

# Healthcare Kiosk using IoT

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**Abstract**— The sensor network technology have become an improving research area in healthcare sectors due to increasing health quality of life of a patient. When work in healthcare field provide continuous monitoring of patient health parameters which provide doctors the help to make accurate diagnosis and giving better treatment. In this we propose a model which monitors various health parameters like heart rate, body temperature, blood pressure monitor and height, weight of an individual. The data which is collected through the cloud is then transferred to the web application and the smart phone application of the patient. This data is transferred to the registered doctors on to their smart phone application as well as standalone computers. The doctor can prescribe the medication based on the patient data results shown by the system. The designed prototype will reduce the work of patients to visit the doctor every time for monitoring of these health parameters.

**Key words:** Healthcare System, WSN, Heart Rate (BPM), Blood Pressure Sensor, Temperature Sensor, BPM Algorithm, Arduino Uno

## I. INTRODUCTION

To measure the BMI parameter of Human body using the various sensors healthcare kiosks are introduced to avoid the time wastage of the doctors. This healthcare kiosk measures physical parameters such as pulse rate, body temperature, blood pressure, height and weight. These parameters are recorded and stored in cloud. Wherever patients need their results which are updated on the server they can collect their reports. Kiosk can be placed anywhere from large hospital environments to smaller individual physicians home. It is a medical procedure of not involving the introduction of instruments into the body. This method will not harm the patient nor take blood samples to test. To prevent spreading of infectious disease, non-invasive method is the best. Health care systems are highly complex. People in need for continuous healthcare are increasing day by day. Medical staff faces with more and more challenges. This raises serious questions in the domain of medical which must be answered in the best possible ways. Problem solving must include detailed analysis of the current state so as to form functional system which resolves the satisfying number of issues which are to be faced in future. In medical WSNs can offer this kind of solution. The aim of our kiosk is to collect the information of the patient health parameters and provide doctors with a clear data and readings which can be used to monitor the diagnosis of health parameters through mobile communication. This can be utilized for individual investigation to help with rolling out conduct improvements, and to share with parental figures for early detection and treatment.

## II. LITERATURE REVIEW

We had survey three paper from those paper we got much more idea about this project. Which consists of different working, different techniques, and different methods. Below are some papers from which we got idea to assemble our project.

According to research paper [1] they have used technology which plays the major role in healthcare not only for sensors devices but also for communication by sharing the data between doctors and patients. It is very important to monitor various medical parameters of current as well as post operational days.

Hence the communication method using IOT is adapted and it was very useful for us in our healthcare project. According to reference paper [2] they have gave the idea of solving health issues using various latest technology. It presents the architectural review of smart health care system using of Internet Things which is aimed to provide quality health care to everyone.

According to this reference paper [3] we learned the method of how remotely the healthcare monitoring system may help to reduce the cost of the healthcare. To access the accurate healthcare data quickly is the main functions of this system and will provide real time monitoring of the patient data.

## III. PROPOSED WORK

### A. Problem analysis

During the survey process we have analysed that the machines which are available in market has many disadvantageous like they are heavy, bulky, can't reached at sophisticated place, can perform only single task at a time and very costly even they are not eco-friendly and does not provide accurate parameter values of healthcare also historical data was not maintained.

### B. Solution

In order to avoid all these problems we have develop the IoT[2] Based healthcare kiosk which comprises of several sensors and devices. On pressing button the kiosk gathers the following information of the patients:

- 1) Height
- 2) Weight
- 3) Blood Pressure.
- 4) Body Temperature.
- 5) Pulse Rate.

Based on the above inputs the system calculates the BMI and other correlation based findings and information of patient is displayed on LCD [2]. The system then maintains data for person every time it's recorded into database and show graphical analysis as needed. The system may also have ability to alert the patient if vital information be beyond the

acceptable range and parameter which is eco-friendly, cost efficient, easy to handle and also with self-protection system.

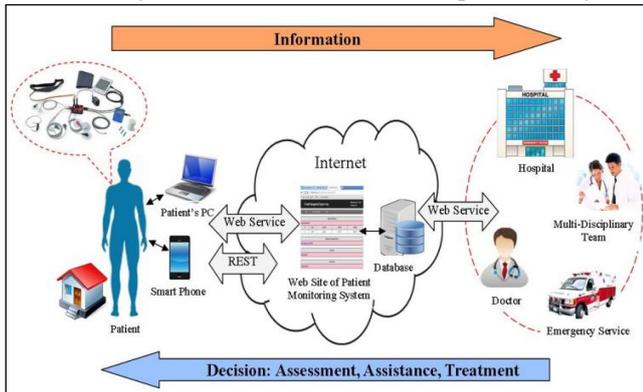


Fig. 1: General view of the system

### C. Design Overview

The Proposed system is that we are going to design and build the healthcare kiosk. This healthcare kiosk has the capability to perform many healthcare parameter by just pressing button. It also has lots of sensors for self-authentication, rest services for finding and analyzing by the historical data.

