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A Survey on use of Internet of Things for e-Health Data Management

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Abstract- Internet of Things(IoT) is fastest growing field of information technology. It is used in various fields including Health Services. This paper surveys current innovations in IoT-based health care technologies and reviews applications, and industrial trends in IoT-based health care solutions. This paper reviews various services and applications of the IoT-based health care applications. Paper also reviews on IoT Healthcare application security requirements and challenges. One security model is proposed to provide security at three different levels.

Key words- *Internet of Things, Information Technology, Healthcare Services, Security, Services, Applications, Challenges, Model)*

INTRODUCTION

The combo pack of the Internet and newly emerging technologies like wireless communication over low distance like near field communications, automatic identify and track the device like real-time localization, and multiple sensors embedded together to achieve many goals together also known as embedded sensors allow us to transform ordinary entities into smart objects that can understand and react according to their environment. Such objects are main building blocks for the Internet of Things and also enable main computing applications. The Internet of Things (IoT) is a technology that reflects connected set of anyone, anything, anytime, anyplace, any service, and any network. The IoT is a megatrend in next-generation technologies. IOT is the internetwork of smart objects that are uniquely identified and the network goes beyond machine-to-machine (M2M) scenarios [1]. The IoT operate on the idea of RFID technology which is widely used for tracking objects, animals etc. The IoT give better solutions for popular applications such as smart cities, traffic management, health care services, security, retails etc. As an emerging technology the

IoT is expected to offer solutions for food supply chain (FSC) and in-home healthcare (IHH) [2]. Medical Technology is one of the important application areas for the IoT [2]. The IoT facilitate many medical services such as remote patient monitoring, managing patient health data, providing fitness videos etc. These medical services are accessible from home as well as by medical people. Various medical appliances, sensors other diagnosis devices are become smart objects for IoT. IoT offer healthcare services at low costs and provide high quality of life.

Fig. 1 illustrates recent healthcare trends [3]. All entities in the system are communicating and exchange data using seamless and secure network. Patient's health information is received using medical devices and sensors attached to patient's body. This data is analyzed and stored in the database which is used for aggregation later. Depending upon analyses and aggregation, doctors can monitor patients from any location and respond accordingly.

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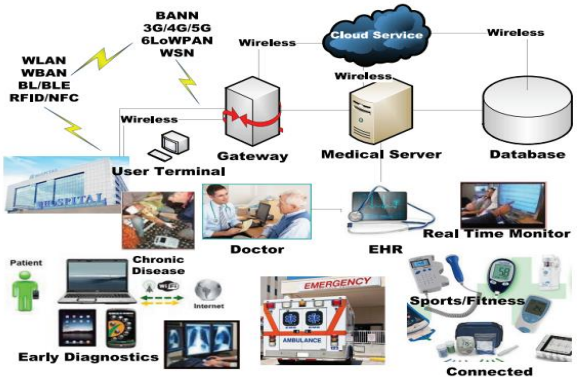

Fig.1. Healthcare trends

IoT HEALTHCARE SERVICES AND APPLICATIONS

IoT-health care applications are divided into two groups: single- and clustered-condition applications. A single-condition application apply to a specific disease and clustered-condition application deals with a many diseases as a whole. Now a days Smart phones is also be used for health care and monitoring of patient health. for e.g the detection of asthma, checking the heart rate, BP etc. [4]–[6], [7]–[11]. Fig. 2 shows different IOT-healthcare devices.

Fig.2. IOT-healthcare devices

Following are some IoT Health care services An IoT along with artificial intelligence offer the health care of aging and incapacitated individuals is called ambient assisted living (AAL). The m-health service is nothing but mobile computing, medical sensors, and communications technologies for healthcare services. An adverse drug reaction (ADR) is an injury from taking a medication [12].Community healthcare monitoring is network based on IoT contains a government hospitals, a rural community and area. This type of monitoring is energy-efficient [13]. Increasing the awareness about children's health related to children's emotional, behavioral, or mental health problems is crucial [14]. The embedded gateway configuration (EGC) service connects patients (network nodes), client and server connected to the Internet, and other medical devices.

