



# INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact Factor: 6.078

(Volume 7, Issue 6 - V7I6-1169)

Available online at: <https://www.ijariit.com>

## A Review on Health Monitoring System

Akansha Khandale  
[khandaleaj@rknec.edu](mailto:khandaleaj@rknec.edu)

Shri Ramdeobaba College of  
Engineering and Management,  
Nagpur, Maharashtra

Dhanada Kapre  
[kapreds@rknec.edu](mailto:kapreds@rknec.edu)

Shri Ramdeobaba College of  
Engineering and Management,  
Nagpur, Maharashtra

Kashish Dhoot  
[dhootkn@rknec.edu](mailto:dhootkn@rknec.edu)

Shri Ramdeobaba College of  
Engineering and Management,  
Nagpur, Maharashtra

Kartik Khandelwal  
[khandelwalkr\\_1@rknec.edu](mailto:khandelwalkr_1@rknec.edu)  
Shri Ramdeobaba College of  
Engineering and Management,  
Nagpur, Maharashtra

Dr. Dattatraya Adane  
[adaneds@rknec.edu](mailto:adaneds@rknec.edu)  
Shri Ramdeobaba College of  
Engineering and Management,  
Nagpur, Maharashtra

### ABSTRACT

*Mobile devices are largely used in almost every aspect now-a-days as they are easy to carry and access. Considering this large use of mobile phones, it will be beneficial to use it in healthcare system to make the medical data easy to carry, accessible, manageable and will increase the efficiency. We looked at the pros and downsides of some of the proposed systems, as well as other methodologies, during the survey. Every year, a big number of people are diagnosed with chronic diseases, necessitating an enormous amount of medical resources. As a result of the expanding patient population at healthcare facilities, remote monitoring techniques are becoming increasingly important. The healthcare industry's technology has advanced at a remarkable pace in recent years. According to the past few years estimation and recent findings, remarkable growth has been observed in data acquisition and monitoring systems for healthcare. One of the research paper proposed a system which aims at improving healthcare management by analysing health parameters like blood pressure, body temperature, heart rate and predicting heart problems. Especially for the patients when they are mobile, this is of great advantage. The system aims to alert the application user in case of any abnormalities by analysing the health parameters.*

**Keywords**— Health Monitoring System, Sensors, IoT Technology

### 1. INTRODUCTION

A Health Monitoring System (HMS) is a cutting-edge technology that offers an alternative to traditional patient and health management. It consists of a wearable wireless gadget, such as a fitness band, that has sensors and is linked to an app that allows a doctor to obtain medical data. Patient (Health) monitoring systems have recently been discovered to be more user-friendly, convenient, and beneficial for both patients and healthcare providers. In 2012, around 2.8 million patients used home-based remote monitoring services from dedicated equipment. [10].

Many applications are being developed nowadays that allow doctors and clinicians to remotely monitor their patients' health, making their jobs easier. Numerous wearable devices have been developed as a result of the rise of IoT (Internet of Things), which record various health data such as heart rate, body temperature, step counts, and are displayed on a mobile phone and can be used to monitor a person's health.

The basic idea is health data analysis which is integrated with mobile apps to aim to detect early signs of health problems and prevent further complications. Since hardware health data acquisition systems already exist, the work done concentrates more on software part of monitoring and analysis. Existing datasets are used to simulate the data acquisition which can be used for further analysis.

Many applications are being developed nowadays that allow doctors and clinicians to remotely monitor their patients' health, making their jobs easier. Numerous wearable devices have been developed as a result of the rise of IoT (Internet of Things),

which record various health data such as heart rate, body temperature, step counts, and are displayed on a mobile phone and can be used to monitor a person's health. [12]

**2. THEORETICAL BACKGROUND**

The work carried out in the paper [12] is a health data analysis system, which can be used with smart phones and aims to analyze collected health parameters in the background and detect early signs of health problems and prevent further complications. The system also provides interaction between the doctor and the application users by providing access of the health data to the doctors. Since hardware health data acquisition systems already exist, the work done concentrates more on software part of monitoring and analysis. Existing datasets are used to simulate the data acquisition which can be used for further analysis.

