



ISSN: 0975-766X  
 CODEN: IJPTFI  
 Research Article

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 www.ijptonline.com

## APPLICATION OF INTERNET OF THINGS AND CLOUD COMPUTING FOR HEALTH CARE-A SURVEY

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Received on: 18.10.2016

Accepted on: 11.11.2016

### Abstract

Health is rooted in everyday life. Healthcare is basically maintaining, managing and improving one's health through diagnosis and treatment. Healthcare environment is keep on changing by adding new methodologies to the present architecture. The nature of healthcare is changing as many new technologies are being added to the existing infrastructure and these methodologies will increase the healthcare by decreasing the medical problems. And it also has privacy and security issues. We have discussed about the new trends of Internet of things in healthcare methodologies, their services, and their applications in this paper. And further, this paper surveys on security model to minimize the security issues in healthcare. In the healthcare industry, Cloud Computing provides important benefits such as the hospitals, health clinics needs fast access to computing & large storage facilities. So healthcare needs to be shared the information and clouds are used to share the information easily and increase the operational efficiency of healthcare.

**Keywords:** Application, Cloud computing, Healthcare, Internet of things.

### Introduction:

A Health system is also known as healthcare system, it is an organization of health institutions, Resources which offers healthcare services in order to face and overcome the needs and necessity of targeted populations. And the healthcare is traditionally considered as a significant determinant in order to provide the general mental, physical health and promoting awareness about the well-being of people all over the world. Nowadays healthcare is using many technologies and these technologies are helpful in improving the quality of the healthcare and it also overcomes the defects faced by our traditional healthcare system [4]. Internet of things is the internetworking of tools, architectures and vehicles and also

another component and these are enclosed with software, sensors, network connectivity, electronics and actuators and those are used in order to enable the objects in order to collect and transform data. And those can let on the objects to become aware of and be restrained accidentally among the present networking architecture [2]. Internet of things is the mixture of both software and hardware methodology which develops lots of information by interconnecting several sensors and tools by the help of cloud and creating sense of information by the help of intelligent tools. Anything we can consider as an IoT tool if it can able to transform and receive data over the cloud and developed to perform a specific task. Therefore the basic work of the IoT is, the tools that can collect and transform information straight forwardly with one other and Cloud is used which make it able to gather, record and view new info streams rapidly and much appropriate thereby resulting in an improved quality and access in the healthcare industry. Internet of Things in healthcare is a composite computing, the wireless communication method of applications and tools which interconnect health service providers and patients in order to find out, view, fix and storing the important medical and statistics data. [10] There are several instances of Internet of Things based Healthcare and few ones are BP monitors, Glucose monitors, ECG monitors, Pulse oximeters, a headset that measure bandwidth, clothes with sensing devices, sensors embedded in medical equipment, dispensing system, device implants and surgical robots, and any wearable technology devices etc[1]. Cloud computing is a class of internet-oriented computing that provides mutual laptop dispensation source and particulars to computers and other devices on require. it's far a representation for permit ever-present, on-call for getting entry to a mutual group of configurable computing resources(e.g., PC , garage, programs, and services), which may be hastily provisioned and launched with negligible control attempt. Cloud computing and storage space solutions present users and organization with plentiful talents to accumulate and practice their statistics within 1/3-party statistics conveniences that be able to place far from the user-range in remoteness from diagonally a town to the earth over[3]. Cloud computing relies on the distribution of resources to attain rationality and financial system of the level, similar to a value (just like the power framework) over an electrical energy community. cloud-computing carriers provide their "services" in line with one of a kind fashions, of which the three general models in keeping with NIST are Infrastructure as a provider (IaaS), Platform as a service (PaaS), and software as a service (SaaS). Those fashions offer growing abstraction; they may be thus regularly portrayed as layers in a stack: infrastructure-, platform- and software-as-a-carrier, but these want not be associated. for example, we will offer SaaS carried out on bodily machines (naked metallic),

without using underlying PaaS or IaaS layers, and conversely, it is easy to run a program on IaaS and get right of entry

to it immediately, without wrapping it as SaaS.

Software as a provider (SaaS). The functionality furnish to the purchaser is to draw on the worker's applications walking on a cloud transportation. The packages are obtainable from numerous consumer strategy through both a skinny consumer interface, such as a web browser (e.g., web-based totally email), or an application interface. The purchaser does now not control or manage the cloud infrastructure including network, storage, or even person value abilities, through the feasible exclusion of restricted person-precise utility design settings. Platform as a carrier (PaaS). The potential furnished to the client is to install against the cloud infrastructure patron-design or obtained packages produced the use of programming languages, libraries, offerings, and equipment support by means of the supplier. The client does not control or control the underlying cloud infrastructure which includes network, servers, running structures, or garage, however, has manipulated over the deploy application and possible pattern settings meant for the application website hosting surroundings.

