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IoT Based Remote Healthcare Monitoring System

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Abstract: In healthcare, technology is crucial for recording and communicating as well as for sensory equipment. It is crucial to follow several medical guidelines and postoperative days. IoT (Internet of Things) is the most recent innovation in healthcare communication methods. The Internet of Things (IoT) is a driving force in many areas, including healthcare. A microcontroller serves as a communication gateway in this project. The dispenser box is moved by the controller's connection to a servo motor, which opens it so that patients can take medication that has already been placed inside by the career. The sensors are wired to a microcontroller, which tracks the patient's condition and updates it on the Blynk app. The internet is effectively used by IoT-based patient health monitoring systems to track patients' health and promptly save lives. This makes using this method for quick conditional medication simple. This system may perform well and respond quickly, and it is also simple to set up.

Keywords: Wearable Sensors, IoT

I. INTRODUCTION

Senior citizens frequently neglect to take their medications or are unable to visit the doctor without assistance, which has an effect on their health. Sometimes a slight change in body temperature or heart rate can have a significant impact on a person's health.

The project's primary goal is to monitor several health factors utilizing sensors including a pulse sensor, temperature sensor, and ECG sensor. To create the embedded circuit for the ESP controller to interface with the aforementioned sensors. To programmer the project so that it can transmit data to the controller in a serial fashion. To create the app's front end. To keep track of the data. To connect the servo motor to the controller. The project's primary goal is the asynchronous serial transmission of patient health parameters like temperature and EKG through the air interface using a Wi-Fi module. The microcontroller will process the data. The Blynk app will show the data. Additionally, address matching is performed, and only the designated receiver is capable of receiving data. If necessary, doctors can make an appointment for that patient or change the prescription online a wearable physiological parameters monitoring gadget built on the Internet of Things has been designed and developed. The systems can be used to track bodily temperatures and physiological characteristics like heart rate. The device can tell if someone is in medical crisis and a receiver unit attached to a computer may plot graphs of the body's observed physiological characteristics. Since they cut down on labor needs, expenses, and hospital time, centralized patient monitoring systems are in high demand. While wired communication was once common, Wi-Fi controller/Bluetooth modules, a wireless mesh network, are now preferred because they are more affordable. Because it uses less energy and has fewer limitations than infrared wireless communication, it is also preferred. Patients demand ongoing attention to their health difficulties in day-to-day living, making it challenging to monitor their health while working or studying. A small alteration in their health has the potential to do them great harm. In this case, we must regularly check on their health and inform the doctor of any changes. That helps to improve the patient's health, but there is no effective way to deal with these issues. The basic health characteristics of patients are uploaded using sensors on an app utilizing a Wi-Fi module, and a message is sent to the doctor about it. The patient's relative can be informed to adjust the prescription if necessary by the doctor, who can also regularly monitor the patient's health.

II. METHODOLOGY

HARDWARE

Hardware is made up of a Wi-Fi module and numerous sensors. Hardware consists of various sensors and Wi-Fi module.

ESP8266 Wi-Fi Controller (Node)
DHT.11 Sensor (Temperature and Humidity Sensor)
AD8232 ECG Monitor Sensor Module (EKG Sensor)
MAX 30100 Sensor (Pulse Oximeter and Heart Rate Sensor
Micro SG90 Servo Motor

Sensors detects the live parameters of patients body and sends that data to the controller.

ESP 8266 is programmed using embedded ‘c’ to continuously this data to Blynk an open source cloud platform.
Servo motor will change its angle at a specified time or done by doctor or caretaker using Blynk app.

ESP 8266 WI-FI Controller is a self-contained SoC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network.

ECG Sensor module AD8232 for ECG monitors the AD8232 is a highly helpful sensor that records the ECG, or electrocardiogram, of the heart. Electrocardiography, or ECG, is the measurement of electrical changes brought on by heart motion.

Pulse Oximeter and Heart Rate Sensor Max 30100 is a low-power, plug-and-play biometric sensor with a pulse oximeter and heart rate sensor, the max30100 is based on the I2C protocol. It uses two leds, a photodetector, improved optics, low-noise analogue signal processing, and two leds to detect heart rate and pulse oximetry (SPO2) readings.

Temperature and Humidity Sensors, DHT.11 Sensor is a digital sensor for detecting humidity and temperature is the dht11. It is simple to connect with any microcontroller, including Arduino, raspberry pi, and others, to instantly measure humidity and temperature.

SG90 Micro Servo Motor is a small, light server motor with a strong output. Servo rotates around 180 degrees (90 in each direction) and functions similarly to larger types of servo.

SOFTWARE

The controller is set up to periodically examine the sensors' output and transmit that data to Blynk through an ESP 8266 Wi-Fi module. The Arduino IDE and Blynk IoT platform are used for this. When the system is in use, the sensors will send data to the controller while continuously monitoring patient parameters like temperature, ECG, and oxygen level. ESP 8266 is used by the controller, which has embedded 'c' programming, to deliver data to the Blynk and continuously monitor sensor output. Doctors can review the information on the blynk and, if necessary, schedule an appointment by letting the career know.

