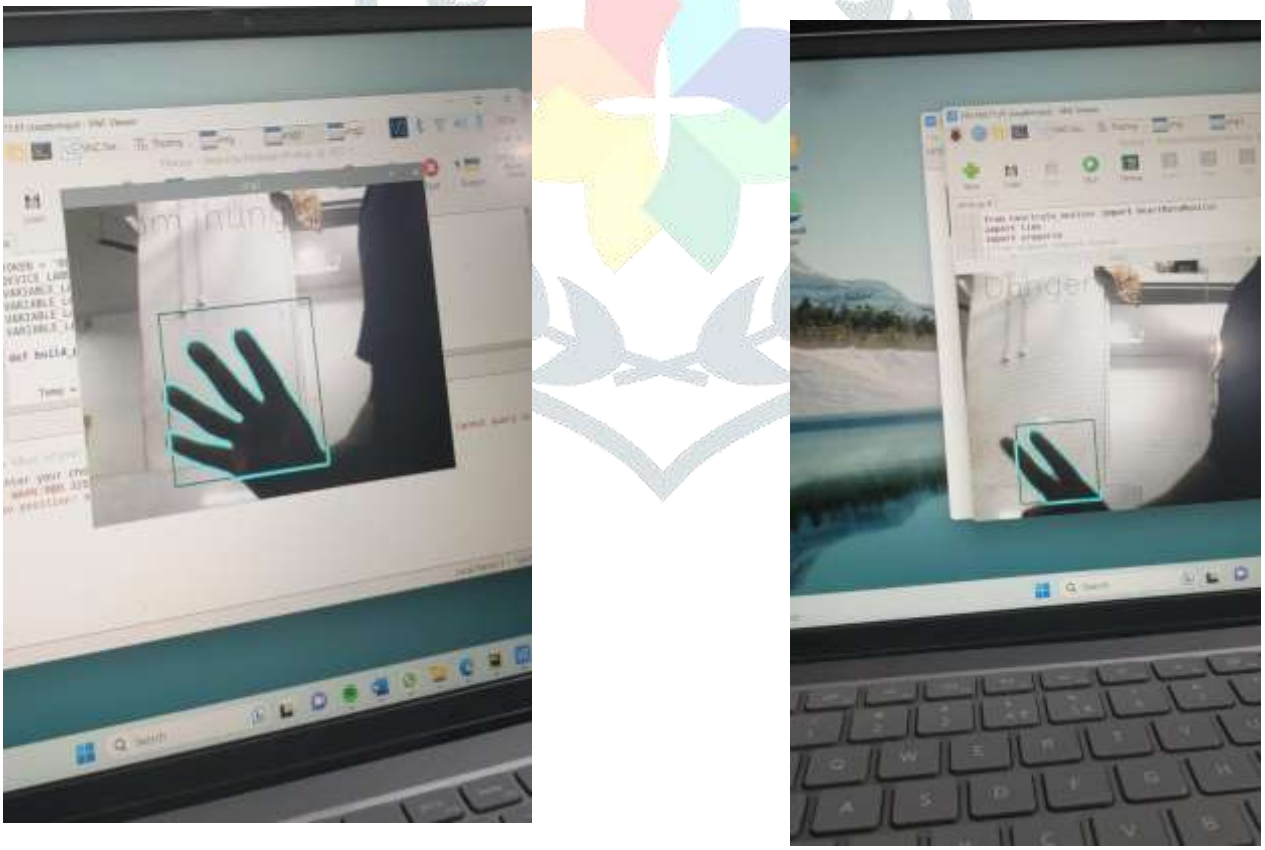


Figure 3: Gesture Representation

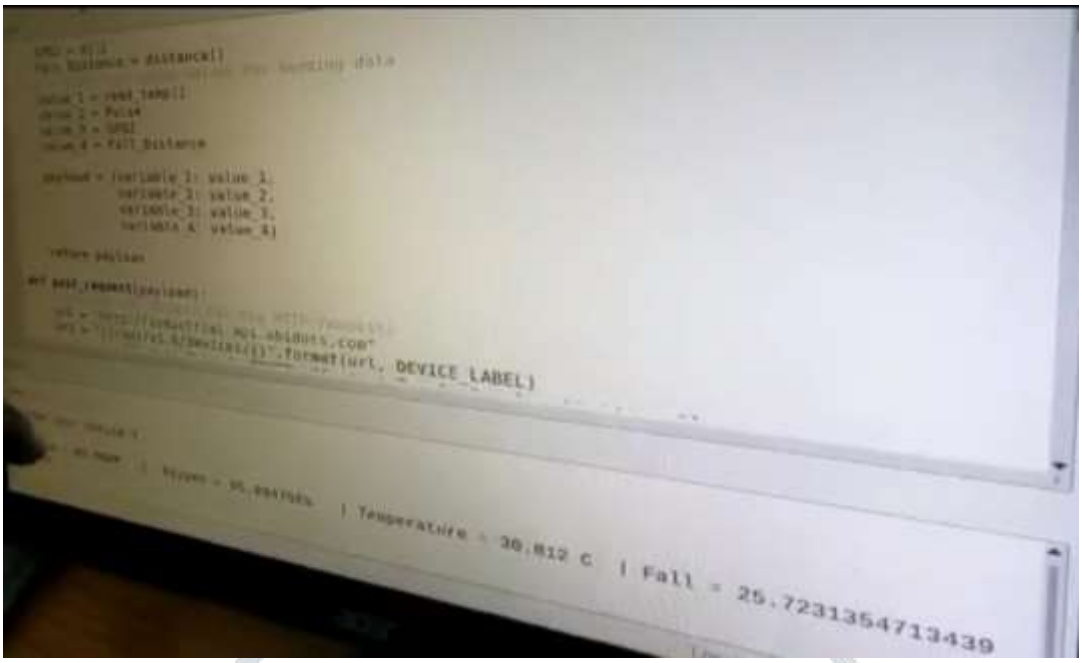


Figure 4 :Health Parameters displaying on monitor

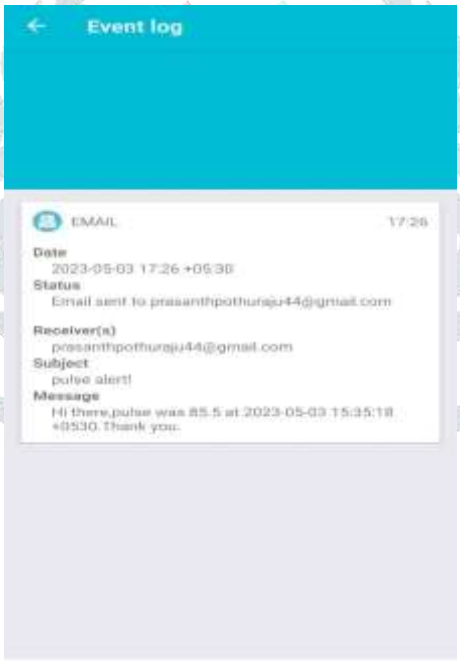


Figure 5: Displaying an app called Ubi dots Explorer

3. CONCLUSIONS

The Internet of Things (IoT) is a network of interconnected devices that can communicate with each other, enabling improved healthcare. By connecting wearable sensors, medical equipment, and smart home technologies to the internet, doctors can remotely monitor patients and access real-time health data from anywhere. This is particularly helpful for patients with chronic conditions that require frequent monitoring. However, privacy and security concerns must be addressed to ensure patient safety and confidentiality. The proposed system aims to provide high-quality healthcare services at a reasonable cost by using big data analysis, cloud computing, and computer technologies, with possible enhancements including a mobile app with a doctor's directory, hospitals, and ambulance services for easy access.

4. FUTURE SCOPE

- Different Technologies can be used and different algorithms can be used for system's security
- Different sensors can be used like new sensors fall detection sensor etc.
- By reducing the size of the sensor, user comfort can be increased.
- We can also integrate all these sensors and by using some other microcontrollers we can integrate this into a small band and it can work similar to smartwatch.
- Different microcontrollers can be used or updated day to day previously we used Arduino present we are using raspberry pi.

5. REFERENCES

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