

# Healthcare Monitoring System for Elderly or Disabled Persons using IOT

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## Abstract

This design represents the usage of IoT in health care system. This design introduces a wireless health monitoring system that can monitor a human 24x7. This system consists of a number of the part. Controlling and data processing is done through the Arduino Uno board, all the sensors are connected to Arduino UNO. Through this system, we can measure ECG, heartbeat, BP, and spo2. Through sensors, it is possible to measure all these values. Here all the sensors are powered using a solar power system. All these analog sensors can be connected to Arduino through any of the six analog pins. These values are then used for detecting any critical situation. In the case of a critical situation, an alert can be given as a message. Also, it is possible to monitor the person's health from any location in the world through the Thingspeak cloud. Data from sensors is uploaded to Thingspeak periodically without any interruption if internet is available. Here ESP8266 wifi module is used for connecting Arduino to the internet. For achieving best monitoring, networked sensors are either in the form of wire able or embedded in our living environment. This system monitors patients pulsate, vital sign salie. if any of on top of parameter goes on the far side the brink price this sensible device inform doctors or care taker and kindle corrective actions to save lot of patients life's. Humans are facing problems of unaccepted died due various illness which is because of lack medical care to patients at right time. Primary goal to develop a resalable patient monitoring system using IOT. Patients temperature heart beat rate ECG data are monitored displayed and stored by the system and send to the doctors mobile containing applications. IOT based patient monitoring system effectively monitored patience health and status and save life on time.

## Article History

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## 1. Introduction

Internet of things (IoT) is used in different vehicles, mobile phones, physical devices etc. Devices that use the IoT also called as smart devices or connected devices. IoT can be communicating with different devices like as sensors, electronics software, embedded systems, etc [1].

In rural area most of the peoples does not gets appropriate approach to health monitoring and clinics if

they had also people need to travel a miles for clinic or any hospital. So it is necessary to design the effective health monitoring system. Thesetiny wireless device is a resolution bound with IoT can form a conceivable way to regulate patients distantly rather than dating the actual clinic or visiting any doctor.

Health is most important part of any human's life without being health the human can't achieve and accomplish anything. Most of the humans live a busy life

in which going to a doctor for weekly or even monthly checkup and it's is an impossible task for elderly or disabled person. Without monitoring human health it is not possible get know to whether you are a healthy or sick person. This problem leads to the design of a product which monitory our health every day without going to a doctor nor moving around a bit. In this a system is designed as a prototype for monitoring alerting to others of a patient, based on health of a person. Any doctor can monitor this person from anywhere throughout world via internet.

Usage of mobile and technology is increasing beyond our imagination and world is use of mobile technology and smart technology device in the area of health as caused great impact on the world. Health experts are increasing taking advantage of benefits this technology bring, thus generating a significant improvement in health care in clinic setting. Likewise, countless ordinary user are been severd from advantages of the M-Health (mobile health) applications and E-Health (health care supported by (IOT) to improve, health and assist there health. Patients health monitoring system using IOT is a technology to enable monitoring of patients. It is possible for such patients to be followed up continuously with wire able heath device maintaining there daily lives in the social environment. This wire able devices continuously measure the patient's heart value.

Here we designed Patient Health Monitoring system. Thingspeak it is an open-source Internet of Things (IoT) application and retrieve data from things using HTTP protocol over the Internet or via a Local Area Network. This design could read pulse rate and measure It continuously monitors pulse rate and updates them to an thingspeak.

## 2. Literature Survey

In earlier days (periods) patient's health was monitored by catching his/her hand to check their pulse rate but nowadays technology in medical field is in an advance level and helps for the easy monitoring of the patient's health and its quality of measuring helps the health officer to know the better health conditions of patients as the technology improves we monitor. The patient's health is monitored by small devices compared to older days. Many health research projects are been done on the wireless sensor. To monitor the patient's heath in 24 hours.

D. Shiva Raman Krishan a number of assignments on the theme of wireless sensor method were work done before as a project report or as research papers IOT based on patients' health monitoring systems.

TanupriyaChowdhary the first system in which the researches made the patient health monitoring system using Arduino microcontroller with wireless body parts sensing network. In this work, the sensor is utilized here and there.

## 3. Proposed System

In this project, a system for 24x7 human health monitoring is designed and implemented. In this system, Arduino Uno board is used for collecting and processing all data.

Different sensors are used for measuring different parameters All this data is uploaded to thingspeak for remote analysis An ESP8266 module is used for connecting to the internet. A solar power system is provided for powering all sensors. Fig.1 Represents the Architecture of proposed system.

