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# REVIEW ON SMART HEALTH CARE SYSTEM USING INTERNET OF THINGS

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**Abstract:** - Healthcare is biggest concern for our society. With the emergence of Internet of Things all objects in our daily life has become part of Internet. IoT is transforming complete healthcare system .Many applications build using IoT concepts are helping people around the world to maintain good health in cost efficient way . Internet of things is a way of connecting anything with Internet. Internet of things is visible from smart home to smart city and smart healthcare .Now days all devices are connected to internet and with the use of wearable devices health industry has majorly improved .Internet based wearable devices help from fitness to providing medical emergency alert for patients who need regular check due to old age or chronic disease .This paper is focusing on various IoT concepts and wearable devices that have changed traditional way of health care system and has made health management very efficient.

**Keywords:** Internet of Things, Smart health, IoT health care

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## 1. Introduction

Internet of Things (IoT) is a new revolution in Internet world. Internet of Things (IoT) is expansion of internet services which reached almost in every area from building smart house to smart cities. Communication between objects is made possible and now objects can organize and manage themselves. Now day's fast and busy life has affected the health of people. In hospitals and clinics there is a provision of medical check-up but no provision for regular health monitoring is available with patient who need continuous health monitoring post hospitalization . But here Internet of things has played a great role in transforming traditional approach of healthcare of patient that requires continuous monitoring.

IoT is not limited to one area. IoT technology has developed in various area from agriculture in rural and health care industry to smart home and smart cities .IoT Objects can be communicated between each other by using radio frequency identification (RFID), wireless sensor network (WSN), ZigBee, etc. The Internet of things (IoT) is used in different vehicles, mobile phones, physical devices etc. The IoT works by communicating with different kind of sensors and other devices like RFID, barcodes, QR codes, Ambient Intelligence and mobile Computing

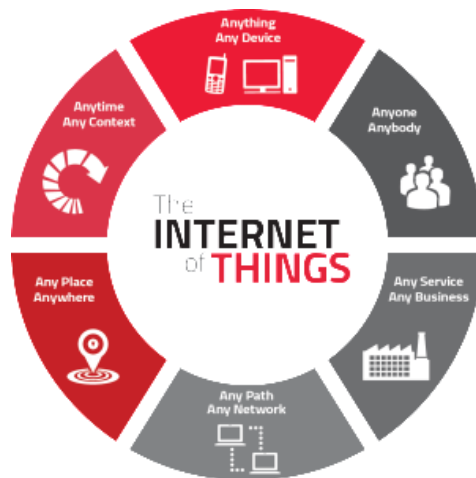


Fig 1[14]

IoT many dynamic applications are allow communication between machine-to-machine, sensor-to-device, patient-to- devices, and patient-to-doctor and device-to-doctor.IoT provides many other application for remote monitoring of patients who require continues care and monitoring due to may be post hospitalization of suffering from any chronicle disease.

## 2. Architecture of Internet of Things

Four layers form a part of Architecture of Internet of things

- 1) Application layer
- 2) Gateway and network layer
- 3) Management service layer
- 4 Sensor layer

## 3. Wearable devices

Various kind of wearable medical devices like fitness bands, health monitoring systems, has smart sensors embedded into them that collect data and store it and analyze it, and conduct tests which are further used by medical experts to take proper decisions.

Internet of things has made a huge difference in way of handling things .In medical sector it has played a great role.

Now wearable devices has come up that help in monitoring the patient regularly .Many patient need require care post hospitalization but regularly visiting t the doctors and hospital in not always comfortable and it is also costly . Wearable devices are not days used regularly for monitoring and recording health of a person.

The devices are connected with mobile phone and the medical information of the person is regularly updated on system and in case of any emergency the report of patient is send to patient and doctor.

The wearables devices are using various types of sensor correct patient medical parameters and send it to database which can further be used for data mining to find and prediction



Fig 2 Wearable devices for health monitoring

The healthcare servers keep registered patient medical records and provide different services to patients, medical consultants and data analysts.

The wearable health devices are monitoring patients health at their homes and also maintaining their past medical records which can be used for analysis. These devices not only monitor the health but also give reminder for talking medicine.

There is a huge list of Wearable healthcare IOT devices available in market

### 1) Smart Thermometer

Kinsa smart Thermometer not only takes temperature but also keep health record of patient so that it can be made available whenever needed



Fig 3 Smart Thermometer [12]

## 2) Blood pressure Monitoring

Smart blood pressure monitoring machines are now come up to provide compact device to collect blood pressure information of the patient



Fig 4 Compact Blood pressure Monitoring devices

## 3) Heart rate Monitoring

Bluetooth enabled device that collect patient data and send it to application for analysis .The data elements are heart rate, steps, and calories.