The goal of this study, as stated in the abstract, is to improve health monitoring through the use of an Android application on a mobile phone. On his phone, the patient can access his health data history, and the doctor can directly check the health information of all the patients he is monitoring, assisting in early diagnosis. When the data is analysed and the patient's condition becomes critical, the patient will be notified of the nearest hospital using the global positioning system (GPS), and a message detailing the patient's location and condition, as well as his or her medical history, will be sent to the concerned doctor.

We determined that mobile healthcare requires technology from the fields of electrical engineering, computer science, and biomedical engineering. The paper [1] focuses on two key points: To begin, a critical analysis of sophisticated applications such as blood glucose monitoring, vital sign monitoring, and smartphone sensor applications based on in-built cameras is required. Second, looking at the problems and important issues surrounding the use of smartphones in healthcare, such as dependability, cost effectiveness, efficiency, user interface, energy consumption, and medical data quality.

Another study [2] looked at a wireless body area network, which is a form of sensor network that is often used to collect health-related data such as ECGs for heart activity monitoring and EEGs for brain activity monitoring. The study deals with coexistence issues such as data collisions caused by acknowledged or unacknowledged transmission modes. In addition, the study depicts the current state of health and development, as well as comparing various established solutions in order to deliver better results.

The GSM modules have been incorporated in heart rate monitoring devices. Bluetooth which enables devices to detect Alzheimer disease and from this system associated person can know the medical feedback based on the data collected by the bio sensors. It also tells us the required hardware equipment for IOT system like Motion sensor, Pulse Oximeter, Bluetooth module. This paper [5] describes the implementation of the system by using smart bio-sensors to detect and record the characteristics human physiology and wireless protocols to interface these data to a computer in order to alert doctors about the patient's health situation.

Wearable sensors have become more popular in recent years, and numerous technologies for personal health care and activity awareness are now commercially available [11]. A modern health-care system should deliver better health-care services to individuals wherever, at any time, in a patient-friendly and cost-effective manner. The essential topic in this study is IOT, which is applied in a variety of methods and algorithms for healthcare monitoring.

Patient Monitoring System (PMS) is a system that uses bio-sensors to continually measure the values of patients' parameters such as blood pressure, body temperature, ECG, EMG, heart rate, and so on. This study [10] proposes a Patient Monitoring System that uses wireless technology to improve doctors' and medical authorities' capacities to track patients' vital indicators and estimate their health status.

The project created and deployed a long-term healthcare system that integrated WLAN and CATV networks into a single, ubiquitous network that served as a service platform for physiological monitoring. [9].

**Table 1: Existing work on Health Monitoring System**

Sr. no	Title	Methodology	Pros and Cons
1.	Patient Health Monitoring System and Prediction using Data Analytics	<ul style="list-style-type: none"> <li>System Architecture the languages Java,PHP, and XML have been employee in this system, which has been combined with the Android studio integrated development environment (IDE)</li> <li>Data Analysis in this example, they employed the Waikato Environment for Knowledge Analysis (Weka). The Weka tool is a data analysis tool that includes a number of algorithms. The study in this paper is done with the Multilayer Perceptron (MLP) technique.</li> <li>Task Implementation Doctors and patients have been given a unique ID to use for login and registration. The data of the patients is kept on the server in the MySQL database. Using Google Place APIs and Google Maps APIs, the patient is given the locations of nearby hospitals.</li> </ul>	<p>This research proposed a system that is solely for patients who are suffering from heart problems. By integrating more data records from a wider range of patients, the accuracy of prediction can be improved even more.</p>
2.	Mobile healthcare application, system design review, critical issues and challenges	<ul style="list-style-type: none"> <li>Mobile healthcare demands technologies from the domains of electrical engineering, computer science, and biomedical engineering, as we discovered in this article. This study focuses on two key points:</li> </ul>	<p>Use of smartphones in patient monitoring, and management. Data security and privacy, acceptance, reliability, and</p>

