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Smart Biotelemetry System

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ABSTRACT:In today's era, health surveillance is the most urgent issue. The patient suffersSerious health problems due to inadequate health monitoring. There are many Internet of Things devices and Products that can track a patient's health. Such as biometric devices. The biometric concept was developed to assess a person's physiological data under normal conditionsof patient resistance. It assesses the risk factors that affect people's health in their daily activities. new technologyThe development enhances biometrics as a wireless application, allowing doctors to monitor a patient's health remotely.The system is based on basis of miniaturesensors – smart sensors, information technologies, and embedded computer systems. In this case, Patients' device like Accelerometers measures the vibration or acceleration of motion of the structure. The ADR voice module as well is used for giving commands to assist the patient. The Smart Biotelemetry System also consists of a customized GSM module which is a customized Global System for Mobile Communication (GSM) module designed for wireless radiation monitoring through Short Messaging Service (SMS).

KEYWORDS: Smart biotelemetry, IoT, Health Monitoring.

I.INTRODUCTION

In recent years increased utilization of IOT-enabled services is already available in medical services in many countries to assist medical staff in treating patients effectively. The Internet of Things (IoT) has dominated the industrial sector, particularly in areas of automation and control. One of the most recent trends providing health monitoring. Biotelemetric System has opened doors not just in hospitals, but also in person health-care or health-monitoring facilities. This Smart Biotelemetry system will continuously monitor the patient's health. Doctors play an essential role in health check-ups with conventional techniques. This procedure needs significant time for registration, follow-up, and generating reports.This procedure becomes very lengthy. Using a smart Biotelemetry system it will cut down the amount of time required for this traditional procedure. Among these approaches, avery useful approach is to monitor the health situation of apatient and screen it to the doctors and other paramedicalstaff through the IOT. As we know that it is very difficult toscreen a patient for 24 hours. So here is the status of the patient'shealth. It remotely monitorsthe patient’s physiologicalparameters and diagnoses the illness as early as possible.The SmartBiotelemetry systemfocuses on the measurement and Monitoringof various biological parameters of the patient’s body like the heartrate,oxygen saturation level in blood, and temperatureusing a web server where the doctorcan continuously monitor thepatient’s condition on hissmartphone using an Android application. And also thepatient history will be stored on the web server anda doctor can access the information whenever needed fromanywhere and need not be physically present. Along with all these facilities Smart Biotelemetry system will be providing the SMS service using the GSM Module, and the ISD1828 voice module which will be accepting the commands of the patient. Voice Recognition Module is a compact easy-control speaking recognition board. It is a speaker-dependent module and supports up to 80 voice commands. Any sound could be trained as a command. Users need to train the module first before recognizing any voice command. Smart Biotelemetry system will also monitor the motion or gestures of the patient with the accelerometer. Accelerometers are devices that measure the vibration, or acceleration of motion of a structure. They have a transducer that converts mechanical force caused by vibration or a change in motion, into an electrical current using the piezoelectric effect. The Best feature of the IOT-based Smart Biotelemetry is the Alarmwhich has been set incase of any emergency situations. Therefore It is the most useful feature for Patients. Cloud computing is the on-demand handiness of resources, particularly data storageand computing power while not direct and activemanagement. Smart Biotelemetry System will also consist of Cloud services Named thinkspeak.com. It is basically apublic cloud. The Smart Biotelemetry System's Cloud Services are used to store all the patient's data.

II.LITERATURE SURVEY

Related Works: Philip et.al [1] proposed an advanced IoT application for remote health monitoring. A biomedical strip-based diagnosis system provides a personalized monitoring environment and long-range analysis for urinary tract infections. With path loss of 119 to 141 the proposed model attains a communication range maximum of 6Km which