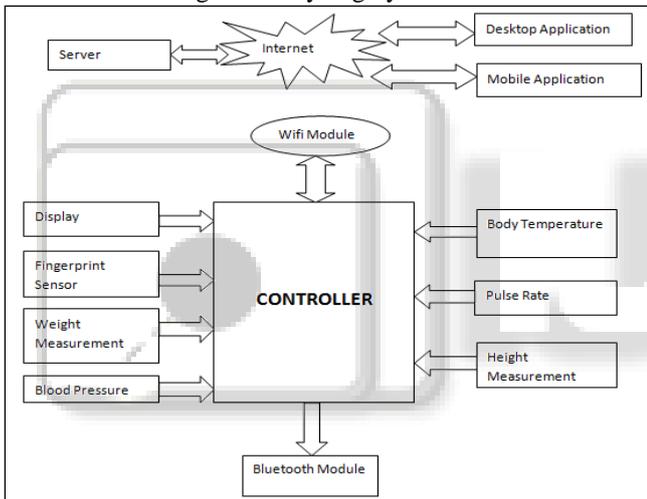


Fig. 2: Block diagram of healthcare kiosk

### D. Sensors & Components Required for the System

Healthcare Kiosk for patient is implemented by using following modules:

- Body temperature sensor
- Pulse rate sensor
- Height measurement sensor
- Blood pressure sensor
- TFT display
- Weight measurement sensor
- Wi-Fi module
- Controller
- Server

1) Body temperature: By using digital thermometer sensor DS18S20 it gives measurement of Celsius temperature and shows the alert capacity with client programmable trigger focuses. It contains central processor with only one data line for establishing communication. Operates at the temperature range of -100C to +850C.

- 2) Pulse rate: Pulse rate sensor measured based on the light intensity through finger tip by using the blood flow of the patients decided heartbeat of user.
- 3) Height measurement: The HC-SR04 ultrasonic sensor is used to measure the human height. The ultrasonic sensor used for the distance measurement sensor. This type of sensor has the range of 7 to 8 foot per inch of non-contact measurement which is enough for our project.
- 4) Blood pressure: Blood pressure sensor provide output of pressure spilt into the two signals. Both signal are provided the input to the serial ADC. First input provided directly into micro controller without any amplification. It contains the pressure signals and oscillations signal. Another signal is provided 256 input through two pole high pass filter to pressure signal.
- 5) TFT display: The 2.4 inch TFT touch screen display is used to display the parameters in different units. It is directly connected to arduino board and can be used as a input or output device.
- 6) Weight measurement: Weight measurement uses load cell transforms force or pressure into electrical output. The weight measurement is done using load cells. Load cells are used for measuring patient weight which are designed for processing applications which require weight control platform.
- 7) Wi-fi module: ESP8266 offers a self-standing Wi-Fi networking with TCP/IP protocol stack which can give Wi-Fi connection to any microcontroller. ESP8266 when connected on board it provided the processing and storage capabilities.
- 8) Controller: Arduino refers to an open source platform or board and the software used to program it. All sensor are connected to it to measure different parameter. Arduino is compatible with bluetooth module and wifi module used for IOT application.
- 9) Rest services: Rest services provided the facility to the user for fetching updating and getting historical data. It provide the URL for the communication between the mobile application, sensors hardware and desktop application.
- 10) Fingerprint sensor: These sensors are mostly used and effectively can be proof of identity in present days. Mostly because of their uniqueness among the number of people, and their least risk of accessing data by others. This technology is used to identify a user's uniqueness based on their physical qualities.

### E. Software Part

In software part regarding to healthcare kiosk we have develop web application and mobile application, using rest services user can interact with healthcare kiosk for checking its health parameters.

#### 1) Web Application:

We have used Angular JS for developing web application, it also shows the graphical analysis of the patient data. In healthcare kiosk dashboard we have created for patient data, medication and also has provided historical data of the patients.

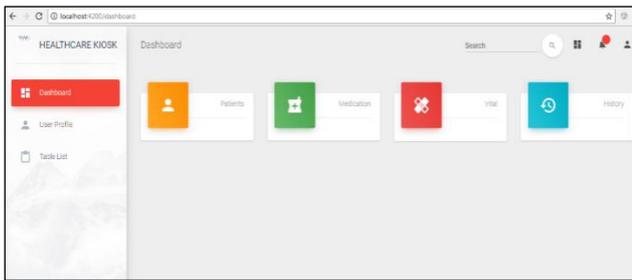


Fig. 4: Web application for healthcare kiosk

## 2) Mobile Application:

For developing mobile application we have used ionic framework, which gives flexibility of using data or historical data for all over through worldwide. Through mobile application patient can also schedule appointment with doctors and can share report for any prescribe medication from doctors. We have also provided the camera facility for uploading the user personal profile. It identifies that user is patient or doctor.

