

# Survey of Health Monitoring Management Using Internet of Things (IOT)

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**Abstract:** *We Are Dealing In The Advancement Of Internet Technologies, In The Advancement Of Internet Technologies On Machineries Are Interrelated. Technology Improvement Is Very Much Useful In Human Life For Making Things Simple And Highly Effective. In Our Day To Day Life We Find Internet Of Things (IOT) Beneficial In Several Places, Smart Such As Smart Home, Smart City, Smart Environment, Agricultural Fields And Medical Fields. Taking In Consideration Of Medical Field We Can Find Internet Very Useful In The Application Of Monitoring Patients Heart Rate, Body Temperature, Respiration Rate And Body Movements Using Raspberry Pi. After Connecting Internet To The Raspberry Pi Board It Act As A Server S It Is Connected To The Internet, Server Automatically Sends Data To The Web Server. After This We Can Monitor These Parameters Using Web Page Anywhere In The World Using Laptops, Smart Phones, ETC. Medical History Stored Is Stored On Cloud For Easy Accessing.*

**Keywords:** Raspberry pi, IoT, Cloud Computing, Oximeter, heart rate, body temp. sensor, Healthcare system

## 1. Introduction

Internet Of Things (IOT) Is A Physical Quantity The Network Of Various Physical Quantities Such As Electronics Software And Sensors Are Embedded Together Have Ability To Collect Data From World Around Us And Share Data Across Internet. Internet Of Things Finds Useful In Various Fields Such As Smart Cities, Smart Environment, Health Care, Etc. In Our System We Are Dealing With Health Care System Which Provides Developing Set Of Modules Which Can Facilitate Diagnosis for The Patient By The Doctor Through Tele-monitoring. To Sense Data From The Patient We Used A Set Of Medical Sensors, This Sensors Senses The Data And This Data Is Relayed To Raspberry Pi For The Diagnosis Of Patient Anywhere In The World Using Internet. We Can Store Data on Cloud of Medical History for Easy Of Access. The Architecture Is Design For Monitoring Patient Privately At Home As Well As Patients In Hospitals. The System Can Be Suitable For Village Health Care Centre.

## 2. Literature Survey

### 1. A Comprehensive Ubiquitous Healthcare Solution on an Android™ Mobile Device

Nowadays It Has Become Important To Focus On Healthcare Awareness And Also The Growth Of Wireless Mobile Technologies. For This Reason Ubiquitous Health Care Solutions Has Become Important As It Provides Services At Anytime And Anywhere. To Complete Our Needs Android Smart Phone Device Has Put Fourth Mobile Monitoring Terminal To Observe And Analyse Ecs [Electrocardiography] Waveforms From Wearable Ecg Devices In Real Time Under The Coverage Of Wireless Sensor Network. Due To Use Of Wireless Sensor Network In A Healthcare We Are Able To Reduce Complications Of Wire Networks And We Can Move A Healthcare From One Location To Another Desired Location. Mobile Phones Are Used As Barcode Decoder For Medicinal Care As An Extension To Monitoring Schemes. In Order to Provide Better and More Comprehensive Healthcare Services. We

Can Use Barcode Decoder To Verify And Assist Out Patient In The Medication Administration Process.

### 2. Android Based Body Area Network for the Evaluation of Medical Parameters

There Are Various Vital Parameters In This System. They Are ECG, Heart Rate, Heart Rate Variability, Pulse Oximetry, Plethysmography And Fall Detection.

The Tele-medical System Is the System Which Focuses on the System Which Focuses on the Measurement and Evaluation of These Vital Parameters. In a Android Smartphones There Are Two Different Designers Of A (Wireless) Body Networks The Real Time System Features Several Capabilities. Data Acquisition In The (W) Ban Plus The Use Of The Smartphone Sensors, Data Transmission And Emergency Communication With First Responders And Clinical Server. It Is Very Important To Smart And Energy Efficient Sensors. This Can Be Compensated. In The First ZigBee Based Approach, Sensor Nodes Acquire Physiological Parameter Perform Signal Processing and Data Analysis and Transmit Measurement Value to the Coordinator Node. Sensors Are Connected Via Cable to an Embedded System In The Second Deign. In The Both Types Of System, Bluetooth Is Used For Transferring The Data To An Android Based Smartphone.