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provides better data communication to the elementary system. Abhishek et.al [2] proposed a low-power telemetry system with a 401-406MHz frequency band for healthcare applications. The essential condition for the telemetry system and bio signal communication range are considered in the design process, and a low-power reliable wireless communication implant module was developed. This transceiver model attains -18dBm of output power with -75dBm of sensitivity which is suitable for electrocardiogram and photoplethysmogram signals. The proposed model attains a maximum communication range of 3m with a minimum bit error rate which is quite useful for biomedical applications. Jindong Guo et.al [3] proposed an IoT-based medical application for digital services to manage medical images, biophysical parameters, and biological information. Since the acquisition and transmission of data through wireless channels requires wide bandwidth and better speed. The proposed work considers these facts and developed an application model using mobile devices to acquire data from patients through a dongle. This electrochemical analyser measures the blood glucose, and uric acid levels and sent the information to the physician for further decisions. The proposed model is experimentally verified and the results are compared with the conventional clinical biochemical analyser. Though the proposed model's performance is better, the cost of the smart analyser is the major limitation of the system. A fully implanted telemetry system is reported in Joseph et.al [4] research model for long-term monitoring. The proposed model considers the subcutaneous glucose level to measure the diabetes range using membrane sensors and oxygen electrodes. For a maximum duration of 180 days is measured with 2min time intervals the proposed model monitors the glucose level of patients. Tissue glucose and blood glucose levels are observed and provide statistical results to diagnose the patient if the range exceeds the threshold.S. M. RIAZUL ISLAM1 [5] proposed the Internet of Things for Health care.The intelligent collaborative security model to minimize security risk; discusses how different innovations such as big data, ambient intelligence, and wearables can be leveraged in a healthcare context; addresses various IoT and eHealth policies and regulations across the world to determine how they can facilitate economies and societies in terms of sustainable development; and provides some avenues for future research on IoT-based health care based on a set of open issues and challenges.AshikurRahaman [6] proposed Internet of Things (IoT) based smart health monitoring system is a patient monitoring system in which a patient can be monitored for 24 hours. Smart health monitoring devices determine the health condition i.e. rate of the pulse, body temperature, respiratory rate, blood glucose rate, the position of the body, ECG, EEG, and other things by using sensors. Mohsen Hooshmand et.al [7] proposed a fitness monitor system to measure blood pressure, ECG, and respiration. Considering the facts in biomedical devices such as battery power, hardware constraint, memory, and energy management a subject adaptive unsupervised signal compressor is proposed in the research model. The proposed model reduces energy consumption through a lossy compression algorithm and enhances the battery life in biomedical devices. From the survey, it is observed that energy management, communication range, reliability, and accuracy are the major parameters considered in telemetry systems. Considering these issues, an integrated IoT system is proposed in this research work for better data transmission and improved accuracy, and efficiency in ECG telemetry systems. VivekanadamBalasubramaniam [8] proposed IoT-based Biotelemetry for Smart Health Care Monitoring System. The proposed research work focuses on the key features of ECG telemetry and provides an Internet of Things (IoT) based application to monitor patient health in an indoor and outdoor environment. Along with medical terms, data management parameters are analyzed in the experimental section to emphasize the proposed work performance.

III.PROPOSED METHODOLOGY

The proposed work aims to develop a comprehensive Smart Biotelemetry system that incorporates various components for remote health monitoring. The system includes an LM35 temperature sensor, a Max 300110 pulse sensor, a relay driver, a Spo2 sensor, a GSM module for emergency text notifications, an ESP32 Wi-Fi module, the Think Speakcloud platform for data storage, an ISD1820 module for audio alerts, an accelerometerfor activity tracking. The first step in the proposed work is to integrate the sensors into the system. The LM35 temperature sensor will be connected to a microcontroller, enabling accurate temperature measurements. Similarly, the Max300110 pulse sensor will be interfaced with a compatible microcontroller to monitor the pulse rate in real time. The Spo2 sensor ill be connected to the microcontroller, allowing the measurement of blood oxygen saturation levels. Additionally, an accelerometer will be incorporated, capturing physical activity data and movement patterns. Next, the relay driver component will be implemented. A suitable relay driver component will be implemented. A suitable relay driver module will be selected and connected to the microcontroller. The microcontroller will be programmed to control the relay driver based on predefined conditions such as activities based on the movement of the accelerometer. This functionality will enable the system to trigger external devices or alerts when necessary, enhancing the monitoring capabilities. The GSM module will be integrated to facilitate emergency text notifications. It will be connected to the microcontroller, which will be configured to send text messages to friends and family members during critical situations. This features ensures timely communication and support in emergencies. The ESP32 Wi-Fi module will be utilized to establish wireless connectivity and enable data transmission to the ThinkSpeak cloud platform. The ESP32 module will be connected to

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the microcontroller and configured to connect to a Wi-Fi network. Protocols and algorithms will be developed to securely transmit data from the microcontroller to the cloud platform. This functionality allows for seamless remote monitoring and data analysis. The ThinkSpeak cloud platform will serve as the storage and visualization hub for the collected data. A ThinkSpeak account will be created, and the necessary channels and fields will be set up for data storage. Communication protocols and APIs will be implemented to transmit data from the microcontroller to the cloud platform securely. Proper data storage and retrieval mechanisms will be established, ensuring accessibility for monitoring and analysis purposes. To provide audio alerts, the ISD1820 module will be integrated. It will be connected to the microcontroller and programmed to provide audio notifications based on pre-recorded and predefined conditions such as critical health events or abnormal sensor readings. This audio alert system enhances the system's ability to communicate critical information to the user or caregiver.