Infrastructure as a provider (IaaS). The functionality furnished to the client is to stipulation processing, garage, network, and extraordinary essential computing belongings in which the purchaser is endowed of installation and run random software program software, that may encompass running systems and applications. The client does now not operate or manipulate the underlying cloud infrastructure but has manipulated over operating systems, storage, and deployed programs; and likely constrained control of pick out networking additives (e.g., host firewalls)

Nowadays healthcare experts are under strain to shift from capital-extensive technology investments to operational charges that provide flexibility and middle on their center commercial enterprise. Healthcare leaders want to funnel capital into cash go with the flow-producing sports that permit them to deliver advanced outcomes. Cloud computing shall we healthcare companies focus on healthcare in preference to data centers, virtual real estate to house them, and professional specialists to maintain and perform them.[3] Cloud computing is one promising era that healthcare businesses can use to achieve good results.

## **II. IOT Healthcare Services:**

IoT in healthcare system may be used in a various number of ranges like childcare and also care for elders. The IoT is expected to allow an array of medical values in which every values offers a group of results in medical system. There is

no specific explanation for Internet of things in healthcare. Despite, in some cases the services may not be impartially compared with a specific result or functions. This paper proposes that these values in healthcare are broad in nature and it contains the ability in order to act as a unit for a group of results or functions. Additionally, this must know about the protocols and also the general services which are needed for IoT patterns must need a certain type of modifications for the sake of perfect performance in healthcare applications. And those consist of supply allocation services, announcement services, internet services, cross-connectivity protocol for varied strategy, and it connect protocol for the chief connectivity.

The simple, rapid, safe, and less-strength finding of gadgets and values may be delivered to this record. For this reason, a widespread dialogue of Internet of things offerings is out of coverage of this survey. The fascinated person who reads are referred to this writing in order to understand the topic and the interested readers are referred to the literature. The following sections consist of several type of internet of things medical services.

### **1) Community Healthcare:**

Community healthcare monitoring is based on setting up a network which covers an area all over a confined society. Community healthcare is an Internet of things-based system all about a residential area, a municipality hospital and a rustic society. Connection of those various network is considered like a coactive system arrangement. In this view, a specially designed service known as Community healthcare is assured on facing technological necessities which are combined as an enclosed one. Rural healthcare monitoring is an IoT platform which has been founded as effective and energy efficient. It is a cooperative network so certain mechanisms like definite verification and approval must be integrated. Another network called community medical network and it is a network which associates multiple wireless body area networks for developing Community Health [11]. The architecture of a society health system is considered as a “effective hospital.” A four-layered architecture of a resident health information service is used as a way for distributing data among medicinal services and the service stage for getting health records and access distant health strategy[12].

### **2) Children Health Information:**

Creating consciousness among children’s strength and educating the common community and also young ones about their basic necessities like exciting activities, activity changes, or psychological health problems and about their family

behavior. This encouraged surveyor to create a specially designed Internet of things service called children health information in order to deal with the above needs. On this service, a successful service is provided at a pediatric ward thereby providing called children health information services. Its main aim is to educate, amuse and empower hospitalized children and also there is another service called an Internet of things-related m-health services which could motivate young ones for better dietetic behavior with the guidance of teacher and parent [14].

### **3) Adverse Drug Reaction:**

An Adverse Drug Reaction is an wound due to captivating remedy which occurs when a solitary amount of drug is taken or else through taking an extended medicinal drug or in taking of an aggregate of two or additional tablets. Since the adverse drug reaction is broad in nature, which is not particular to the prescription for a specific illness, and there are necessities for developing some common technological problems and the results for it separately and that is called adverse drug reaction services. An IoT-primarily related adverse drug reaction is used for which affected person's terminal identifies the precise pills with the help of barcode/NFC-enabled strategy. And with the help of a medical wise statistics device, facts machines are used for checking whether the drugs are well suited with the digital fitness document, allergic infection. The iMedPack is created as an element of the iMedBox to deal with the adverse drug reaction [13] by makes use of RFID and Controlled Delaminating Material technology.

### **4) Embedded Context Prediction:**

In order to construct context-alert medical scenarios over Internet of things system, a intermediary founder needs a broad framework through the apt mechanism, that is known as the embedded context prediction service. This structure has been created in the circumstance of ubiquitous medical system. Many numbers of investigation challenges in context-alert ever-present medical systems are found and revealed. comparatively same investigation challenges must be founded for context-alert medical scenarios among Internet of things networks, and a context analyzer is apply to IoT-based distant health monitoring system[15] .