	(Springer)	<ul style="list-style-type: none"> <li>• First, a thorough analysis of advanced applications such as blood glucose monitoring, vital sign monitoring, and smartphone sensor applications using built-in cameras.</li> <li>• Second, looking at the problems and important issues surrounding the use of smartphones in healthcare, such as dependability, cost-effectiveness, efficiency, user interface, energy consumption, and medical data quality.</li> </ul>	cost are the challenges that must be overcome. Instead of smartphone sensors, wearable device could be used since it is observed that in case of step measurement in long-term analysis may differ by 30% and this is because we do not carry smartphones everywhere.
3.	A Distributed Scheme to Manage The Dynamic Coexistence of IEEE 802.15.4-Based Health-Monitoring WBAN	<ul style="list-style-type: none"> <li>• Coexistence's Impact on WBANs IEEE 802.15.4-based WBANs are affected by dynamic coexistence in two ways: beacon collision and data collision.</li> <li>• Coexistence Analytical Modeling: We simulate the coexistence of homogenous WBANs, with the same number of sensors and data rates, in order to offer an accurate and unambiguous study of the effects of cohabitation on the operation of WBANs.</li> <li>• Coexistence Management in a Dynamic Environment: The dynamic coexistence management (DCM) technique is developed to allow WBANs to independently manage the dynamic coexistence issue.</li> </ul>	They introduce the DCM technique in this study, which allows WBANs to manage the coexistence issue in a distributed manner independently.
4.	IOT Based Health Monitoring Systems	<ul style="list-style-type: none"> <li>• ZigBee technology is used to power wireless temperature and health monitoring devices. This device would come with a transmitter and a receiver.</li> <li>• C, ADC, Clock, Power Supply LCD, and ZigBee modem are all components of the transmitter.</li> <li>• The simulation uses PROTEUS software to maintain track of the patients in real time.</li> </ul>	The major goal is to allow for gadget movement and agility on a human while remaining extremely unique in terms of recording all of the parameters set.
5.	Development of Smart Healthcare Monitoring System in IoT Environment	<ul style="list-style-type: none"> <li>• This system employs the three-stage architectural elements of (1) Sensor Module (2) Data Processing Module (3) Web User Interface. A variety of hardware components were used to create the system.</li> <li>• During the implementation phase, the hardware components were put together. The ESP32, a built-in Wi-Fi module, is used as a processing device, and all of the sensors are connected to it.</li> </ul>	For each example, the devised scheme's error percentage is within a defined range (<5%). The state of a patient is communicated to medical workers through a gateway. The technology is particularly useful in the treatment of infectious diseases such as a novel coronavirus (COVID-19).
6.	A pervasive health monitoring service system based on ubiquitous network technology	<ul style="list-style-type: none"> <li>• CAP based Ubiquitous network architecture. A gateway is used to send information about a patient's condition, and a CAP device with an authentication authorization, and accounting (AAA) security certification method is used to provide medical professionals with access efficiency and security across wireless broadband networks. Cable modems (CMs) and a WLAN were used to create the CAP-based network architecture.</li> <li>• AAA – Client Mechanism: It is in charge of verifying user identification (ID) and access permissions in accordance with the database. Wireless Health Monitoring Devices.</li> <li>• Health-monitoring devices that can be used wirelessly by sending physiological data across a wireless network to a back-end health management server, complete and continuous personal physiological records can be retained.</li> <li>• Health Gateway: The Information Gathering module is in charge of connecting to various monitoring devices.</li> </ul>	The system contained a CAP device and a security authentication mechanism, allowing for two-way vital sign and data exchange.
7	A Survey on Health Monitoring System by using IOT	<ul style="list-style-type: none"> <li>• The information/data gathered from the sensors is gathered and communicated to the smart phone via IOT, which is a crucial element in this project.</li> <li>• Biosensors are used in the IOT-driven healthcare system to collect numerous physiological signals at the same time, and wireless connectivity is used to transfer or share the signals immediately to the cloud diagnostic server and</li> </ul>	This system has the advantages of inexpensive cost, quick analysis, and low power usage.