IV. RESULT AND DISCUSSION

fig 1. shows the graph of the Date vs heart rate of the patient measured in BPM

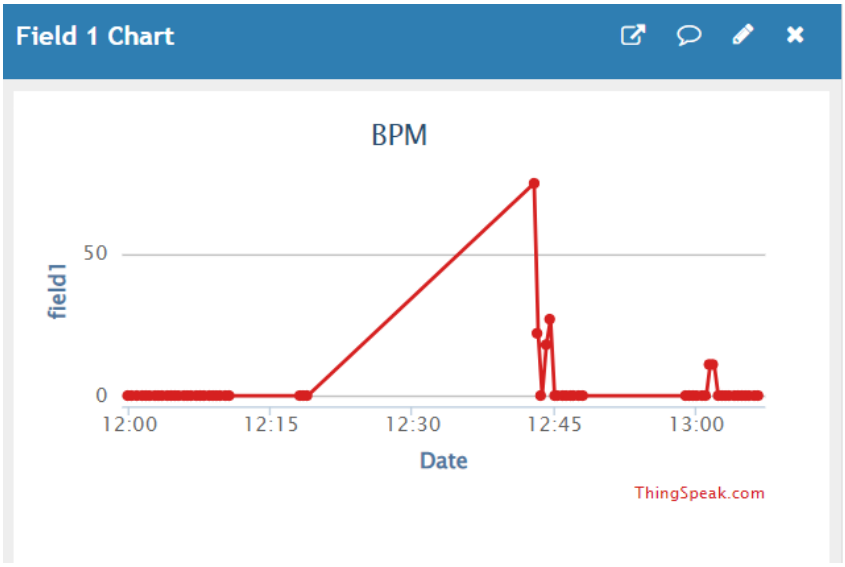

Fig. Field 1 Chart Date vs BPM

Fig 2. Represents Oxygen saturation level in blood measured by Spo2 sensor

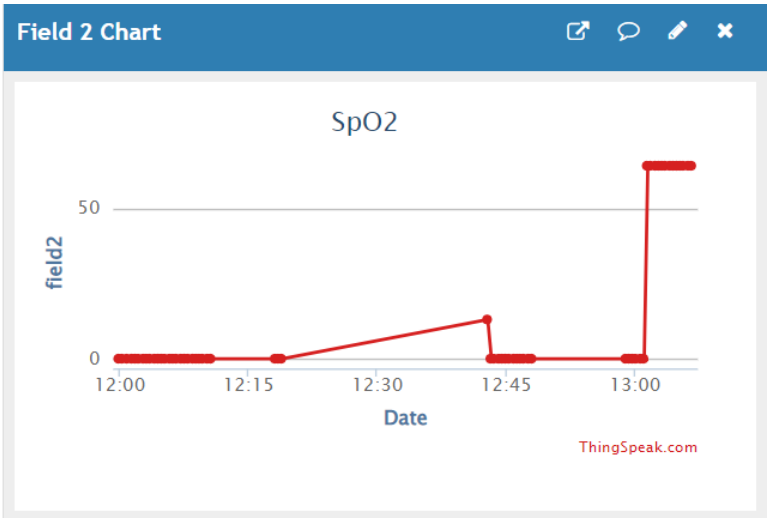

Fig. 2 Date vs Oxygen Level

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Fig. 3 Represents the Body temperature graph which is measured using an LM35 temperature sensor