### 3. Communication and Security in Health Monitoring Systems - A Review

The Fast Improvement Of Sensing Devices And Radios Lets Us Move Powerful And Flexible Remote Health Monitoring System. In The Vision of the Future Internet of Things (IOT). This Vision Leads To The New Requirement And Challenges, And These Have To Manage. So as To Design and Implement of Such System. Maintaining The Gap Between Sensors Nodes And The Human Body And The Internet Becomes Challenging Task In Terms Of Comfortable And Suitable Communication. The System Will Not Have To Provide Functionality But It Should Have To

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Be Highly Secure. In This Paper, We Provide A Survey An Existing Communication Protocols And Security Issue Related To Pervasive Health Monitoring By Explaining Their Limitation, Challenges, And Possible Solutions. We Introduce A Generic Protocol Stack and Design towards Handling Interoperability in Heterogeneous Low Power Wireless Body Area Networks.

#### **4. Design and Development of E-Health Care Monitoring System**

As We Are Dealing With E-Health Care Monitoring System, Our System Designs Is Based On The Wireless Sensor Networks (WSN) And Smart Devices. It Is Very Important To Have Strong Networks Between Doctor, Patient, And Care Givers Judges The Condition Of The Patient. Sensors Are Used To Monitoring Of Patient Surrounding As Well As Health, These Sensors Are Medical And Environmental Sensors. Sensors Are Relayed To The Prior Devices Through The Transmitter And Them To The End User. In This System Doctor And Care Takers Can Observe Patient Without Exactly Visiting The Patient Actually. And Furtherly They Can Upload Medicines And Medical Reports On The Web Server Which After Can Be Accessed By The Patient Anywhere At Any time. It Is Very Much Easy Process and Convenient For both the Doctors and Patient. With The Help of This Data Doctors Can Understand and Observe Patient from Private Home Patient to Public Health Care Centre Patient. This Is The Cost Reducing Technique. We Have Also Define The Sets Of Add On Services Which Include Real Time Health Advice And Action (Retina) And Parent Monitoring.

#### **5. Health Gear: A Real-Time Wearable System for Monitoring and Analysing Physiological Signals**

A Health Gear Presents A Real Time Wearable System For Monitoring, Visualising And Analysing Physiological Signals. Set Of Non-Invasive Physiological Sensors Are Wirelessly Connected To A Cell Phone, Which Stores, Transmits And Analyses The Physiological Data And Then It Presents It To The User In An Appropriate Way. Set Of Non-Pervasive Sensors Are Part Of Health Gear. To Monitor The Users Blood Oxygen Level And Pule While Sleeping, We Focus On Implementation Of Health Gear Using A Blood Oximeter. Also The Two Different Algorithms We Use For Automatically Determining Sleep Apnea Events And For Illustrating The Performance Of The Overall System In Sleep Study With 20 Volunteers.

#### **6. Internet of Things: Remote Patient Monitoring Using Web Services and Cloud Computing**

The Android Application (Called 'ECG Android App') is developed for the Healthcare Domain Which Is Based on Internet of Things & Cloud .Which provides the End User with Visualization of Their Electro Cardiogram (ECG) Waves and Data Logging Functionality in the Background. The Logged Data Can Be Uploaded to the User's Private Centralized Cloud Which Can Be Monitor by Patients As well As Doctors. This Paper Gives Some Fundamental Concepts Of IOT. Further There Are More Technologies

Used: IOIO Microcontroller, Signal Processing, Communication Protocols, Secure And Efficient Mechanisms For Large File Transfer, Data Base Management System, And The Centralized Cloud. The Infrastructure Is Also Helpful For Other Healthcare Domain Development

#### **7. Low Cost and Portable Patient Monitoring System for E-Health Services in Bangladesh**

This Paper Propose An Efficient Low Cost & Portable Patients Health Monitoring System. A Raspberry Pi Based System Is Developed for Collecting Sensed Data from Sensor (Sensors like Temperature, Blood Pressure, Oximeter Etc. Are Used) This Signals From Patients Will Be Send To Doctor For Remotely Analysing The Patients Health Report. A Web Based Application Has Been Developed For Both Patients and Doctors through Which They Can Even Communicate With Each Other. This System Can Be More Useful For The Peoples From Rural Areas.