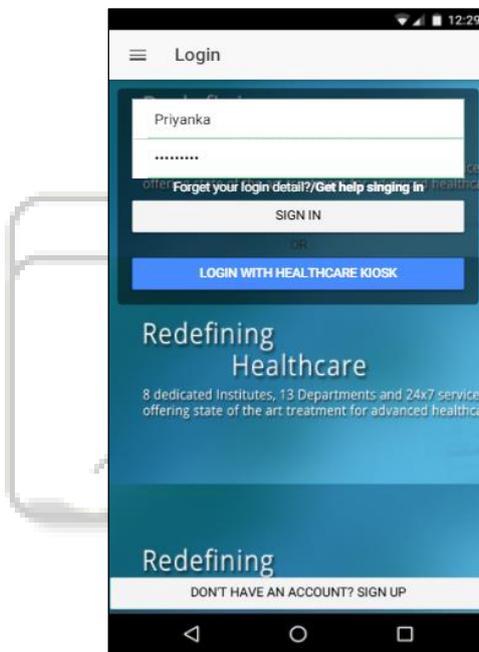


Fig. 6: Mobile application for healthcare kiosk

Firstly, when user register in healthcare kiosk, then after login patient or doctor will access its all data. According to user health checkup it will schedule appointment with doctor, then according to the historical data doctor will provide medication to the patient. This mobile app shows result of patient health analysis, by doing medical diagnosis; patient also gets a clear picture of the tested health parameter which is needed for further and confirm diagnosis by the doctors. The healthcare mobile application also saves patient time as well as saves the doctor time and also saves patients form longer pain and suffering.

### F. Mathematical Model

In Healthcare Kiosk there are inputs functions and output based on various parameters users can access data through BMI.

Let S be a system such that,

$$S = \{I, F, O\}$$

Input:

- I1 = Patient walkthrough kiosk.
- I2 = Fingerprint for patient validation.
- Function:
- F1 = Scan the fingerprint of patient.
- F2 = Calculate the Height.
- F3 = Calculate the Weight.
- F4 = Calculate the Blood pressure.
- F5 = Calculate the Body temperature.
- F6 = Calculate the Heart rate.
- F7 = Calculate the BMI.
- F8 = Login.
- F9 = Registration.
- Output:
- O1 = Body Mass Index.

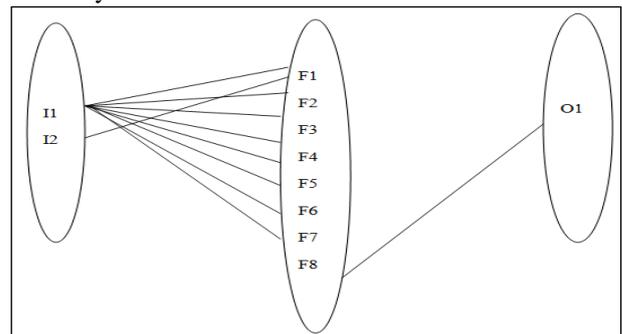


Fig. 7: Mathematical model for healthcare kiosk

## IV. PERFORMANCE ANALYSIS

As we have made wireless healthcare kiosk for patients, so that every now and then patient need not want to go in hospital for his health checkup.

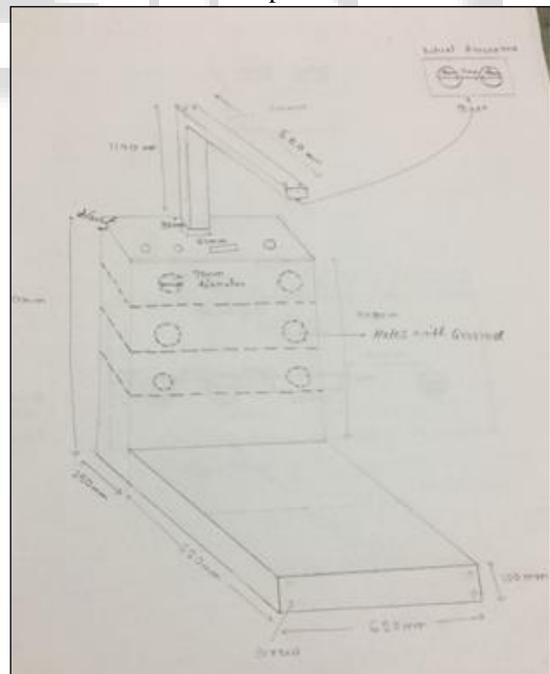


Fig. 8: Design of Healthcare Kiosk

## V. CONCLUSION AND FUTURE SCOPE

Usually, the patient can't get the historical information of their health. The project aim is to build an IOT based healthcare kiosk that lets one perform preliminary analysis of vitals collected from patient and based on the input parameter

system will maintains the data for patient for every time it records into database and show graphical and statically analysis as needed and the patient accesses data remotely. The calculation of medical healthcare parameters using wireless sensor networks is a new idea, in this we have concentrate on calculating various healthcare parameters like heartbeats, and blood pressure, body temperature monitoring altogether in a kiosk which possess to the users as a single system when interfaced with smart phone application providing higher usability both to the doctors as well as the patients.

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