

# Smart Health Care Monitoring System Using Android Application: A Review

Rameswari.R, Divya.N

**Abstract:** *The innovation is changing the scene of the world and driving us towards a down to earth specialized world. The rising part of ICT and IOT has made an enormous effect on human services. It enhances the nature of care, builds the patient security and information insurance and limit working and regulatory cost. The media transmission gadgets are easier to understand and utilized by everybody around the globe which have decreased the correspondence hole to a zero level. The paper clarifies a portion of the correspondence innovation and the particular conventions for moving the information in a protected way (i.e.,) how the imperative indications of patients of patients of patients are sent to the medical consultant for the further treatment.*

**Keywords:** *IoT, ICT, Media transmission, Conventions, Information assurance, Security.*

## I. INTRODUCTION

The medicinal services industry in India is at an essential crossroads. Preventive human services are turning into a territory of center in many nations, and India is the same. Because of the headway in innovation, for example, IoT the most recent decade has seen a rising reception of home-observing gadgets for simplicity and accommodation rather than normal visits to specialists or way labs. Preventive human services has helped customers in settling on predictable options and making positive move on wellbeing, eating routine and way of life so as to remain fit. These activities not just give the body a reasonable shot at remaining sound yet in addition help control existing issues at an earlier stage. IoT assume an imperative part in enhancing human services for people by giving new and more productive methods for getting to, imparting, and putting away data, IoT can help in giving data between the restorative experts and patients through the advancement of databases and different applications The innovations that are utilized for exchanging the information's are MQTT convention, esp8266, esp8266 utilizing TCP/IP convention, cc3200, OBC verified mode, 3G or GPRS innovation, RFID based WBASN, and 5G and so on., the proficiency and execution of the framework utilizing above advancements were talked about in the following literature surveys.

## II. LITERATURE REVIEW

AyaskantaMishara et.al (2018) proposed the social insurance framework utilizing AD8232 heart rate sensor. The framework is chiefly made out of three critical stages initially is the accumulation of information's through the sensors and following stage is transmitting the information's to the web with help of microcontroller through WLAN module lastly preparing the information's in the server . The ECG sensor AD8232 Joined to the patient measures electrical exercises of heart over some undefined time frame. The information procurement is done utilizing arduinouno and is transmitted through the ESP 8266 to cloud. The ESP8266 module has been pre-customized with an arrangement of firmware .Thus we can interface this to the arduino specifically and after that transmit the information. This phase of information taking care of prompts the addition of minor blunders while transmission from the shield to the web. As a finding to this minor mistake a successful convention can be utilized for secure transmission of information. This proposed framework fundamentally weight on the financially savvy innovation and simple method for getting to information utilizing IoT[1].

AkshyakantaMishara et.al(2018) proposed an online ECG observing framework. The procedure starts at the sensor AD8232 which gathers the ECG signal from the patient and pass it on to simple to advanced convertor ADS1115. It changes over the simple information got by sensor AD8232 and passes it to Raspberry Pi3 .Raspberry Pi3 convert them into computerized information. At that point MQTT was introduced on Raspberry pi utilizing python charges[2]. At that point a profile was made on MQTT cloud alongside the heart beat screen and afterward we could get to it utilizing raspberry pi. Framework utilizes MQTT convention over HTTP convention as it utilized less payload information , has a straightforward distribute buy in design and its message estimate is little along these lines making it perfect for memory compelled gadgets . Also, the extra point in regards to the MQTT is that it is the lightweight open convention it is helpful for associations with remote areas where a little code impression is required The above reviewed content focuses on monitoring the ECG data and sending them to the cloud, they have used a light weight protocol MQTT [2] which is an easy way of sending data than using ESP8266 [1]Bhaskar Niraghatam et.al (2017)is expected at building up an ECG checking framework utilizing an android stage. Diverse ECG beats are taken by interfacing the cell phone to the emulator and the got information is put away for reference by the specialist.

