

## Health Care Monitoring System

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**Abstract**— The healthcare monitoring systems have drawn considerable attentions of the researchers. The prime goal was to develop a reliable patient monitoring system so that the healthcare professionals can monitor their patients, who are either hospitalized or executing their normal daily life activities. In this work we present a mobile device based wireless healthcare monitoring system that can provide real time online information about physiological conditions of a patient. Our proposed system is designed to measure and monitor important physiological data of a patient in order to accurately describe the status of her/his health and fitness. By using the information contained in the text or e-mail message the healthcare professional can provide necessary medical advising. The system mainly consists of sensors (i.e. temperature sensor, gyroscope, accelerometer), location locker (i.e. GPS), microcontroller (i.e. Node MCU), and software (i.e. Embedded C). The patients temperature, no. of steps he/she walks, location, displayed, and stored by our system. Along with above mention parameters, android app will display timing and amount for drinking water and alert about same.

**Keywords**— Healthcare, Io, Temperature, heart rate.

### I. INTRODUCTION

Health is one of the global challenges for humanity. According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. Healthy individuals lead to secure their lifetime income and hence to increase in gross domestic product and in tax revenues. Healthy individuals also reduce pressure on the already overwhelmed hospitals, clinics, and medical professionals and reduce workload on the public safety networks, charities, and governmental (or non-governmental) organizations. To keep individuals healthy an effective and readily accessible modern healthcare system is a prerequisite. A modernized healthcare system should provide better healthcare services to people at any time and from anywhere in an economic and patient friendly manner. Currently, the healthcare system is undergoing a cultural shift from a traditional approach to a modernized patient centered approach. In the traditional approach the healthcare professionals play the major role. They need to visit the patients for necessary diagnosis and advising. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be on site of the patient all the time and secondly, the patient remains admitted in a hospital, wired to bedside biomedical instruments, for a period of time. In order to solve these two problems the patient oriented approach has been conceived. In this

approach the patients are equipped with knowledge and information to play a more active role in disease diagnosis, and prevention. The key element of this second approach is a reliable and readily available patient monitoring system (PMS). The need for a real time recording and notification of vital signs of a patient is of prime importance for an effective PMS. By encapsulating the advantages of modern bioinstrumentation, computers, and telecommunication technologies a modern PMS should acquire, record, display, and transmit the physiological data from the patient body to a remote location at any time. For more efficient, timely, and emergency medical care the PMS must also be incorporated with an alarm system. In order to alert the patient as well as the health care service providers the PMS should not only monitor and analyze the critical patients data but it should also send alarming messages in case the monitored data go outside their normal ranges. Hence, an active database system must be associated with the PMS. Most of the proposed PMSs are centralized in a sense that all patients data are stored in a single server. By using necessary firmware and software the server can be connected to an open communication network via TCP/IP protocol. Thus a patient can be monitored from a remote location. Existing and widespread mobile phone networks can assist in this regard.