Services are used to develop applications, whereas applications are directly used by users and patients. Therefore, services are developer-centric, whereas applications, user-centric. IoT applications like various gadgets, wearables, and healthcare devices currently available in the market. These applications are new inventions in the Iot field that provides various health services

IoT HEALTHCARE SECURITY

The IoT is rapidly growing technology in every field and hence the medical field is expecting huge adoption of the IoT in next several years. Healthcare services process sensitive health information such as personal healthcare data. In addition, these smart devices may be connected to global networks for their access anytime, anywhere. Therefore, the IoT healthcare services may be on the radar of attackers. So in the medical field, it is important to provide security and privacy to the patient data. Therefore, to achieve secure services, there is a need to focus on the following security requirements like Confidentiality, Integrity, Authentication, Availability, Fault Tolerance,

IoT security requirements are not ensured by traditional security techniques, novel countermeasures are needed to address new challenges posed by the IoT: 1) Computational Limitations, 2) Memory Limitations 3) Energy Limitations 4) Mobility 5) Scalability 6) Communications Media

IOT devices are also face different types of security attacks to get the information illegally

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A PROPOSED SECURITY MODEL

IoT based medical field is continuously developing so it is difficult to identify and predict all possible vulnerabilities, threats, and attacks associated with it.

To provide security the services must have dynamic properties i.e. they should have the ability to reach decisions on unnoticed problems based on experience and knowledge.

Consider a scenario, existing security scheme provide few security mechanisms. If system is expanded in terms of health devices, networks, and applications, and attacker threaten the security with new type of attack. In this case, existing security services are expected to be capable of at least identifying this new type of attack by using dynamic algorithms. To address this issue, this paper proposes a security model for IoT-based healthcare services.

This intelligent security model is collaborative in nature and uses the most recent knowledge base. Fig. 3 security model that presents the scheme for the following three security services: Protection services are designed to reduce attacks. Detection services get data from health equipments, and health networks. Using defense process, reaction services allow patients and medical people face all attacks. The security model is implemented with the help of dynamic algorithms where there is the strong co-ordination is between different IoT services

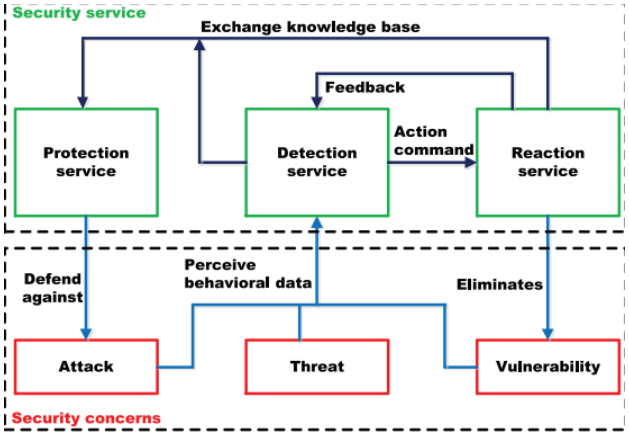

Fig.3. security mode

IoT HEALTHCARE TECHNOLOGIES

There are many enabling technologies for IoT-based healthcare solutions

- Cloud Computing: Iot with Cloud Computing provide facilities with global access to shared resources, offering services upon on request over the network
- Grid Computing: It increases the computational capability of medical sensor nodes of healthcare network.
- Big Data: Big Data contains large amounts of health care data
- Networks: IoT healthcare network supports various short range communications (e.g., WBANs, WLANs, 6LoWPANs,) to long-range communications (e.g., any type of cellular network)
- Ambient Intelligence: In healthcare network end users and customers are humans so the application of ambient intelligence is important
- Augmented Reality: It is important and useful for surgery and remote monitoring
- Wearbles: Various wearable medical devices are become landmarks for getting patient information in IoT healthcare service.

Some security challenges are there like Physical Security as attacker may tamper the medical device or may extract critical medical information of patient for misuse, Data Transparency because IoT service use patient sensitive data which is outsourced on IoT cloud so Data Transparency is must., mobility because IoT healthcare service support mobility of patient so that they can be connected to the healthcare service from anywhere any time, secure routing, scalability etc.

CONCLUSIONS

Various researchers from worldwide are inventing new application using current technologies to improve the healthcare services. This paper surveys various concepts related to IoT-based healthcare technologies. IoT can be used for pediatric and elderly care, chronic disease supervision, private

health, and fitness management. The technological combination of IoT and new upgradation in various medical devices like sensors, devices, internet applications, and other technologies allow researchers to invent affordable healthcare gadgets

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