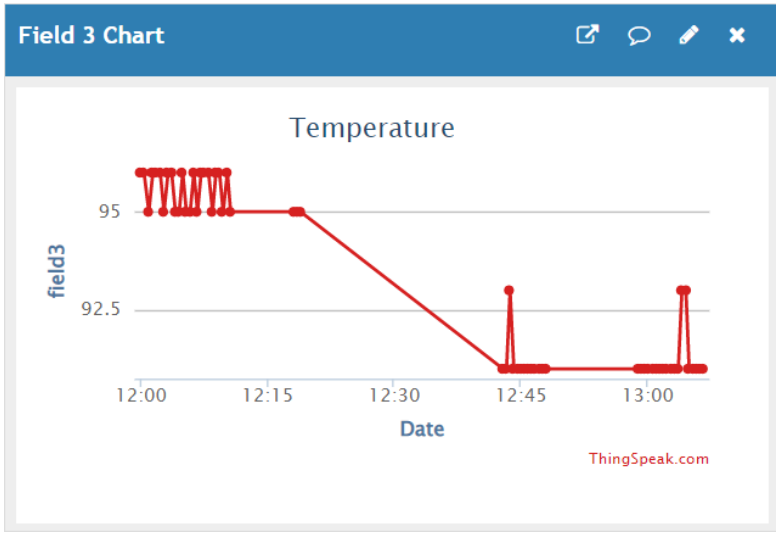

Fig. 3 Date vs body Temperature

V.CONCLUSION

In conclusion, the proposed work includes the integration of various sensors and modules into the SmartBiotelemetry system. The sensors will enable monitoring of temperature, pulse rate, blood oxygen levels, and physical activity. The relay driver and GSM module will allow for external device control and emergency text notifications. The ESP32 Wi-Fi module and ThinkSpeak cloud platform will enable wireless connectivity and secure data storage. Lastly, the ISD1820 module will provide audio alerts. By combining these components, the SmartBiotelemetry system will facilitate remote health monitoring with accurate data collection and timely notifications for improved healthcare support.

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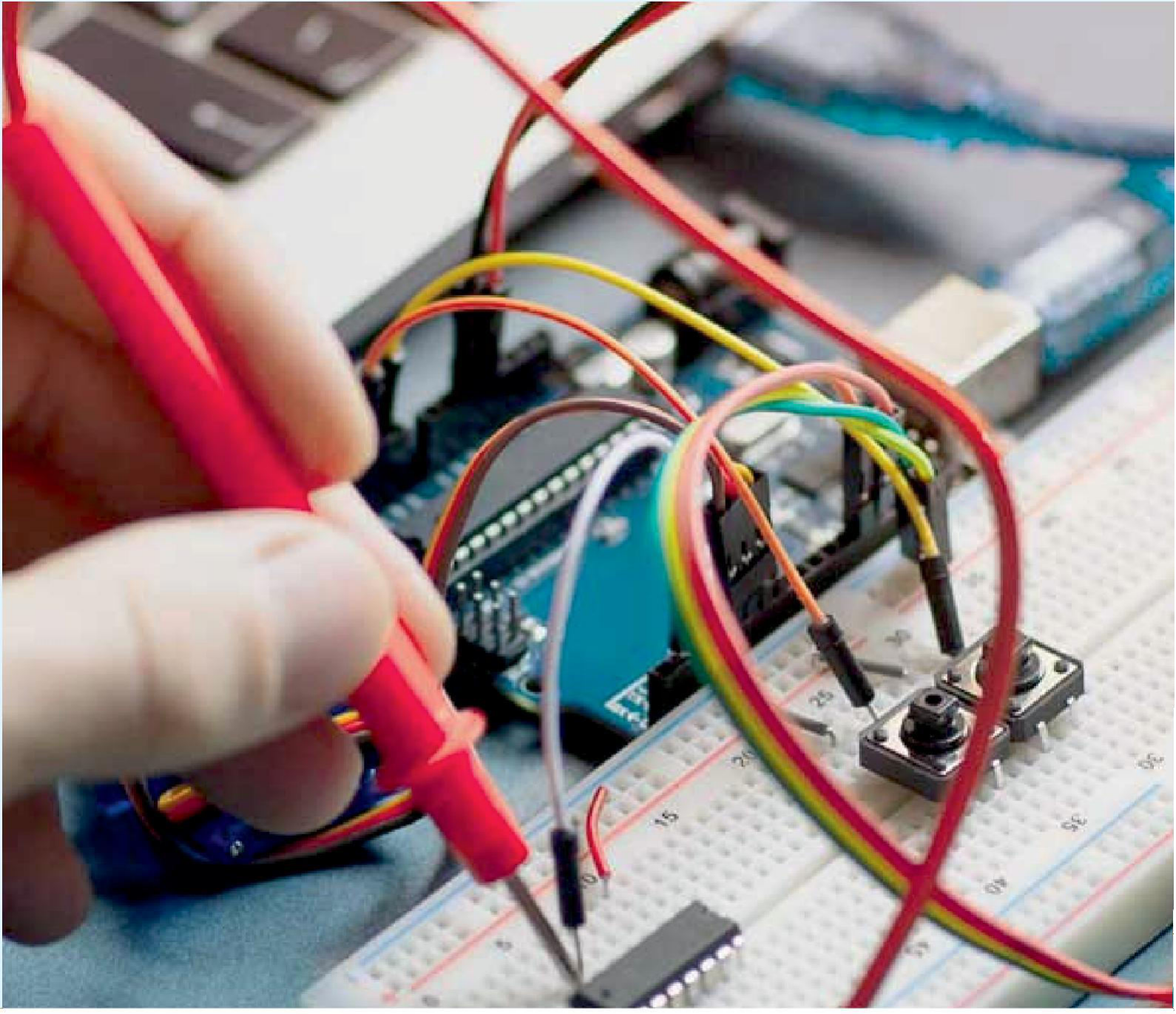

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