

Remote Monitoring of the Patients using the IoT Widget through Hrut Gati Android Application

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Abstract - Upgrading the adequacy of the social insurance framework is one of the best testing regions for the current world. Checking patients remotely is developing with the notoriety of different users of cell phones that have set up for caring patients. Right now, principle thought is to manufacture a versatile application that will be set up on the android stage for the social insurance field, which utilizes the idea of the Internet of Things (IOT) and distributed computing. This 'Hrut Gati Application', which gives the client their perception of Electro Cardiogram (ECG) waves and information characterization usefulness out of sight. The detected data can be transferred to the patient's remote incorporated cloud or a clinical cloud, which holds a record of all the distinguished information and can be reused for the assessment of patients.

Key Words: AD8232 ECG SENSOR, ESP32 MC, HRUT GATI MOBILE APPLICATION.

1. INTRODUCTION

In the present situation, the "Heart problem" has a greater impact on an individual's life. Due to the increase in the population, the healthcare system is facing new challenges in providing health services for the patients during an emergency.

According to the Survey report of 2020, the quantity of aged people is around multiple million. Presently, smart phones are playing a key role in human life. The increased use of mobile devices in healthcare has triggered a great impression on the ecosphere. Health professionals are progressively taking benefit of these technologies thus generating significant improvement in health care in clinical settings.

Over the accessibility and advancement of wearable IOT devices which are designed for health monitoring for saving human lives during an emergency. To monitor patients remotely without sensors is not possible in the real world, so with the help of this application, we can record patient conditions using sensors and send the data

to the concerned doctor and can get advice remotely from him when in need. These technologies can provide a very low-priced, easier and faster respondent a long history of the patient

1.1 Major Contributions

The primary intension is to build up an IOT sensor framework that is extraordinary for expecting a heart failure since they normally join the acknowledgment and correspondence parts. The significant commitments are as per the following:

- i. Developing an ECG Sensor IOT-based framework for investigation of the heartbeat pace of the designated person.
- ii. Designing, creating, and executing a low force correspondence module to send information to the assigned cloud.
- iii. Developed an android application and executed among specialists and patients by means of remote checking of enrolled patients, which is utilized for observing patients remotely.

2. LITERATURE SURVEY

Mathan Kumar et al [1] considered with respect to observing ECG, Breathing rate, heartbeat rate, and internal heat level. The sensors utilized in the process were associated with the PIC16F887A microcontroller, in the process of gathering information from sensors, the information transferred physically for the observing of patients.

K. S. Shin and M. J. Mao Kaiver considered a Phone based application checking framework with self-investigation which incorporates IOT, a unique standard that utilizations practicality objects which are not just equipped for get-together the data from the earth and systems administration with the physical world yet additionally to be sorted out with one another through web to trade information just as data.

Pereira et al. [3] built up a framework independent on a Mobile Cloud Computing in which there is an association among sensors and a cell phone by Bluetooth. Mohammed et al. [4] built up an ECG observing framework utilizing the cloud as an FTP server.

Reza S.Dilmaghani(2016) in their examination started the technique of a Wi-Fi sensor organize that is equipped for checking patient's constant illnesses at their home itself by means of a remote observing framework. Along these lines, developing of remote sensor innovation separate test like just circulatory strain, pulse, and so forth can be estimated however this assessment venture empowers every one of these parameters together to be estimated under a solitary framework, and in this manner, all can be worn by the patient and dealt with information coordinated towards web over the web of things.

2.1 Connected Mobile Application:

This permits guardians to watch the patients and to deal with the people. The key undertaking remains anticipating coronary episodes which are the highest examination fixation. The Combination of blood warmth and ECG predicts heart variations from the model. None of the examination researchers talked about the capacity utilization rate during information assortment. The framework utilizes a periodic intensity of WIFI module association with gather the longitudinal information remotely utilizing a cell phone application [7].

The creators introduced a complexity between various information preparing systems for cardiovascular breakdown forecast. It additionally introduced just evaluated calculations rather than an entire framework with a data assortment gadget and a figuring stage. The most utilized procedures that are most normally utilized for expecting heart issues are Decision Tree, Naïve Bayes, Neural Network, and K-mean [8].