## II. RELATED WORK

Amna Abdullah and et al [1] shows LabVIEW based patient checking framework. The framework task is finished in five fundamental advances. We think about two procedures to execute the framework. In the main method we interface the sensors joined with the patient's body to a transmitter unit related with a ZigBee or GSM organize. The transmitter transmits the information remotely to a recipient that is additionally connected with a ZigBee or GSM arrange. The beneficiary is associated straightforwardly to the USB port of a nearby observing unit (which is a Laptop with LabVIEW programming in it). The neighborhood observing unit shows the last information. Sehore Jaykaran Singh and et al [2] shows the improvement of a microcontroller based framework for remote heartbeat and temperature observing utilizing ZigBee. In India numerous patients are passing on due to heart assaults and explanation for that they are not getting opportune and appropriate help. To give them convenient and legitimate help first we need to ceaseless observing of patient wellbeing. The settled observing framework can be utilized just when the patient is on quaint little inn framework are enormous and just accessible in the healing facilities in ICU. The framework is created for home use by patients that are not in a basic condition but rather should be steady or occasionally observed by clinician or family. In any basic condition the SMS is send to the specialist or any relative. With the goal that we can without much of a stretch spare numerous lives by giving them fast administration. Priyanka Kakria and et al [3] states that Online telemedicine frameworks are valuable because of the likelihood of auspicious and productive social insurance administrations. These frameworks depend on cutting edge remote and wearable sensor innovations. The fast development in innovation has astoundingly improved the extent of remote wellbeing observing frameworks. a constant heart observing framework is produced thinking about the cost, simplicity of use, exactness, and information security. The framework is conceptualized to give an interface between the specialist and the patients for two-way correspondence. The fundamental motivation behind this investigation is to encourage the remote cardiovascular patients in getting most recent medicinal services administrations which probably won't be conceivable generally because of low specialist to-persistent proportion. The created observing framework is then assessed for 40 people (matured somewhere in the range of 18 and 66 years) utilizing wearable sensors while holding an Android gadget (i.e., cell phone under supervision of the specialists). The execution examination demonstrates that the proposed framework is dependable and accommodating because of fast. The examinations demonstrated that the proposed framework is advantageous and solid and guarantees information security requiring little to no effort. Aamir Shahzad and et al [4] concludes that Tele-monitoring is

definitely not another term, in data innovation (IT), which has been utilized to remotely screen the strength of patients that are found not in like manner places, such doctor's facilities or restorative focuses. For that, wearable restorative sensors, for example, electrocardiography sensors, circulatory strain sensors, and glucometer, have generally been utilized to make conceivable to gain the ongoing data from the remotely found patients; subsequently, the therapeutic data is additionally conveyed, by means of the Internet, to perform medicinal conclusion and the relating medications. Like in other IT parts, there has been enormous advancement accounted in therapeutic areas (and in telemonitoring frameworks) that changes the human life security against a few perpetual illnesses, and the patient's medicinal data can be gotten to remotely by means of Wi-Fi and cell frameworks. Further, with the appearances of distributed computing innovation, medicinal frameworks are currently more effective and versatile in handling, for example, stockpiling and access, the therapeutic data with negligible improvement costs. This examination is additionally a bit of upgrade made to track and screen the constant restorative data, limited in approved region, through the demonstrating of private distributed computing. The private cloud-based condition is planned, for patient wellbeing observing called limited telemonitoring framework, to get the ongoing restorative data of patients that dwelled in the limit, inside medicinal wards and outside therapeutic wards, of the restorative focus. Another remote sensor arrange situation is structured and demonstrated to keep or screen the patients' wellbeing data entire day, 24 hours. This examination is another anchored sight towards therapeutic data access and gives headings for future improvements in the restorative frameworks. SARA FATIMA and et al [5] The Body Sensor Network (BSN) innovation is a standout amongst the most basic advances utilized in IOT based present day medicinal services system. IOT has now turned into the most great correspondence standard of the 21st century, by expanding the idea of Internet and making it more inescapable, permitting consistent association among various kinds of gadgets. In view of that reason, IoT has now turned out to be more gainful in a few zones, for example, social insurance framework. This paper proposes a framework design for brilliant medicinal services dependent on GPS and GSM Technologies, comprising of scaled down body sensor units (Bsus), which can gauge pulse, heartbeat rate and body temperature and convey them in instances of unprecedented practices to supervision therapeutic elements utilizing GSM, GPS to convey prompt activities to protect patients existence with possibility later on to include other essential components estimations as per accessible sensor in the market which can accomplish the target of giving a solid viable application to continuous wellbeing checking and following. Sumit Majumder and et al [6] concluded in their paper that Future in many nations has been expanding