## **II. IoT Healthcare Applications**

### **1) Glucose Level Sensing:**

In India most of the people have diabetes. Diabetes is not a disease it will be irregular condition changes in the body. A normal human body have the ability to control the blood sugar level whereas diabetes person cannot control their blood

sugar level. For this reason m- IoT Configuration method is purposed. In IoT Configuration glucose monitor always keep track of blood glucose level of a particular patient and keep on updating the details to the healthcare which in turns helps the patient to regulate the meals activities and medication time based on the advice of healthcare providers. This device consists of blood glucose level collector, mobile or a computer and processor[9].

## **2) Blood Pressure Monitoring:**

Blood Pressure must be regularly monitored and has to be controlled by the entire person. The motivation of the Scenario is that all the things have to be done remotely. The combination of a KJT BP meter and Smartphone will make scenario reality [5]. The device consists of KJT BP meter, NFC enabled, KJT Mobile phone and a communication channel, connects patients with health Center. The BP data which is collected are transmitted over an IoT network (Communication Channel) [6].

## **3) Body Temperature Monitor:**

Monitoring of body Temperature could be an important a part of health care services. Body temperature could be sign within the maintenance of health condition [7]. The survey consists of body heat detector that's embedded within the TelosB material [9]. An IoT system uses the home gateway for measuring body temperature using infrared recognition. An additional IoT system which is in charge for temperature tracking and communication are the RFID module. This module is also used for monitoring the temperature.

## **4) Wheelchair Management:**

Many surveys have been processed to develop fully automation wheelchairs for physically challenged people. The IoT has the capability to implement the full automation wheelchair. Health care system is used IoT technologies for wheelchair application. The design of wheelchair application is WBANs combine with different sensors whose methods are comfortable to IoT requirements. An IoT technology uses peer-to-peer (p2p) for the medical support system. The wheelchair application detects the status of the user by using chair vibration control. An Intel's IoT department developed another IoT-based wheelchair. This design shows that data can be driven by connected machines which are evolved in standard things. The data is collected based on the user's surroundings and location's accessibility by monitoring the individual sitting in the chair [1].

## **IV Advantages and Disadvantages**

**A) IoT in Health care**

There is no ambiguity that the IoT is complete changing or redefine the health care industry by using technology, application, interact with the user. IoT is providing new tools and methods for developing and improvement in health care. There are more advantages as well as disadvantage using IoT in healthcare

S.NO	ADVANTAGES	DISADVANTAGES
1.	Communication: IoT provides communication between devices to devices, machine to machine, health care team and patient. So the health care system will be more transparency.	Privacy: Implementing IoT in healthcare takes the privacy and protection of personal information. The possibility of exposing sensitive information of the patient is high.
2.	Automation and Control: In IoT physical objects are connected and controlled digitally. It is centralized by wireless infrastructure. All devices in IoT are fully automated there is no need of manpower.	Enormous amount of information needed before starting patient treatments
3.	Decreased Costs: When health care providers implemented IoT in medical field then monitoring patient can be done in real time basics. There is no need for visiting patient unnecessary by doctors .It also provides home care facilities so it is guaranteed that reduced costs on hospital stays and so on.	Complexity: The IoT is a complex network. Implementing IoT in healthcare can be overloading too much of data to the physicians which distracts him.
4.	Monitoring: The most advantage of using IoT in Healthcare is monitoring. Health care provider monitoring patient records regularly by using IoT Technology. Diseases are treated or examine before they get out of hand	Technology: In IoT-based healthcare, we have used many technologies. Health care system should use suitable technologies to implement applications. This will be overheads for developer

**B) Cloud in Health care**

Cloud computing provides an opportunity to improve health care environment by means of giving proper services to the patients, share information easily, improve efficiency .There are many advantages and disadvantages using the cloud in health care.

S.NO	ADVANTAGE	DISADVANTAGE
1.	Collaboration: In some cases information needed in two places (i.e. different health services at the same time).Cloud technologies will synchronize information and shared in real time.	Implementing cloud in Healthcare raises technological problem like cloud breaks down, binding of components, backup plan.
2	Speed: Using cloud in the healthcare leads to be fast and inexpensive.	Developing Cloud in health care have issues like errors in maintaining or storing patient records, disaster backup, rapid response time, data in availability and security problem.
3	Mobility: Mobile devices are the great tool, through that patient can interact with healthcare by video conferencing. Cloud speed up the device and allows better flow if communication even at the distance.	Personal and sensitive information are transmitted through the network in the cloud .so the sensitive information will not be confidential, integrity.

## V. Conclusion

In this paper, we have talked about the health care system. In health care system we have some issue to management, improvement, satisfy patient, errors, security issues. To overcome this type of issue we have suggested implementing health care in IoT and Cloud. In this work, we have explained about the cloud usage in health care. We have talked about IoT features and IoT technologies using in Healthcare system. We have also explained about the IoT application used in Healthcare .In this paper, we have likewise presented the advantages and disadvantages of using IoT and Cloud in the healthcare system.

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