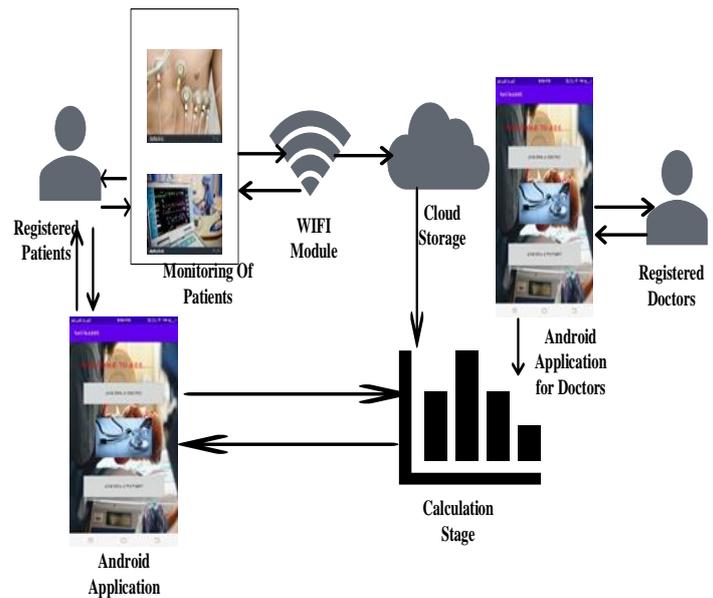


Fig-1: Process System Architecture

3. SYSTEM DESIGN

3.1 System Architecture:

The design comprises of a wearable gadget that incorporates the equipment. Each time a patient is sick or on the off chance that he needs to visit a medical clinic for a day by day registration, the patients' supervisor will put a wearable gadget on the patient's Chest. At that point through the Health application in the patient android portable will sign in for the application and register for the new patient if the patient is new else will open the profile of the previously existing patient.

There are primarily 2 modules present in the framework:

The module consists wearable sensor gadget this gadget predominantly comprises of ESP32 microcontroller, sensors, and inbuilt WIFI module. The sensor is utilized for the circulatory strain of a person.

Another module is the Hrut Gati Android application which is produced for giving the remote checking of the patients. The application comprises of the profiles for the specialists and the patients where the patients can enlist their necessary qualified specialists as indicated by their issues.

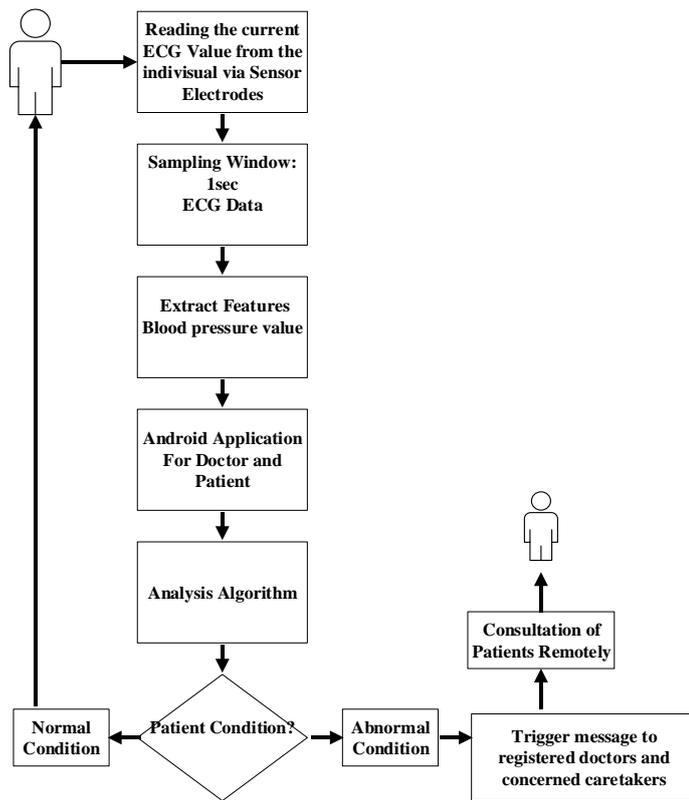


Fig-2: Overall Flow diagram of proposed system

MODULE	ITEM	SPECIFICATION
AD8232 ECG Sensor	ECG data	Read Data from ad232 Send ECG data to app or webpage
ESP32 Microcontroller	WIFI, Connectivity	Read ECG data from humans
Android Mobile	CPU, OS, Connectivity, Battery	Communication between doctor and patient.