#### **8. Mobile Telemedicine System for Home Care and Patient Monitoring**

This Paper Describes The Implementation Of A Telemedicine System For Patient Monitoring Using Mobile Telephony, Using This Application Any Patient Can Be Monitored With Rs232 Interface. The System Proved To Be Quick And Reliable. Therefore, It Represents an Applicable Solution to Tele-homecare. Additionally, The High Costs Involving The Conventional Internment And The Frequent Problems In Patient Transporting Do Necessary A Different Way Of Providing Good Medical Care. This System Is Based On Client Server Application In Which Server Stores Data Collected From Client, Role Of Client Is To Collect Proper Data From Patient & Transfer It To Server.

#### **9. Apnea Medassist: Real-Time Sleep Apnea Monitor Using Single-Lead ECG**

This Is A Low Cost Sleep Apnea Monitoring System "Apnea Medassist", This Is Fully Automated System Which Analyses The Signals From Patients ECG And For Detection Of Apnea It Is Using Support Vector Classifier. This System Implementation Includes Android Application. The Reduced Complexity Of "Apnea Medassist" Comes From Efficient Optimization Of The ECG Processing, And Use Of Techniques To Reduce Svc Model Complexity And ECG-Derived Respiration Signals And By Reducing The Number Of Support Vectors.

#### **10. Patient Health Management System Using E-Health Monitoring Architecture**

This System Is Based On An Android Application & A Wireless Network Which Will Be Used For Monitoring Patients Health Report In Real Time. This System Is Developed In A Such Way That It Would Be More Useful In Emergency Conditions. With This System It Will Be Possible To Analyse Patient Using Tele-monitoring. Sensors Will Be Used To Monitor Patients Health Continuously And It Will Be Updated On Server. The Patients Medical History Is Being Stored On Cloud For Global Access. This System

Will Be Useful For Patients At Home As Well As Patients From Hospitals. As It Will Be Using Smart System for Accessing Data It Be Low In Cost Security Is an Issue Which Has To Be Considered While Storing Data On Cloud Which Can Be Accessible By Only Patients And Relatives.

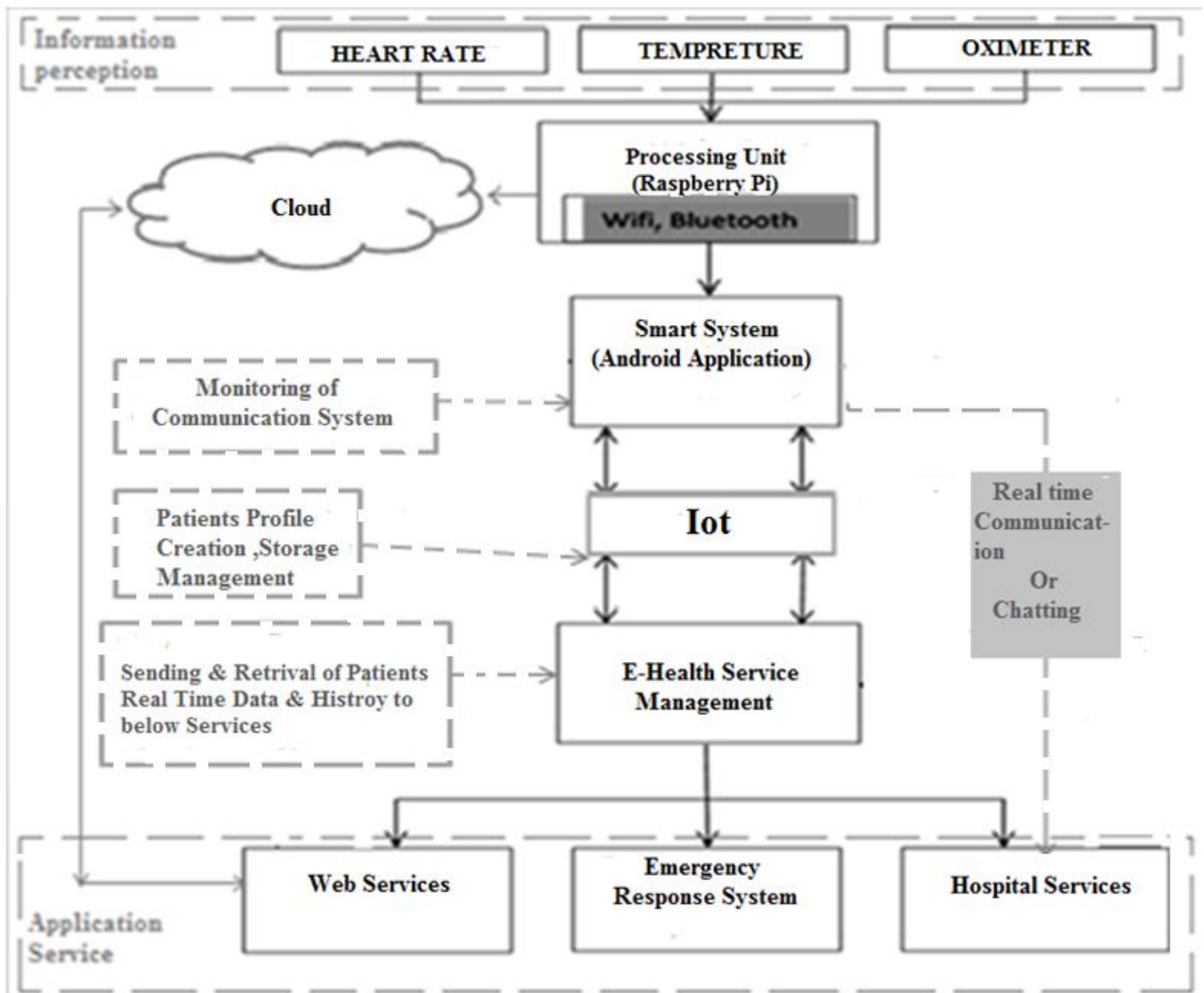
Information Of Each Patients Are Displayed On Webpage Using IOT Module So That We Can Access The Data From Anywhere In The World Using Laptop And Mobiles Etc. IOT Is Used To Keep Updated Information On Webpage Which Can Be Accessed From Anywhere Globally.