		caregivers for additional analysis and clinical assessment.	
8	A Real-Time Health Monitoring System for Remote Cardiac Patients Using Smartphone and Wearable Sensors	<ul style="list-style-type: none"> <li>Smartphones use GPRS, 3G, or other</li> <li>Wi-Fi networks to connect to Web portals. Smartphones with built-in GPS assist in Locating the patient's geographic location. The web interface is built using the larvae PHP Framework.</li> <li>The alarming mechanism's major components are data visualization, statistical pre-processing, and notifications.</li> </ul>	Both wireless protocols have message sending times that are within medically acceptable ranges. Due to sensor and smartphone battery difficulties, false alarms can be triggered.

The system proposed in the paper "Patient Health Monitoring System and Prediction using Data Analysis" is better than all the other mentioned researched systems above.

The approach employs the Multi-layer Perceptron (MLP), a supervised learning algorithm that trains datasets to learn a function  $f(\cdot): R_m \rightarrow R_o$ , where  $m$  is the number of input dimensions and  $o$  is the number of output dimensions. This algorithm aids in the attainment of accuracy.

**Improvements:** They can switch to Firebase as a database instead of MySQL which can also be used for an authentication purpose. This will maintain the security of the application.

### 3. CONCLUSION

This study looked at a variety of healthcare monitoring strategies and algorithms. The advantages and disadvantages of the various systems presented in the papers were also investigated. It was observed from many of the systems that to increase accuracy and efficiency of the measurement of analysis, their respective hardware is important where IOT technologies are used. In our application, several important modules like medicine scheduler and hospital location reflector were included, though the main focus is on predicting the minimum time for the user to get fit. We will be trying to overcome the disadvantages and will try to include extra modules like regular Healthcare tips, medication reminders, etc. in our system.

### REFERENCES

- [1] Mirza Mansoor Baig, Hamid GholamHosseini, Martin J. Connolly. "Mobile healthcare applications: system design review, critical issues and challenges". (Springer) 2015.
- [2] Mohammad N. Deylami, Emil Jovanov. "A Distributed Scheme to Manage The Dynamic Coexistence of IEEE 802.15.4-Based Health-Monitoring WBANs". (IEEE) 2013.
- [3] Md. Milon Islam, Ashikur Rahaman, Md. Rashedul Islam. "Development of Smart Healthcare Monitoring System in IoT Environment". (Springer) 2020.
- [4] Rueyshun Chen. "A consumer-based smart home and health monitoring system". (ACM) 2018.
- [5] Naina Gupta, Hera Saeed, Sanjana Jha. "IOT based health monitoring systems" (IEEE). 2017.
- [6] Aleksandar Kotevski, Natasa Koceska, Saso Koceski. "E-health monitoring system" (Researchgate) 2016.
- [7] N. K. Tripathi, Peerapong Kitipawang. "A Real-Time Health Monitoring System for Remote Cardiac Patients Using Smartphone and Wearable Sensors" (hindawi) 2015.
- [8] Harshitha Bhat, Nishmitha Shetty, Ankitha Shetty. "A Review on Health Monitoring System using IoT". (ijert) 2019.
- [9] Chung-Chih Lin, Ren-Guey Lee, Chun-Chieh Hsiao. "A pervasive health monitoring service system based on ubiquitous network technology" (Elsevier) 2008
- [10] Priyanka Das, Rashmita Deka, Suneina Sengupta, Bintu Kr. Nath, Hemashree Bordoloi. "A Review Paper on Patient Monitoring System" (JAFS|ISSN) 2015.
- [11] M. Saranya<sup>1</sup>, R. Preethi<sup>2</sup>, M. Rupasri<sup>3</sup>, Dr. S.Veena<sup>4</sup>. "A Survey on Health Monitoring System by using IOT" (IJRASET) 2018
- [12] Padmashree T, Dr.N.K.Cauvery, Anirudh.V.C, Punith Kumar "Patient Health Monitoring System and Prediction using Data Analytics" (IJIET) 2017