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SCOPE OF IOT IN HEALTH CARE INDUSTRY: OPPORTUNITIES & CHALLENGES

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Abstract

The speedy rise of technology has made human life Very comfortable and easy. In health care sector IOT is a key player facilitating the patient and doctor in providing better medical facilities in Hospital. The IOT connectivity and the digital controller are very helpful in monitoring the patient health issues .The system make use of temperature, humidity and blood pressure sensors to monitor the vital signs of a patient. Due to fast life and pressure in workplace or personal life health has become a critical issue now days. The advanced sensors can be either worn or be embedded into the body of the patients, so as to continuously monitor their health. Especially old age people require special medical help by using IOT system things can be monitored easily. The doctors can process all the information for early prediction of disease and for better treatment by using IOT enabled devices. IOT enabled technology make a revolutionary change in pharmaceutical industry with improved outcomes at economical health care .This paper discussed the main scope of IOT in health care industry and interlinked opportunities and challenges with this technology up gradation .

I.INTRODUCTION

Today Technology has changed the world and life of people. Use of IOT influences the way we live and our work. Before Internet of Things, There were no monitoring devices to check patient's health remotely but IOT had made it possible. The Internet of Things (IOT) has the potential to transform the hospitality industry as its enabled devices and technology is reliable, affordable and it can connect patients and doctors easily. Sensors and devices can easily record information of patient who is using it and physician can use that information for treatment of the diseased

person [1]. The Internet of Things has upgraded the health sector with its best facilities [2]. Even in case of emergency when doctor is not available, IOT enabled devices can help to predict health issues .It can help in medicine prescription as well from the systematic study of medicinal databases. The IOT is set to renovate the healthcare industry in near future .It has a great scope and it can help in multiple applications.

Figure:1 Scope of IOT in Healthcare Industry

II.RELATED WORK

A lot of works have been done on IOT use in healthcare industry and various models have been developed. Almotiri et al. [3] projected a structure of m-health which is based on mobile device to collect patient's information about his health and keep this information. It uses wearable device and body sensor which patient can use and after it medical staff can easily diagnosis the health issues of patients and can provide them best medical help. Barger et al. [4] made a smart house facility device with a sensor system to keep an eye on and follow the activities of the patient in hoke and a prototype of the same is also being tested. This device is capable of diagnosing the behavior pattern of patients which can help doctors to keep a check on patient's health recovery and behavior symptoms.Chiuchisan et al. [5] proposed a sensor for ICU patients who can help patient's relative and family or doctors about health issues and any emergency risk. This device also can access and help in control the room temperature and needy atmosphere of surrounding which can help patients in fast recovery. Dwivedi et al. [6] prepared a system in order to keep record of patient's information which can be transmitted over internet for Electronic Patient Record (EPR) in any need or emergency. It is helpful in preparing a data base of patient's history. Gupta et al. [7] projected a representation which can measure and records ECG and other health issues by the help of using Raspberry Pi .It is a smart system which can help in handles the medicine details, the Expiry date of the medicines and also checks about the stock availability. By its help real time temperature and relative humidity can be displays which can hospitals to maintain required changes in temperature. Lopes et al. [8] proposed an IOT based solution for disabled people in healthcare sector. They experimented theses IOT based devices on some disabled people needed medical help and found that it can help the doctors who are involved in treatments of disabled people. Sahoo et al. [9] discussed about healthcare management system and use of cloud

based technology for prediction of patients disease causes and symptoms .patient data can be generated from various reports which can be analyzed expert teams for better medical treatments.Tyagi et al. [10] explored the opportunities of IOT in medical sector which can solve the issue of shortage of hospitals and doctors. It can help in enhanced care and better timely consultation to patients .they propose a cloud based framework by which information securely can be transferred to hospitals and labs . Xu et al. [11] presented a data model relate with emergency medical service based on technology using IOT.This platform can collect worldwide data anytime anywhere which can be helpful for patient or doctors for better medical facilities and help .

III. PROPOSED METHODOLOGY

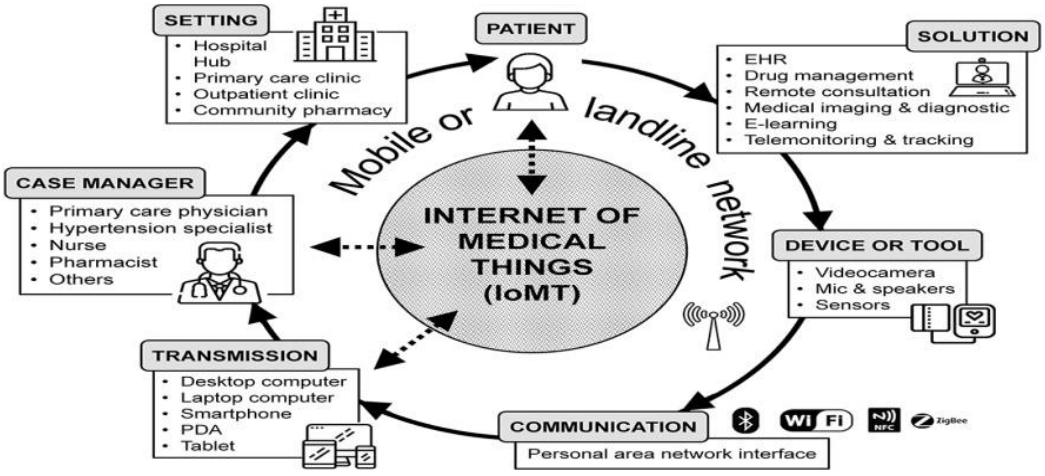
In this paper, IOT main functions and application areas have been discussed .The major aim of the paper can be summarized as following:

- ✓ To know main application areas of IOT in healthcare industry
- ✓ To know opportunities and challenges of IOT in healthcare industry
- ✓ To know future scope of IOT
- ✓ To suggest better strategies to use IOT in healthcare industry

IV. Discussion on Redefining Healthcare Industry (IOMT)

IOMT has transformed the medical history and healthcare sector and its future is very miraculous. It can help in saving cost and money and its use is very convenient .Health sector is very important part of any country. By the help of IOMT this sector is flourishing day and night IOMT basically works on some programming based functions by which all data is captured or processed at one stage and yields the value to the next stage.

Figure:2 Internet of Medical Things



SYSTEM ARCHITECTURE

Step 1: it consists of operational interconnected devices that comprise sensors, actuators, detectors; camera systems etc. to collect patient's information and help in diagnose the health issues.

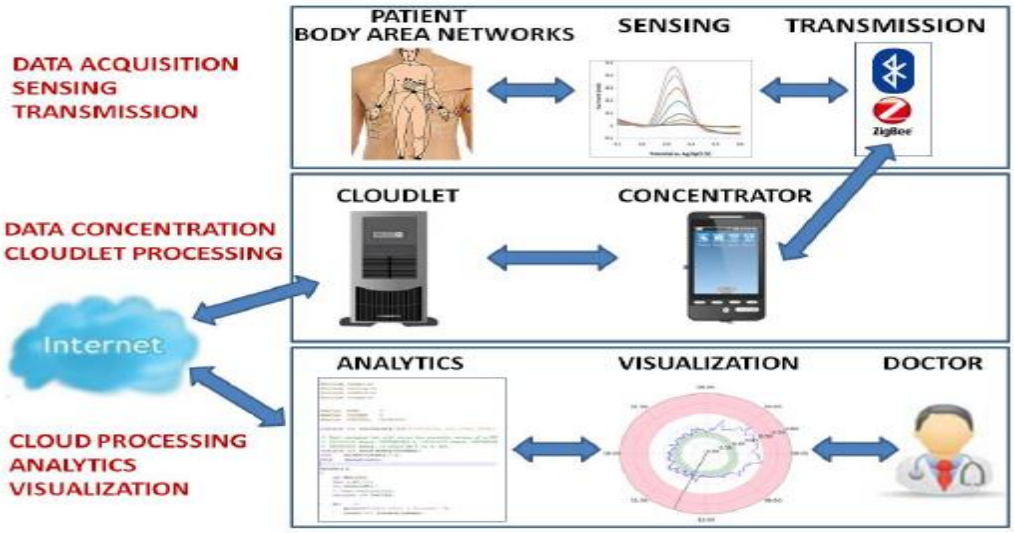
Step 2: This process includes converting analog information in digital form which help in prediction of health related issues and symptoms

Step 3: after digitized and compiling the data it is moved to the data center or Cloud.

Step 4: Final data is managed and processed with advanced analysation techniques at the required level by doctors and hospitals for patient illness recovery and curing him with best possible medicine and treatments.

IOT is certainly transforming the healthcare industry. IOT enabled technological devices are providing healthcare benefits to patients and their family, doctors or hospitals and insurance

Figure: 3 Components of a remote Patient monitoring system based on IOT



V. Benefits of IOT

It is certainly transforming the healthcare industry. IOT enabled technological devices are providing healthcare benefits to patients and their family, doctors or hospitals and insurance companies.