### 3. Proposed System

A Proposed System Will Monitor Patient's Heart Rate, Body Temperature Respiration Rate Using Raspberry Pi. That Sensed Data Is Relayed On Raspberry Pi . Patients Diagnose Can Be Monitored In The Monitor Screen Of Computer Using Raspberry Pi As Well As Monitoring Through Any-Where In The World Using Internet. The All Updated

The Proposed System Is Mainly Design For Monitoring Patient Privately At Home As Well As Patients In Hospitals. And It Can Be Suitable For Village Health Care Centre Rural Areas Where The Medical Facilities Are Not Available.

### 4. Architecture



### 5. Mathematical Model

System Description:

- Input: Patient Personal Information, Parameters Sensed By Sensors.
- Output: Provides Medication Depending On The Health Parameters Without The Physical Presence Of The Doctors. Show Sensor Data History.

- Classes: Doctor, User, Patient, Patient Appointment, Diseases And Symptoms.
- Set Theory:
  - 1) Let  $S =$  Be A System For Health Monitoring .
  - 2) Identify Input As  $I = D1 \dots DN$   
Where  $D_i =$  No Of Patients.  $S = I$
  - 3) Identify T As Output I.E. Successful Recommendation  $S = I, T, P.$
  - 4) Identify Process P  $D_a =$  Data Acquisitions  $C_e =$  Client Embedded System

Webs= Web Services

S = I,T, Da, Ce, Webs

• Success Conditions: When The Correct Inputs Are Provided Then Patient Gets

Proper Diagnose With Correct Physical Parameters.

• Failure Conditions: When Correct Inputs Are Not Provided Then System May Fail

To Give Proper Medical Help

## 6. Conclusion

We come to the conclusion our system is purely based on IOT and cloud computing We used cloud computing to store data, this data can be stored permanently and can be accessed anywhere. Cloud computing is also useful to keep update of patient. Doctors and care givers can immediately interface with patient and take a serious action in emergency cases and also provide medication depending on health parameters. Doctors and Care givers can interact with patient without there physical presence the system automatically can generate the graph of body changes as emergency SMS doctor gets EG. If a patient suffers from body temperature it will easy for doctor to recognised problem and also save the time of check up our system is very much suitable for village health care centre and rural areas where lack of medical facilities are available. This system also keeps patient privacy at home as well as at hospital. This health monitoring system has been proved to be of great help for the health care of patient.

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