III. Working

Identifying the different parameters of the patient using the internet of things is done in this project. In IoT-based health monitoring systems, the patient's real-time data is sent to the cloud via an internet connection. These data can be sent anywhere in the world, allowing the user to view the details whenever they want. IoT-based patient health monitoring systems allow doctors or their loved ones to view data relating to the patient's health. The reason for this is that, in contrast to the global system for mobile communication-based patient monitoring system, access to the data requires going to a website or computer address. Health monitoring systems based on the IoT have a number of senses.

With the help of the temperature sensor, heartbeat sensor, and blood pressure sensor, we first sense the temperature level, pulse rate, and oxygen level of the patient. Instant notification to the related doctor or nurse would allow them to provide the appropriate treatment in time. This is very useful due to the doctor being able to identify the patient's health parameters by simply visiting an IP address or website on the internet. And today, a number of IoT applications are also being created. In order to monitor or track the patient's health, the doctor and/or family members will use android applications, websites or IP addresses. The servo will also be set by a predefined timer, causing it to rotate and allowing the patient to take medication from the dispenser tray.

IV. BLOCK DIAGRAM

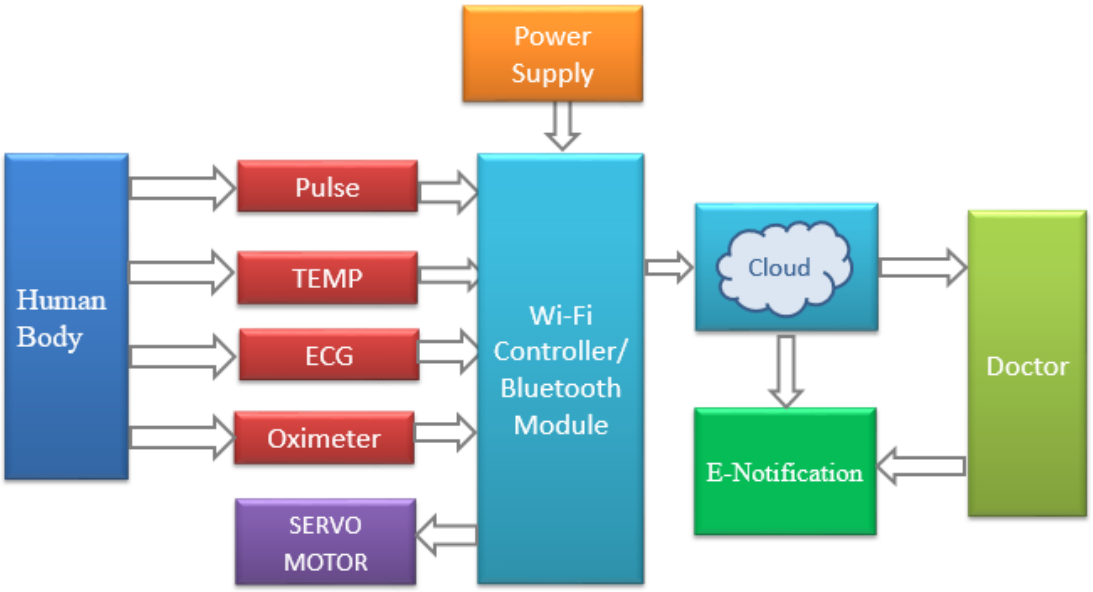

Figure. 1 Block Diagram of Proposed System

V. FLOW CHART

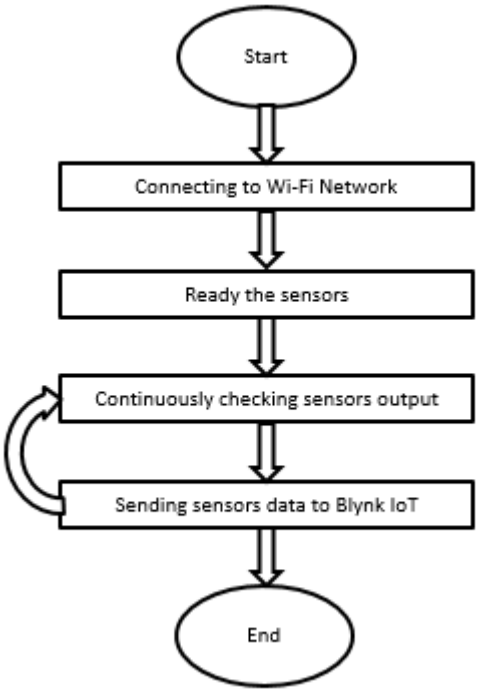

Figure. 2 Flowchart of Patient Health Monitoring System

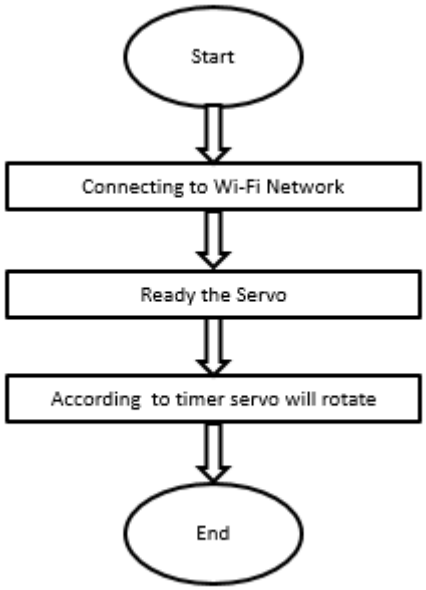

Figure. 3 Flowchart of Dispenser System

VI. RESULT

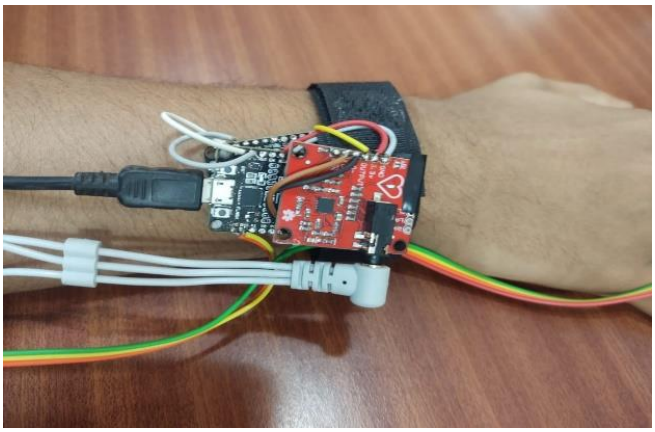

Figure 4 Proposed System

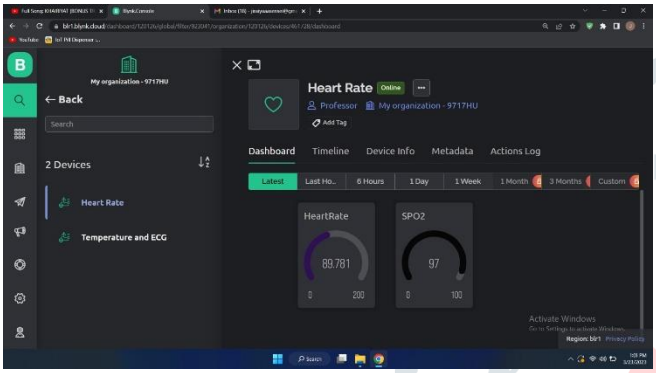