constantly over the few couple of decades on account of noteworthy enhancements in drug, general wellbeing, and in addition individual and natural cleanliness. In any case, expanded futures joined with falling birth rates are relied upon to induce an extensive maturing statistic sooner rather than later that would force huge weights on the financial structure of these nations. Along these lines, it is basic to create financially savvy, simple to-utilize frameworks for elderly social insurance and prosperity. Remote wellbeing checking, in view of non-intrusive and wearable sensors, actuators and current correspondence and data advancements offers a proficient and savvy arrangement that enables the elderly to keep on living in their agreeable home condition rather than costly human services offices. These frameworks will likewise enable medicinal services work force to screen essential physiological indications of their patients progressively, survey wellbeing conditions and give input from far off offices. In this paper, we have displayed and thought about a few minimal effort and non-intrusive wellbeing and action observing frameworks that were accounted for lately. A study on material based sensors that can conceivably be utilized in wearable frameworks is additionally exhibited. At long last, similarity of a few correspondence advancements and in addition future points of view and research difficulties in remote observing frameworks will be examined. B. Srirama Chowdary and et al [7] framework we utilized heartbeat sensor to gauge the heart beat rate of a man, and accelerometer to check number of steps, separate, speed, calories consumed and a controller board Ti's CC3200 ,which has inbuilt Wi-Fi that works in both station mode and passageway mode. The beat sensor's information goes to controller, at that point the controller sends this information to the web empowered versatile application by utilizing accessible Wi-Fi arrange. The data can be seen from versatile application with security accreditations like login points of interest. Olalekan Oyebola1 and et [8] recognized some glitches including awkward information extraction and dynamic tuning of information to protect the nature of information transmission only for the matured. This paper shows an option planned engineering of a microcontroller based heartbeat and body temperature checking framework utilizing fingertip and temperature sensor as an answer for a portion of the recognized difficulties of existing innovation that utilizes organize between the patient and specialist to empower remote observing of matured patient for restorative consideration. Evaluation of the gadget on genuine signs indicates precision in heartbeat estimation, even under serious physical action for the matured. Aashay Gondaliaa [9] proposed a system that empowers to armed force control unit to track the area and screen soundness of warriors utilizing GPS module and remote body zone sensor systems (WBASNs, for example, temperature sensor, heart beat sensor, and so forth. The information originating from sensors and GPS beneficiary will be transmitted remotely

utilizing ZigBee module among the individual troopers. Besides, LoRaWAN arrange framework has been proposed to be utilized between the squadron pioneer and the control unit in high height warzones where cell organize inclusion is either missing or does not permit information transmission.

### III. PROPOSED SYSTEM

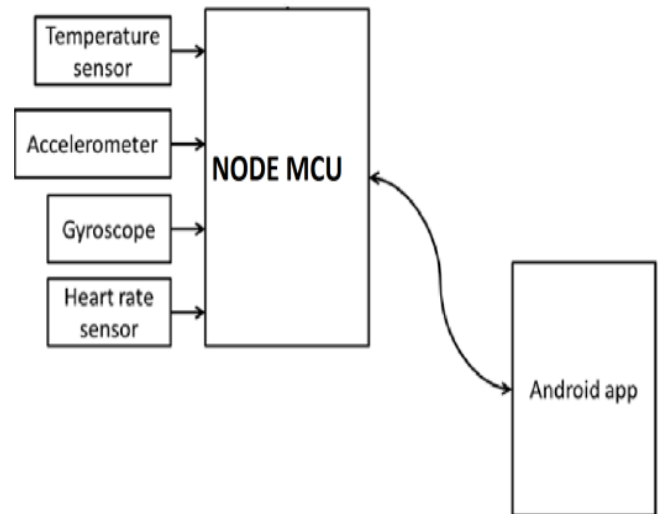


Fig. 1. Proposed System

Here patients body temperature, body movements, respiration and heart rate is measured using respective sensors and it can be monitored in the monitor screen of computer using Node MCU as well as monitoring through anywhere in the world using internet source. The proposed method of patient monitoring system is monitor patients body temperature, Blood pressure, and Respiration rate and body movements using Node MCU. After connecting internet to the Node MCU it act as a server. Then the server is automatically sends data to the website. Using IP address anybody can monitor the patients health status anywhere in the world using laptops, tablets and smart phones. If these parameters are goes to abnormal it will automatically sends alert mail to the doctors and relatives. After full hardware completion process, then putty software is used for completion of full project Then MIT app inventor software is used for transfer these parameters (Patients body temperature, Blood Pressure, and Respiration rate and body movements) from Node MCU to Android App. This paper proposes a real-time low cost electronic saline monitoring and control system which can automatically monitor the saline flow rate, remaining time and can also control infusion rate. It can wirelessly send the information to server and display the results in the form of saline droplet rate, failure condition, remaining time to empty the saline bottle and show infusion volume displayed on central monitor.