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we can likewise contrast the already put away information and present information. This framework can't be utilized for remote territories .future work of this framework can be made accessible for remote places and making them accessible on the play store[3].

R.Harini et.al (2017) proposed an ECG observing framework utilizing android application. The framework depends on ECG sensor, microcontroller and android innovation .The framework utilizes e-Wellbeing Sensor Shield that permits the Arduino UNO board to perform biometric and therapeutic applications where imperative sign checking is required by utilizing different sensors like, Electrocardiogram (ECG),Heartbeat ,oxygen in the blood (SPO2), Body Temperature, Glucometer, Wind current (breathing) and so on for the capacity of information in the web XAMPP is utilized. The proposed framework enables specialists to see his patient's fundamental parameter remotely and progressively in genuine time [4]. A comprehensive review on ECG monitoring are proposed by AyaskantaMisharaet.al [1][2], Bhaskar Niraghatamet.al[3], R.Harini et.al[4].

Gaurav Raj et.al(2017) built up an IOT based EMG observing gadget, which will investigate the EMG flag, created from biceps bronchi to check the execution of exhaustion in that muscle. Moreover, the produced crude EMG flag are spared and send over web by means of WIFI module esp8266 utilizing TCP/IP convention. The EMG flag was recorded on spike recorder programming. At that point recorded flag was separated in four investigation sets and each set was additionally isolated into four stage. After this, the estimations of each eliminate were found. Subsequent to getting estimations of each period of each member, mean power recurrence (mpf) is computed by recognize 4.1. This will give best outcome to investigation. The minitab version 18 was utilized to look at the signs. Contingent upon the size of the signs, this investigation can perceive the muscle weariness in manual lifting[5].

Ho-Murmur Kao et.al (2018) has incorporated a framework for versatile wellbeing application. the executed versatile table care engineering incorporates a home box associated with a circulatory strain check, an android so advanced mobile phone related with inescapable registering, a UI in the PDA and a cloud-based silverware data framework. The framework can perform information observing and administration of patient imperative signs and day by day action, giving a powerful interface between clinical staff and remotely helped patients. The framework mostly centers around the self administration and in enhancing the telecare systems[6].

Godavarthi Rajesh et.al(2017) proposed a framework to screen the patient's energetic signs, for example, EMG, circulatory strain, blood glucose, ECG,bilirubin check and so forth. The detected incentive by the sensors are refreshed on the database and sent to the specialist's cell phone as android application. Here cc3200 microcontroller is utilized in view of in-manufactured system processor to deal with famous conventions[7]. Ho-Murmur Kao et.al[6], Godavarthi Rajesh et.al[7] has designed different framework for monitoring the vital signs of individuals but [6] is developed with self administration technique for enhancing

telecare system rather than sending the data using an effective protocols.

SpurthyTalakalaet.al(2017) have planned an original thought for observing the patients points of interest, for example, ECG, EMG, pulse, blood glucose , heart rate ,temperature utilizing a web server and android plateform, where specialist can continuously monitor the patients using a simple application. In android application it gets the Bluetooth information with help Bluetooth attachment Programming interface and read the information with the assistance of read stream. The principle favorable circumstances are remote checking framework, area can be explored without utilizing GPS, naturally acquire the situation with no constraint[8].

DevashriDeshmukh et.al(2017) proposed an android based human services observing framework where the patient's essential sign, for example, circulatory strain, spo2, heart rate and so on are checked and remotely sent to the particular restorative expert. The fundamental point of the task is to send the data remotely through remote sensor systems. Acquired data by the sensor is sent to the arm controller and then remotely to the web-based interface which decreases hospitalization and help cost [9].

Farah Nasri et.al(2017) has built up a shrewd IOT for medicinal services framework. They are developed to provide medical services using remote sensor at any time anywhere. It diminishes separate obstructions and enhances access to restorative administrations. It is likewise used to spare lives in basic care and crisis circumstances inside urban areas and provincial networks. The fundamental favorable position of the venture is the utilization of remote body sensor arrange innovation it lessens the danger of wired technology [10]. The above papers by SpurthyTalakala et.al [8], DevashriDeshmukh et.al [9], and FarahNasri et.al [10] are intended to collect the patient's data from the wearable sensor.