Table -1: Specification of required devices

The Fig 2 explains the proposed system where the sensor electrodes senses the EG value of an individual and updated into the database through in ESP32 microcontroller. The ECG value will be calculated for each second. The patient and doctor will be registered to Hrut Gati android application. According to the result of the Analysis Algorithm the emergency message will be triggered to the respective registered doctor and to the patient’s caretaker. If the patient condition is normal, then sensor will sense the value for next interval.

3.2 Specification of Health Care System:

The organization architecture contains various components and the component specifications shown in the Table 1.

Due of the variety of circulatory strain currently numerous people are influenced by high or low pulse levels. Cardiovascular strain is an indispensable parameter that must be acquired for every patient. The Fig 3 explains the overall structure of the IOT device which includes the ECG sensors and along with the graphic representation of the signal.

3.3 Hardware Components:

Happening of the Heart Diseases is a direct result of the patient's natural condition. Since Electrocardiography is an arrangement of storing up electrical signs made by the heart in an individual. Figure.2 shows a square chart of the ECG data obtaining system. The essential methodology in the extraction of the ECG signals from an indusial starts from the foundation of Arduino using the SD card adequately.

The AD8232 Heart Rate Monitor breaks out nine relationships from the IC that you can fix pins, wires, or various connectors to. SDN, LO+, LO-, OUTPUT, 3.3V, GND give central pins to working this screen with an Arduino improvement board. The signs will be escalated, and signals will be filtered using the AD8232 module. In further methodology, the Analog to Digital converter module is used. Yield signals are plotted on the exhibit unit which is utilized by methods for Arduino HDMI joins.

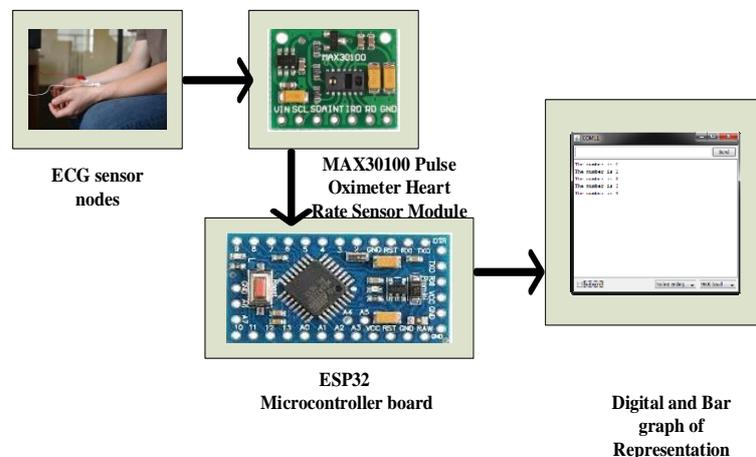


Fig-3: Overall structure of the ECG data receiver.

A. Sensor Electrodes:

Cathodes utilized in created framework are cement. These are put on body parts to get ECG signals. For the most part cathodes are covered with Ag-AgCl. The 3 terminals structure a solitary lead System. It makes potential distinction in the middle of them. It will produce ECG plot.

B. ECG Data Acquisition Module:

It is a completely coordinated sign melding ECG front end circuit. It is utilized to intensify, and channel ECG signals got from ECG cathodes. AD8232-ECG securing module has a yield pin to which ADC is associated. Single inventory activity is inside 2.0 V to 3.5 V. Yield pin of Ad8232 is additionally associated with ADC inventory activity is inside 2.0 V to 3.5 V. Yield pin of Ad8232 is additionally associated with ADC.