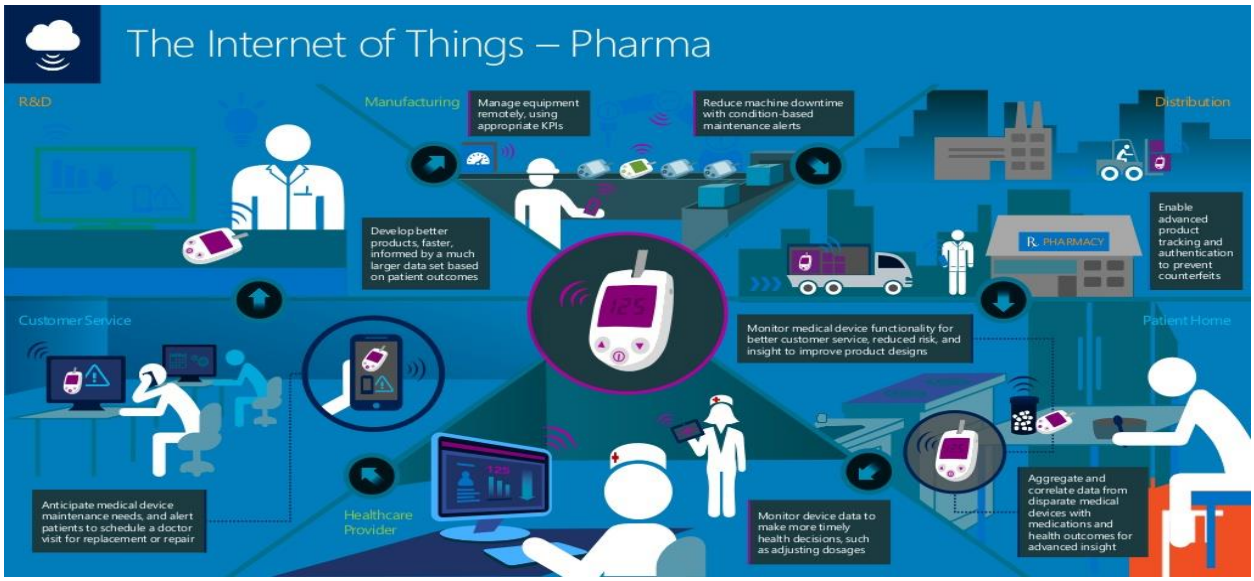
- **IOT for Patients** – patients who are having blood pressure or sugar they can use fitness bands and other devices which can inform about heart rate and glucometer patients can access their health status personally with the help IOT enabled medical

devices or sensors . Now everywhere weight gain is also a major issue, people who want to control their weight can use calorie count device which can make them aware about their fitness .Elderly people health monitoring and checking is also a major issue all over the world. But now with the help of technology and IOT enabled devices it can be easily diagnosed and can be control or monitored.

- **IOT for Physicians –**Now with the help of IOT enabled devices and sensors it is very easy for physician to keep a proper check on patient's history. Physician from remote location can access their patients health related issues and can suggest them best medical advice in case of some emergency or immediate medical help. IOT facilitate healthcare professionals to be more attentive and hook up with the patients proactively.
- **IOT for Hospitals –** Issues related with infection or maintaining hygiene facilities is a challenging task in hospitals where infection risk is always high. IOT-enabled hygiene sensors or equipments can provide a great help in this challenge. It can help in control of inventory related medicine, temperature or humidity control .medical staff deployment at different locations can also be managed.
- **IOT for Health Insurance Companies –** Insurance companies need the Peron all medical history for their health insurance plan registration. Insurance company can get the data about medical status and claim of insurer by IOT devices .This will help insurers to reduce claims significantly.

IOT has redefined the healthcare industry with lots of advantages and comfort like better care and diagnose, better treatment facilities and medicine .It has also made possible patients recovery fast and easy . It is helpful in reducing cost and time. Doctors and patients are experiencing better healthcare facilities and treatment processes.

Figure: 4 Benefits of IOT in Healthcare industry



The major advantages of IOT in healthcare include:

➢IOT can facilitate patients virtual presence to doctor which can help in cutting down unnecessary visits to doctors, hospital stays and re-admissions

- Better treatment possible because it enables physician to make evidence-based informed decisions.
- Continuous health monitoring can provide proactive medical treatment.
- Through IOT equipped devices drugs and medical equipments can be managed easily.

VI. Recommendations

Though solutions from IOT appear very promising, it is essential that before implementation of this network of devices, companies must acquire the required security and infrastructure in place. For pharmaceutical companies, IOT offers visibility and access into every area of production and operation, thus generating huge amount of vulnerable confidential data resource. Typically for pharmacy industries, privacy of the data is of paramount importance, hence strong data security must be ensured to avoid any kind of data breach which would affect not only the firm's business but the personal data of the consumers. Trusted collaboration within the partner organizations is crucial for the successful implementation of the IOT. Any production domain contains a wide spectrum of utilities, equipment, operators and associated software all of which should be compatible with every element/sector of the supply chain network. Also, the change management is to be considered and optimized before implementation of the Internet of Things, to develop business in compliance with the major drivers and stakeholders of the business with successful transition.

VII. Conclusion

This paper discussed about IOT use in Health care industry and it also focused on IOT main future prospects and challenges which need to address.IOT is providing some avenue for future research in pharmaceutical and facilitating sustainable development in healthcare industry. To conclude, the scope and overall applications of the Internet of things are very promising, which in future will bring revolutionary benefits for large population; provided necessary infrastructure will be there in place for the security and assurance of the people and associated firms.

This paper introduces the Internet of Things which relates to the current world scenarios along with the real life applications. Successful implementation of IOT can revolutionize in pharmaceutical manufacturing and its operational areas .With the promising technological advances in IOT, it is possible to make major contribution in solving those challenges faced by the pharmacy industry with the implementation of solutions from IOT to overcome the barriers in the current processes.

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