SarfrazFayazkhan et.al(2017) developed a system for monitoring the patient's conditions using a mobile phone through wireless body sensor arear network.Here RFID based WBAN is used to transmit the information directly to the mobile phones. In this paper the RFID Tags are used to establish thewireless communication. The main advantage of the system is information is transferred securely through RFID tag [11].

PrashantSalunke et.al(2017) has proposed a system that reduces the risk of patients to visit the doctor every time. The real time data of the patients are collected by the doctor through the cloud platform and the suggestion are given by the medical professionals to the respective patients. Thesystem is developed at the aim of reducing the cost, increasing the quality of life and to enrich the real time experience. The system is provided with Intel Edison Which is a computer-on-module that was offered by Intel as a development system for wearable devices<sup>1</sup> and Internet of Things devices which provides multitasking capability and low power consumption thus by making it an effective system[12].

OlutayoBoyinbode (2017)proposed a cloud based body area sensor network in mobile health care systems .The main unit of the system are Wearable Body Area Sensor Network (WBASN),Automated Intelligent Central Node (AICN) or Sink, Cloud-based Central Server (CICS). WBASN consist of two open source electronics boards, the Arduino Leonardo and Arduino wireless Yun shield and three medical sensors which are affixed to the patient. The sensors gather their appropriate data and transmit that information to the second component (AICN) via wireless hotspot communication protocol. The sensors include heart rate sensor, temperature sensor and Galvanic Skin Response (GSR) sensor use hotspot wireless protocol for communication with the AICN. The mobile phone serves as a way to the middleware sink. A software agent operating on the phone collects data from the sensors and sends the user record to the Cloud-based Central Server (CICS) which is a web based application using 3G network.The suggested system is helpful in the prior detection of infections, continuous monitoring of health status of people; and enhanced mobile scheduling between patients and healthcare consultant [13].

Higinio Mora et.al (2017) proposed framework for health care monitoring system that can not only be applied for android application but also for other mobile environments. The system uses the available biomedical data's in BSN for healthcare monitoring. The case study for the proposed application is given in the area of sports (football match).Here the system is composed of wearable devices, biosensors and cloud for storage and mobile environment for extracting the monitored data. Communication between the wearable and the different sensors takes place through Bluetooth and the next generation 802.11ah standard of WLAN is used for large range of communication such as between the wearable and the remote devices. The paper thoroughly explains how the data's are communicated and the framework for the proper transmission of data in the medical application [14].

kavitha.y et.al(2017) proposed a system using body sensor network for health care application .Here many bio sensor are connected to the central core unit LPU (local processing unit)which works as an intermediate between the BSN and the central server .data's from the BSN nodes are sent securely through OCB authenticated mode.OCB mode was developed to provide security and privacy of messages.OCB mode avoids the need to use two systems MAC and authentication systems [15].SarfraFayaz khan et.al [11] and kavitha.y et.al [15] provided a secured way of transmitting information using RFID tag and OBC authenticated mode respectively.

Ranjeet Kumar et .al(2017)proposed a system using a Body Sensor Networks, nodes of the body sensor network are attached with temperature ,humidity and pulse rate sensor , the sensed data from nodes of the BSN are sent to the cloud through raspberry pi for retrieving the data's in mobile phone. When an emergency situation arises it will reminds us. The systems efficiency is improved by statistical analysis of past and present records .For the future work the system can also be attached with multiple sensors for measuring the vital signs of the patients[16]. AyaskantaMishara et.al [2] have proposed system only for

ECG monitoring raspberry pi but this system [16] has overcome the drawback using single vital sign.