C. ESP32 Microcontroller:

It is a 32-bit processor. It is running at 900MHz. It has an aggregate of 40 GPIO pins Micro SD port is utilized to stack working frameworks and to store information. It has a Linux stage. The showcase unit is associated with the controller utilizing HDMI link.

D. Arduino UNO:

The Arduino UNO an open-source microcontroller board dependent on the Microchip ATmega328P microcontroller and created by Arduino.cc. [10][11]. Arduino will run on any platform like Mac, Windows, and Linux. The serial data representation is displayed in the software as are longer distance communication, less number of wires for communication, reduction in hardware complexity etc.

E. Firebase Database:

The Firebase is a Backend-as-a-Service (BaaS) that offers the engineers a wide range of apparatuses and administrations to grow top-notch applications at a lot quicker pace. It permits the developers to build up an element for applications on various stages like Remote Configs, Notifications, and Real-time Database.

There are various benefits of Firebase that relate to the core technology of advancement.

- Firebase Real-time Database
- Firebase Auth
- Firebase Storage
- Firebase Crash Report
- Firebase Analytics
- Firebase Cloud Messaging
- Firebase Remote Configuration.

4. "HRUT GATI" ANDROID APPLICATION

The Doctor can see the patient name in the top of the list in the patient list, if the he is in the critical condition.

The patient needs to register to the application, and to select the doctor which they require according to their needs. Even the patient's caretaker's address and contact number is been present in the patient database. The patient can also see his current ECG value which is been calculated for every second, and current doctor availability.

Android Application works on the Analysis Algorithm. The android application works through following steps.

Step 1: Registration of the patient to the Android Application.

Step 2: Registration of the Doctor to the Android Application.

Step 3: Application will receive the current ECG value from the sensors and evaluate according to analysis algorithm

- A. Condition of the patient is normal, then, it will read the next interval of the ECG interval of the patient.
- B. If the ECG value too much more than the average value of the ECG value of the person of age more than 70 then trigger message will be sent to the doctor and to the patient caretaker.

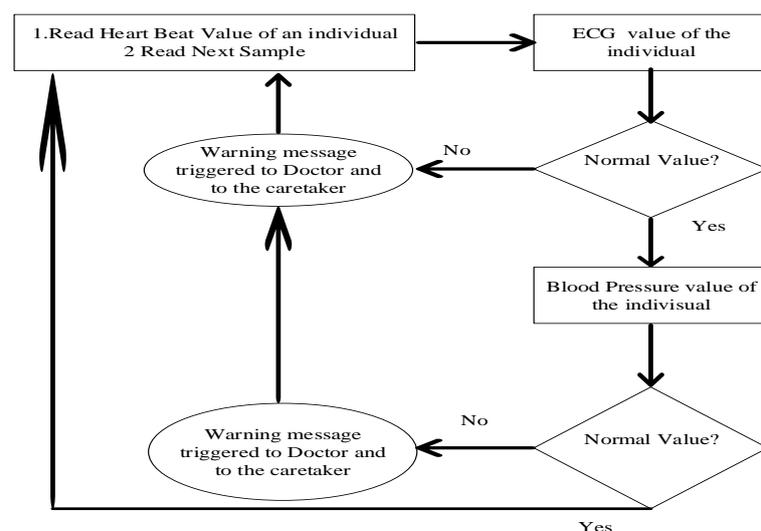


Fig-5: Flow diagram of the Analysis Algorithm

HI Dr.NARAYANA MY HEALTH IS NOT GOOD KINDLY ADDRESS ME WITH YOUR HELP.....MY ECG VALUE IS 905

Fig-6: Triggered message for the doctor.

The fig 6 indicates the snapshot of the trigger message will be sent into the doctor's registered number from the patient number for the remote monitoring of the patient along with the current value of the ECG of the individual.

5. RESULT AND CONCLUSION

The main result is the remote monitoring of the patients with ECG value of individuals. So, the patients can be treated at accurate time and life of the patient.

The future enhancements the different type of sensors may be connected to the human body and based on the results of those sensors the patient can register to the various doctors through the single application can get treatment remotely. These can be enhanced and implemented which can save the lives of the patient and the time of the patient's care takers and the doctors by remotely monitoring the patients throughout the day.

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