Figure 5 Screenshot of Heartrate and SPo2 on blynk IoT dashboard

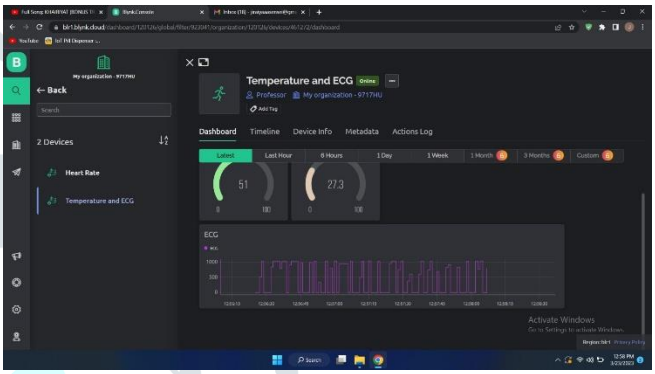

Figure 6 Screenshot of Temperature and ECG on blynk IoT dashboard System

VII. DEVICE COST

Table 1. Costing of Proposed System

Sr. No.	Name of the Component	Cost of the Component
1.	ESP8266 Wi-Fi Controller×3	Rs. 900/-
2.	AD8232 ECG Monitor Sensor Module	Rs. 450/-
3.	MAX 30100 Sensor	Rs. 100/-
4.	DHT. 11 Sensor	Rs. 150/-
5.	Micro SG90 Servo Motor	Rs. 100/-
	Total	**Rs. 1700/-**

VIII. CONCLUSION

The proposed system is focused on using internet technology to create a system that would communicate through the internet for better health. The health care industry is one of several areas where the Internet of Things is king. As a result, the current study focuses on designing an Internet of Things-based smart patient health tracking system using an Arduino microcontroller. In this case, a temperature sensor and pulse rate sensor are utilized to measure the heartbeat and communicate the corresponding data to the cloud over the internet. Additionally, this data is sent to the Blynk application so that patients can easily access their health status. A warning message is delivered to the doctor in urgent cases. The warning message is delivered to the doctor's phone during emergency scenarios in addition to alerting the career. The doctor can see the sent information.

IX. FUTURE SCOPE

The options for such a system are limitless, and many of them are both highly desirable and helpful. Utilizing lithium and alkaline batteries for cost- and life-effectiveness. Extending the range even more by utilizing Lora WAN technology. Utilizing cutting-edge

technology to avoid constantly needing internet. Making the device small will make it more portable, convenient to operate, and carry. Deployment of this system in military and healthcare facilities

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