Syed Muhammad Waqas Shah et.al (2016) proposed a model that is particular for giving essential wellbeing administrations and access to the therapeutic staff living at far separation from patient's territory. Patient can visit to the savvy wellbeing unit and communicates with specialist through sound and video applications like Skype. They have proposed a three-layer demonstrate; sensor layer, organize get to layer and administration get to layer to isolate the correspondence usefulness for better understanding and usage. Fundamental point of the paper is to utilize the PSTN and versatile administrator's foundation with IOT innovation to give essential wellbeing administrations at entryway step particularly in immature nations and rustic regions. People in general exchanged phone organize (PSTN) is the total of the world's circuit-exchanged phone arrangements that are worked by national, provincial, or nearby communication administrators, giving foundation and administrations to open media transmission. The PSTN comprises of phone lines, fiber optic links, microwave transmission joins, cell systems, interchanges satellites, and undersea phone links, all interconnected by exchanging focuses, in this manner enabling most phones to speak with each other. initially a system of settled line simple phone frameworks, the PSTN is currently as a rule advanced in its center system and incorporates versatile and different systems, and settled phones [17].

Ahmed Imteaj et.al(2016) developed a mobile application which are helpful for the patients in finding the nearby hospitals, and getting first aid information prior ,and booking the room in the respective hospitals . people can easily operate with the mobile applications and handling is also an easy one .here the hospital act as an administrator and user act as the client who can get information from the serverand the main advantage is that app can be used without internet. [18]

Won-Jae Yi, JafarSaniie et.al (2016)introduced a system for a Patient Centered Mobile Health Monitoring system. The system uses multiple biosensor to make predictions on the signs of the patients so that they can easily get medicated in addition to the biosensors the system make use of the type of sensor called environmental sensor to improve the integrity and analysis.[19]

Joon-SooJeonget.al(2016) introduced an IOT healthcare to provide patients monitoring and diagnosis for prior detection of disease and who are in need of intensive monitoring for health conditions.

Medical data is gathered by sensors, the gathered data processes through mobile and intelligent network, the data goes to cloud computing for analyze the data with complex algorithms and medical professionals can make diagnoses and treatment recommendations in a smart healthcare system such as IOT healthcare [20]

Hanqing Chao et.al (2016) presented a model for analyzing the density of population in each hospital using location based services system with bigdata.

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This system is helpful in maintaining the population in the hospitals and act according to that. [21]

Edison R. Valencia-Nuñez et.al (2016) proposed a model to determine the arrival timing of the ambulances using the type of software called geospatial software. The hospitals there by get ready for the treatment of the patients in the ambulance. The system reduce the risk of patients who are arriving in the ambulance [22]

Maradugu Anil Kumar et.al (2015) Proposed a health care scheme which focus on the measurement and Monitoring various biological parameters of patient's body like heart rate, oxygen saturation level in blood and temperature using a web server and android application, where medical consultant can continuously monitor the patient's vital signs on his smart phone using an Android application. And also the patient details will be stored on the server and doctor can make use the information whenever needed from anywhere [23]

Muhammad WasimMunir et.al (2015) built up an application that finds the closest healing center around five km range with the coveted therapeutic expert. The close by position of clinics is figured with a worked in highlight of

Global Positioning System (GPS) in Smartphone's and finds the course from their present area through Google Map application Program Interfaces (API). An instructive review of various clinics in Karachi is directed to gain a precise rundown of specialists accessible in every healing center. With the utilization of this application, a patient can make utilization of the closest healing facility as per specific specialist accessibility. An extensive profile of specialist and healing facility is accessible in the application including the site, postage information and contact numbers [24].The papers [21][22][24] are focused at developing a Location based services in hospitals for example [21] they are estimating the population density and [22] arrival of ambulances ,whereas [24] they are focusing on the nearby clinics in the Karachi district.

Daryl Abel et.al (2015) presented a system for fixing an appointment with the doctor or medical consultant. By making use of this system the patients can easily fix appointments using a simple mobile application A mobile application is developed and road map is attached for further enquiry[25] [18] they mainly stress on appointment and cabin booking.

