

# Review on IoT Based Heart Rate Monitoring System

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**Abstract:** Medical Electronics is going advance with the application of internet of things which is fastest growing technology in the modern world. Using networking inter communication of embedded devices is possible through IOT. Early discovery of cardiovascular disease and ceaseless supervision of clinician can decrease the death by giving the exact identification of pulse rate which indicates the activity of the heart in every situation of research information. In this paper we discuss about the various Heart rate monitoring systems, technology used to develop these, designs of heart rate monitoring systems, the parameters required to develop these, their application in real world and the areas which can be tackled for development.

**Keywords:** Heart Rate Monitoring System.

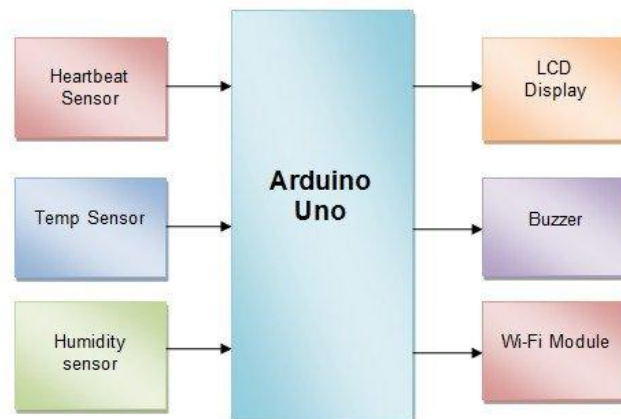
## I. INTRODUCTION

During the past few years there is rapid growth in use of electronic devices, smart phones and tablets which makes communication much easier and efficient. In the next generation electronic devices sensors, appliances, vehicles and other things are connected using internet of things. IOT which was called interned of everything was first introduced by KEVIN ASTHON in 1999, where every object system was connected to sensors using internet.

Number of times heart beats in a minute is calculated as heart rate. It is essential to know once heart rate because it indicates the health condition and underlying diseases related to it. Heart beat can be sensed through sensors where an artery is close to the skin such as wrist, groin, side of the neck, back of the knees etc. Heart plays a major role in circulating oxygen throughout the body. Heart beat is produced due to the contraction and expansion of auricles, ventricles and corresponding signals sent by the valves.

Incorporation of IOT in medical field is essential as it allows the patient to take part in collecting and reviewing their reports and self-analyse the data in a short period of time.

In general heart rate monitors work by measuring electrical signal from your heart by measuring the volume of blood by measuring time of reflection of light that was passed out of source this data is sent to the computer or system via Bluetooth which analyse the data and gives result. There are many portable devices like wrist watches, chest traps which are usually used in our daily life even some mobile detect pulse rate through finger print sensor. In this paper we give the information regarding these monitors by studying different research papers and finally analyze the area in which these heart rate monitors can be developed.



## **II. LITERATURE REVIEW**

Peter Lejidikkers et.al an Australian professor of Sydney in the university of technology, Peter raised his work on popping a notification in the beginning of heart assault and also by giving a set of instructions to the system and acknowledging the inquiries are made about the heart issues they went through. With the help of these kind of applications the clients condition can be easily suspected by computerizing the call. If there are issues with respect to heart, The system helps in detecting the area which has underwent the issue of heart failure.

Dr A. Agujar et .al of sipna, Amravati also worked on frame work in which the issues related to heart are been noted. In this, sensor is been interlinked with the help of microcontroller by which the pulses are read and sent to internet and also notifies if heart rate is in limits or rapidly increasing. In this heart beat sensor, the unique feature is that the current pulse rate can be identified and displayed on the LCD screen which can be used in all places.

Nikunj Patel et.al of CSPIT, Charusat proposed a frame work of identifying the heart as result with respect to the watching pulse which is dependent on the web thing on behalf of previous works, this framework made use of heart beat sensor, Arduino board which is a microcontroller board which is originally based on the AT mega168 and the Wi-Fi module.

A Dutla et.al from the engineering institute of management in Kolkata. Who worked on a gadget by making use of a minor regulator which simply means a controller and heart beat sensor. This helps in detecting the heart rate as well as the injection portrayed by the pulse. With the help of this particular gadget, we need to set our age and sexual alignment before running the machine. The minor controller or regulator constantly passes the bit rates on the user and sets an alert or current state of the patient.

Lee et.al also presented based on physiological signal which helps in monitoring the load cells to measure the heart rate algorithm and breathing rate from the signals examined by the load cells. They conducted many experiments based on the ECG and respiratory signals that made use of the reference signals from the sensors with the help of reference signals they demonstrated the heart beat and respiratory information that were used to find the average percentage of errors in the pulse rate.

IOT based heart rate monitoring by Sahana S, Khawitha and Prof Mohammad Rafi. With the help of some research paper heart rate is measured by using pulse sensor with Arduino Uno and Bluetooth HC-05 module. Here the pulse sensor measures the heart rate and sends it via Bluetooth to the android mobile application, the cases for heart rate measurement which defines the low, normal or high pulse rate is coded in the software. It has been found that there are two major software requirements that are Arduino IDE and Blynk app. Arduino IDE is designed to be publicly accessible to the environment where we can write the code and upload it on UNO board. It runs on the operating systems such as Mac, Windows and Linux blynk controls Arduino it is basically designed for internet of things. It is also responsible for communication between Smartphone and hardware. The hardware requirements which basically loads after the communication of signals and storage are provided by Arduino UNO pulse sensor, HC-05 Bluetooth and many essentials. The pulse sensor uses Photo plethysmography which is a low cost technique which is optically able to detect volumetric changes in blood flowing through capillaries from the surface of skin, this version does not share data or record anything it is only successful in displaying accurate results the scope of results are lagging heart rate measurement and time stamp information availability.

A.K. Vaishnave, S.T. Jensha, S. Tamil Seleri who went through IOT based heart attack detection, heart rate and temperature monitor. In this research paper heart rate is measured using pulse and temperature sensors which wirelessly send the data to the database which is stored data of the person pulse rate over a period of time which helps in diagnosing. There are 3 modules which contains sub modules called sensors that detects and responds to some type of input from the physical environment hub and cerebrum hub. Heart beat sensor device and temperature sensor are attached to patient's body which detects information from the patient, gathers readings which are run interfaced to the Arduino and then transmitted to the sensor whose produced voltage shifts directly with change in temperature. Main module gathers information from all the modules by branch hub and forms the main data base. Interaction module basically called combination module allows to interact between the collected data gives the output by matching the previous data. The patient information can be seen from the validated clients just in combination module through. Output shows the person pulse rate and temperature in Celsius. This model clearly specifies the pulse rating beats for minute and body temperature in Celsius. This model can be future developed for its future effective speed and instead of fingertip it can be developed or updated and it can be incorporated in wrist watches/bands.

### III. CONCLUSION

Healthcare software solution was basically developed to make health care services affordable and easily accessible in an effective way of covering wider perspective. As discussed above it is smart way and saves the time of the customer to go diagnosis on regular basis and can be checked irrespective of location. The sensor collects the heart rate as signals the Arduino board processes the information and sends the data via Bluetooth at the time of emergency notification and location is sent using microcontroller.

The major challenges that were encountered by IOT based heart rate monitoring system are the maintenance of privacy of the record and security needed in order to store the individual's data in it. The failure in the system may impact several sensors connected to it and increases the implementation cost. Though it has many advantages its disadvantages might lead to a greater problem.

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