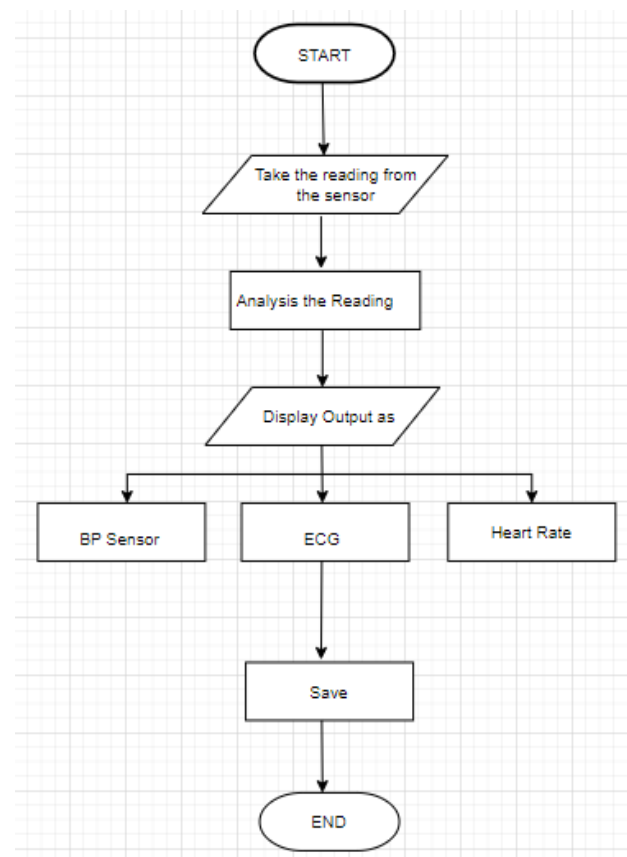


Figure 1: Architecture of Proposed System

This process accomplishes by collecting data that can be used to monitor (in-original- time) the state of a patient or to get sensitive information in order to be subsequently analyzed for medical diagnosis. Data is sent to the Cloud in order to perform permanent storage or to visualized in the original time by sending the data directly to a laptop or a smartphone. The Apple Phone and Android applications have been designed in order to easily see the patient's information.

Flowchart shows the steps of the program for the system. The design starts by receiving the readings from the sensors attached to the human body through wireless. Acquired data is then sent to the program environment. The program analyzes and displays the result regarding the ECG, BP, HB sensor.

In addition to some personal information about the patient and timing data, the report presents monitored physiological data. It is depicted in the report that the heart of the patient is in normal condition. Fig.2 illustrates the Circuit Diagram of Proposed system.

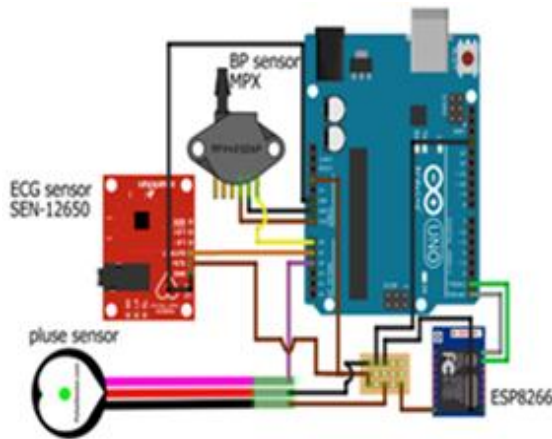


Figure 2: Circuit Diagram of Proposed system.

### ECG Sensor

Electro cardio grams are used to monitor or record the heart rhythms. Doctor suggests to the ECG when to detect the irregularities in the rhythms. ECG helps the doctor further investigations of the patients with a heart disease. ECG sensor record the pathway of electrical impulses through the heart muscles and helps to increase the conductivity between the skin and electrodes. To conduct ECG a technician must correctly place ten electrodes on the human body. Electrodes passes electric heart rhythms which can be seen on the screen in the form of way.

### BP Sensor

BP sensor is used to know blood pressure excreted on the circulatory system. The maximum pressure exits extracted on the blood vessels is known as systole pressure normal range 100-140mmhg. The minimum pressure extracted on the blood vessels is known as diastole pressure. Normal range 60-90mmhg. In a healthy adult the blood pressure should be 120/80mmhg.

If the systolic pressure is more than 140 and diastolic pressure more than 90mmhg. Than the person has high blood pressure (Hyper tension). If the systolic pressure is less than 100 and the diastolic is less than 60 mmhg than the person as low blood pressure (hypo tension). If the person is old more (60 or 70) the person will have high BP compare to other this due to loss of blood viscosity and loss of elasticity of the blood vessels in this case we can't say the person as high blood pressure.

### Heart Beat Sensor

Heart beat sensor is a electrical device used to measure the heart rate. The normal heart beat of a healthy adult is

72-74 per minute .aid as soon as possible in case of slight pain Heart beat is heard due to closure of valves in the chambers of heart. The heartbeat is measured based on optical power variation as light is scattered or absorbed d/g its path through the blood as the heartbeat changes. Heartbeat sensor is a digital device and gives Heartbeat pulse, output. whether we place finger on it LED flashes in unison with each heart beat. The light modulates by blood flow through finger at each pulse.

### Wi-Fi Module

Components used in this work are pulse sensor to checkup the rate of heart beat signal and lily pad temperature sensor to detect body temperature from the patient. Signals sensed by the lily pad are transferred to the wi-fi module whereas it transmit the measured data wireless to the android mobile.