S.NO	AUTHORS	TITLE	OBSERVATION
1	AyaskantaMishra,BiswarupChakraborty	AD8232 based Smart Healthcare System using Internet of Things (IoT)	Ad8232 is used ,Cost effective technology , errors may occur
2	Ayaskanta Mishra, AkankshaKumari, PoojaSajit, PranjalPandey	Remote Web Based Ecg Monitoring Using MQTT Protocol For IOT In Healthcare	Sensors are used for collecting the data , MQTT protocol is used for transferring data to the cloud
3	Bhaskar Niraghatam ,M V Ramanamurthy	Heart Beat Monitoring System And Security Using Android	Different ECG pulses are taken by connecting the mobile phone to the emulator and the received data is stored for reference by the doctor. Does not used in remote areas
4	R.Harini, B. Rama Murthy , K.TanveerAlam	Development Of ECGMonitoring System UsingAndroid App	ECG sensor, microcontroller & android technology are used for processing ,storing and retrieving Xampp is used
5	Gaurav Raj, Neelam Rup Prakash, Jagjit Singh Randhawa	IoT Based EMGMonitoring System	The system is provided with WIFI module ESP8266 it uses TCP/IP protocol for storing the ECG data sensed by the sensor
6	Hao-Yun Kao, Chun-Wang Wei, Min-Chun Yu, Tyng-Yeu Liang, Wen-HsiungWu, Yenchun Jim Wu	Integrating a Mobile Health Applications for Self-Management To enhance Telecare System	Tele care system is developed to monitor the health of the patients .focus mainly on the self-management of health using tableware
7	Godavarthi Rajesh, M.K. Srilekha	Advanced Healthcare Monitoring System Using CC3200microcontroller	CC3200 microcontroller is used because of in-built network processor to handle popular protocols such as TCP and UDP, secure connectivity
8	SpurthyTalakala ,M.Hari Krishna	Instantaneous Health Care Monitoring System d Smart Phone	Remote monitoring system ,location can be navigated without using GPS, automatically obtain the position without any constrain

9	Devashri Deshmukh1, Ulhas B. Shinde2, Shrinivas R. Zanwar3	Android Based Health Care Monitoring System	Sensed data is received by the arm controller and sent wirelessly to the web portal. which reduces hospitalization and assistance cost
10	Farah Nasri, AbdellatifMtibaa	Smart Mobile Healthcare System Based On WBSN And 5G,”	Use of wireless body sensor network technology it reduces the risk of wired technology
11	SarfrazFayaz Khan	Health Care Monitoring System In Internet Of Things (Iot) By Using RFID	Here RFID based WBAN is used to transmit the information directly to the mobile phones.
12	Prashant Salunke1   Rasika Nerkar2	Iot Driven Healthcare System For Remote Monitoring Of Patients	Used for real time monitoring of patients , intel Edison is used which play a major role in IoT ,especially for the transmission of data
13	OlutayoBoyinbode	A Cloud-Based Body Area Sensor Network Mobile Healthcare System	Wearable Body Area Sensor Network (WBASN), Automated Intelligent Central Node (AICN) or Sink ,Cloud-based Central Server (CICS) plays a major role in the system, highly secured system.
14	Higinio Mora ID , David Gil ID , Rafael Muñoz Terol D , Jorge Azorín ,D Andjulian Szymanski.	Iot-Based Computational Framework For Healthcare Monitoring In Mobile Environments,	The system make use of available biomedical sensor for sensing data, provide a frame work how transmission takes place .
15	Kavitha.Y ,Lavanya.M, Mounika.A, Sasirekha.KN.VignaVinod Kumar	A Secure Iot-Based Modern Healthcare system Using Body Sensor Network	Body sensor area network is used . the system is provided with OCB authenticated mode , many parameters can be measured
16	Ranjeet Kumar, RajatMaheshwari, AmitAggarwal, M. Shanmugasundaram And Sundar S	Iot Based Health Monitoring System Using Android App	BSN is used for sensing the data in the healthcare and transferred to the internet using raspberry pi, Easily transmitted, drawback is only few parameters can be measured
17	Syed Muhammad Waqas Shah, Maruf Pasha	IoT-Based Smart Health Unit	It is provided with PSTN and mobile operator’s infrastructure with IOT technology to provide basic health services at door step
18	Ahmed Imteaj and Muhammad KamrulHossain.	A Smartphone based Application to Improve the Health Care System of Bangladesh	This app has number of benefits like finding hospital, information about cabin, suggestions for choosing hospitals.
19	Won-Jae Yi, JafarSaniie	Patient Centered Real-Time Mobile Health Monitoring System	The PCMHM system has the ability to provide on-demand health information of patients via the Internet, track real-time daily activities and patients’ health condition. This system also includes the capability for assessing patients’ posture and fall detection
20	Joon-SooJeong, Oakyoung Han2 And Yen -You You.	A Design Characteristics Of Smart Healthcare System As The Iot Application	IOT healthcare to provide improved patients monitoring and diagnosis for detecting the disease earlier.