Fig 5 Pulse on Heart Monitoring devices [13]

## 4. RELATED WORK

With the purpose of improving health care system ,research is going on in various fields of IoT healthcare system and application ,which is efficient in receives raw data from wireless network connected devices and managing patient medical record and monitoring patient from remote location for patient who need continuous monitoring due to chronic illness or post hospitalization

Durga Amarnath et al .[1] designed an health monitoring system that collects patient data like Blood pressure , heartrate into mysql database .and in case of emergency alert is sent to patient doctor with full medical information

Vikas Vippalapalli et al [2], proposed A BSN (Body Sensor Network) that works by collecting data from sensors that are placed inside or outside human body

Arijit Ukil et al. [3] has proposed automated system of cardiac screening of patient. They have developed Maximum Inter-class Distant Maximum Intra-class Close (MIDMIC) feature optimization criteria for robust feature selection.

Md Ashrafuzzaman et al [4], propose a system that detects the heart blockage, abnormal blood and valve circulation using smart phone that record heart sound.

Yosuf ElSaadany et al. [5] designed system that gather ECG and body temperature using smart phone for heart attack prediction using multisensory embedded IoT system

Himadri Nath Saha et al. [6] proposed system that uses temperature sensor, pulse sensor, blood sensor to collect patient pulse rate, eco, pressure level, temperature and send data to cloud. The application gives alert in case it detects abrupt change in patient heart rate.

Sarfraz Fayaz Khan [7], proposed a healthcare monitoring system using RFID tags system that collect patient data and which further is used for prediction

P. Chavan et al [8] proposed ECG android application that focuses on waves of ECG monitoring. The proposed solution uses technologies like ADC, microcontroller, signal processing for ECG waves, communication protocols and system design to support private and secure data transfer and cloud techniques.

Jayanth S et al. [9] has proposed a IOT based wearable device to monitors the patient heart rate that gives alert in form of vibration and email to user's family and doctor in case of unexpected change

Punit Gupta [10] presented a design a health monitoring system to collects patients heart rate, blood pressure and ECG and send an emergency alert to patients doctor with current status and full medical information

## 5. Conclusion

Internet has brought a great revolution in our society. Internet of things is connecting everything to internet. IoT is seen everywhere now. IoT made cities and homes smart. And now IoT in healthcare play a great role in monitoring patient's health anywhere, especially if patient need to be monitored continuously. IoT in healthcare not only made easy monitoring of patient at their home but also made healthcare cost effective. The data collected by using various form of sensors are sent to doctors and patient relatives for immediate action in case of emergency. The important medical data of patient is stored on cloud which can be tracked by patient or doctor anytime and can also be used for analysis as well for predicting diseases. These paper focuses on various applications running that make smart healthcare systems.

## 6. REFERENCES

- [1] Durga Amarnath M. Budida, Dr. Ram S. Mangrulkar "Design and Implementation of Smart HealthCare System Using IoT" 2017.
- [2] Vikas Vippalapalli, Snigdha Ananthula " Internet of things (IoT) based smart health care system" 2016
- [3] Arijit Ukil, Uttam Kumar Roy "Smart Cardiac Health Management in IoT through Heart Sound Signal Analytics and Robust Noise Filtering"
- [4] Md. Ashrafuzzaman, Md Mazaharul Huq, Chandan Chakraborty, Md. Rafi Monjur Khan, Taslima Tabassum, Rashedul Hasan. "Heart Attack Detection Using Smart Phone" IJTEEE, 2013
- [5] Yosuf ElSaadany, AKM Jahangir A. Majumder, Donald R. Ucci " A Wireless Early Prediction System of Cardiac Arrest through IoT" IEEE 2017
- [6] Himadri Nath Saha, Supratim Auddy, Subrata Pal, Shubham Kumar, Shivesh Pandey, Rocky Singh, Amrendra Kumar Singh, Priyanshu Sharan, Debmalaya Ghosh, Sanhita Saha " Health Monitoring using Internet of Things (IoT)" IEEE 2017

- [7] Sarfraz Fayaz Khan “Health Care Monitoring System in Internet of Things (IoT) by Using RFID” 2017
- [8] P. Chavan, P. More, N. Thorat, S. Yewale, and P. Dhade, “ECG - Remote patient monitoring using cloud computing,” 2016
- [9] Jayanth S, Poorvi MB, R Shreyas, Padmaja B, Sunil " Wearable Device To Measure Heart Beat using IoT" (ICISC-2017)
- [10] Punit Gupta, Deepika Agrawal, Jasmeet Chhabra, Pulkit Kumar Dhir " IoT based Smart HealthCare Kit" 2016 (ICCTICT)
- [11] <http://www.electronicdesign.com/iot/how-will-internet-medical-things-change-healthcare>
- [12] <https://www.kinsahealth.com/>
- [13] <https://health.nokia.com/in/en/blood-pressure-monitor>
- [14] <http://knowledgeblob.com/technology/a-brief-about-internet-of-things-iot/>