**IV. RESULT**

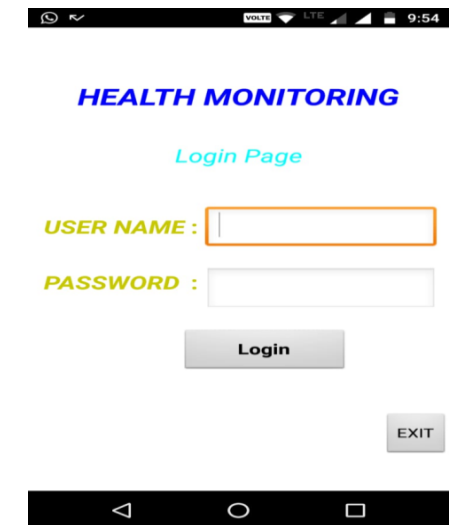


Fig 2 login page of proposed system

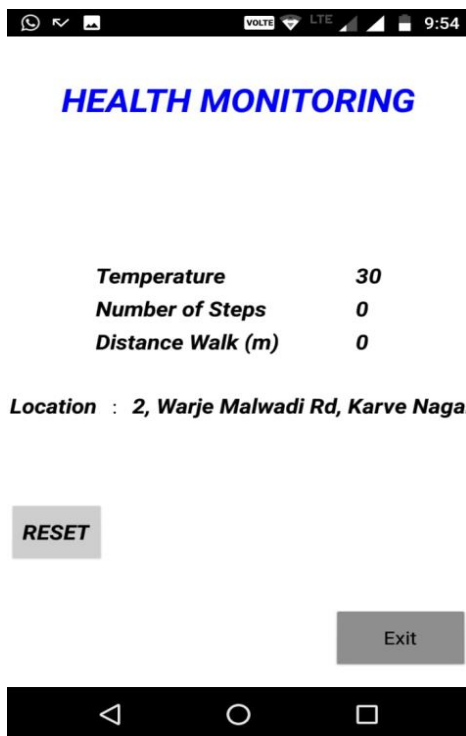


Fig 3 data monitoring on android App

All this data is shown on the android app as shown in fig 5. Android app has facility to write prescribed medicine and it is accessible by only authorized persons. The data from temperature and heartbeat sensor is updated automatically on android app and according to this data dr. prescribes particular medicine which can be seen on android app. Steps are counted; steps and location are updated on mobile app.

Table 1 analysis of different sensors w. r. t. time

Time	Temperature (° C)	Heart rate	No. of steps
10 AM	36	90	1770
12 AM	37	100	3000
2 PM	39	96	4760
4 PM	38	98	4902
6 PM	35	101	6521
8 PM	32	97	10564
10 PM	29	103	12350

Interpretation of data from different sensors is shown as tabular format in table 1 and as graphical format in figure 6. Temperature is represented in Celsius whereas for normalization in graphical analysis no. of steps are divided by 100.

**V. CONCLUSION AND FUTURE SCOPE**

A smartphone based health monitoring system has been presented in this work. By using the system the healthcare professionals can monitor, diagnose, and advice their patients all the time. The physiological data are stored and published online. Hence, the healthcare professional can monitor their patients from a remote location at any time. Our system is simple. It is just few wires connected to a small kit with a smartphone. The system is very power efficient. Only the smartphone or the tablet needs to be charged enough to do the test. It is easy to use, fast, accurate, high efficiency, and safe (without any danger of electric shocks).

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