21	Hanqing Chao, Yuan Cao, Junping Zhang, , Fen Xia, Ye Zhou, and Hongming Shan.”	Population Density-based Hospital Recommendation with Mobile LBS Big Data	Developed an application using big data which would be beneficial to guiding and managing outpatients
22	Edison R. Valencia-Nuñez, Hamilton V. Montenegro López, Lorenzo J. Cevallos-Torres	Probabilistic Model for Managing the Arrival Times of Pre-Hospital Ambulances Based on their Geographical Location (GIS)	The system uses a software called geospatial software for calculating the arrival time of the patients and thereby treating them in hospitals. It also reduces the risk of treating patients in hospitals.
23	Maradugu Anil Kumar, Y.RaviSekhar	Android Based Health Care Monitoring System	This system make use of the web server where doctor can easily make use of the information for the further process
24	Edison R. Valencia-Nuñez, Hamilton V. Montenegro López, Lorenzo J. Cevallos-Torres	Probabilistic Model for Managing the Arrival Times of Pre-Hospital Ambulances Based on their Geographical Location	Developed an application that locates the nearest hospital about five km radius with the desired medical specialist
25	Daryl Abel, BulouGavidi, Nicholas Rollings and Rohitash Chandra	Development of an Android Application for an Electronic Medical Record System in an Outpatient Environment for Healthcare in Fiji	Developed an application for managing appointments between the doctor and the patients

Table.1: Review on Smart Health Care Systems:

III. PROPOSED SYSTEM

The proposed framework is centered around creating brilliant versatile based social insurance application for arrangement from specialists utilizing android application, the framework is made out of three noteworthy areas initially is observing the quantity of out patients in different clinics around our area utilizing android based application, furthermore it centers around choosing the specialists and bolstering the information's to separate specialists or restorative expert. The information's to the medicinal expert are given by sensors through Arduino board. The last procedure is sending the information to the cloud utilizing correspondence conventions. The correspondence conventions might be TCP/IP, UDP OR MQTT Convention.

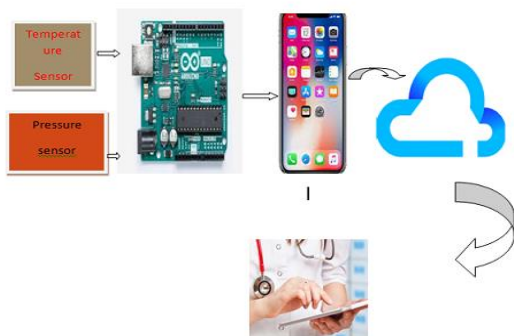


Figure 1 Block diagram of the proposed system

IV. CONCLUSION

The purpose of the review is to view the existing technology in location based services for health care and make use of the present technology for development in the

future findings. Also the study helped us to understand the various existing and blooming technologies in the healthcare such as ECG ,EMG monitoring through android apps, usage different protocols for transferring data's such as MQTT,TCP/UDP, OCN authenticated mode ,WLAN technologies etc.

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