### Cloud

Now cloud computing get involved in scientific application. The different types of computing devices equipped with ECG sensor to constantly monitor the patient heartbeat. The respective information is transmitted to patient mobile devices that will immediately forwarded to the cloud hosd web services for analysis.

Entire web services from the front end of the platform that is completely hosted in the cloud that consist of three layers: saas, pass, laas.

## 4. Result and Discussion

In this design, the prototype provide the real time solution of observing the normal heart rate for adults range from 72-74 per minute. Normally lower heart rate at rest implies more efficient heart function and better cardio vascular fitness. When the heart rate is increases more than 74 it will give an alert message in the thingspeak cloud, so that concerned person or doctor will get know that patient is in critical situation. The processing of storing the data can be further used in many ways such as predicting the diseases ,analyzing etc. it's reduce the adverse emergency for a patient to occur with any diseases.

Here where the results of each and every sensor values obtained and processed are displayed individually or separately in wave form so it's very useful for the doctor analysis the data or value.

Nowadays due to developed technology in India, we can get available of smart watches from different company such as MI, FastTrack etc.. In this smart watches we can check our heart rate, time and so many things. But these such devices are too expensive to buy.

Fig.3 illustrates the Heart Rate and Fig.4 illustrates the ECG Signals.

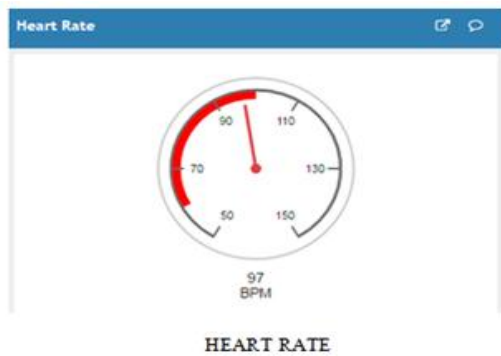


Figure 3: Heart Rate

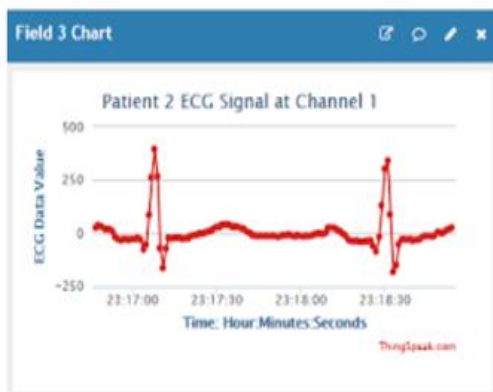


Figure 4: ECG Signals

Table I Illustrates the results of Heart rate, Table II illustrates the results of Blood Pressure and Table III illustrates the results of ECG.

Table I: Result of Heart Rate

SUBJECT	GENDER	AGE	HEART BEAT BY DEVELOPED SYSTEM	HEART BEAT BY MANUAL	ERROR %
Sub1	M	22	85	85	1.04%
Sub2	M	21	84	82	2.38%
Sub3	M	20	78	78	0%
Sub4	M	22	90	87	3.33%
Sub5	M	32	100	102	2%
Sub6	F	22	76	77	1.32%
Sub7	F	40	104	103	0.96%
Sub8	F	20	68	66	1.47%
Sub9	F	22	72	71	1.38%
Sub10	F	22	84	85	1.19%

Table II: Result of BP

SUBJECT	NAME	GENDER/AGE	BP TOOL VALUE	BP SMARTPHONE VALUE	ERROR %
Sub1	Adi	M/22	80	81	1.23%
Sub2	Aru	F/23	81	84	3.57 %
Sub3	Anu	F/50	76	76	0%
Sub 4	Abhi	M/23	97	97	0%
Sub 5	Dhanu	M/12	80	73	9.59%
Sub 6	Druva	M/22	112	117	4.27%
Sub 7	Anvi	F/6	73	74	1.35 %
Sub 8	Tani	M/58	80	80	0%
Sub9	Daivik	M/22	98	101	2.97%

Table III: Result of ECG

Age group	Male	Female	Total
16-19	149	385	534(4%)
20-29	538	863	1406(10.5%)
30-39	2017	1435	3452(25.8%)
40-49	1546	597	2143(16%)
50-59	1385	1077	2462(18.4%)
60-69	1291	1124	2415(18.1%)
70-79	354	443	797(6%)

## 5. Conclusion

This design is very effective in monitoring an elder or disabled person's health continuously because it is fully automated. It can be tested very easily with any person or human being help.

## 6. Future Enhancement

Developed system is very much flexible. System we have created operates on only on the health, but our current state, we can add more health sensor devices, where each sensor can be used provide health values .All it need is more electronic sensor and modification

- Nearly 8/10 of health care provider going to use IOT devices in their institutions, organization.
- 88% of facilities going to monitor their patients with IoT devices.
- 91 % of organization of are planning on implementing IOT in their facilities in their by 2023..



- Organizations, institutions felt that IOT as saved costs up to 78% of their facilities.

Also, Internet of Things (IoT) Healthcare market was valued at USD 28.42 Billion in 2018 and is projected to reach USD 337.41 billion by 2035, growing at a CAGR of 28.2% over the forecast period.

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