

## Consociate Healthcare System through Biometric Based Internet of Medical Things (BBIOMT) Approach

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### Abstract

Internet of Medical Things (IOMT) or healthcare Internet of Thing (IOT) is a collection of medical devices and applications that connect the various healthcare systems based on IT through online computer networks. The devices are connected the output Wi-Fi allowing the M-M (machine to machine) communication through IOMT. IOMT provides various applications including remote patient monitoring (RPM), wearable fitness bands (WFB), hospital beds that are sensor equipped and many-more. IOMT allows communication of medical devices without the intervention of human. The widespread deployment of IOMT faces challenges of security, privacy, connectivity as well as compatibility. IOMT based systems suffer from various security breaches and hacking attacks. Traditional security measures of login/password do not compliment IOT based systems. So this research chapter proposes a novel Biometric Based Internet of Medical Things (BBIOMT) technology that is unique and spoof free. The BBIOMT approach eliminates shortcomings of traditional password schemes and offer a much superior authentication solution.

**Keywords:** IOMT, IOT, BBIOMT

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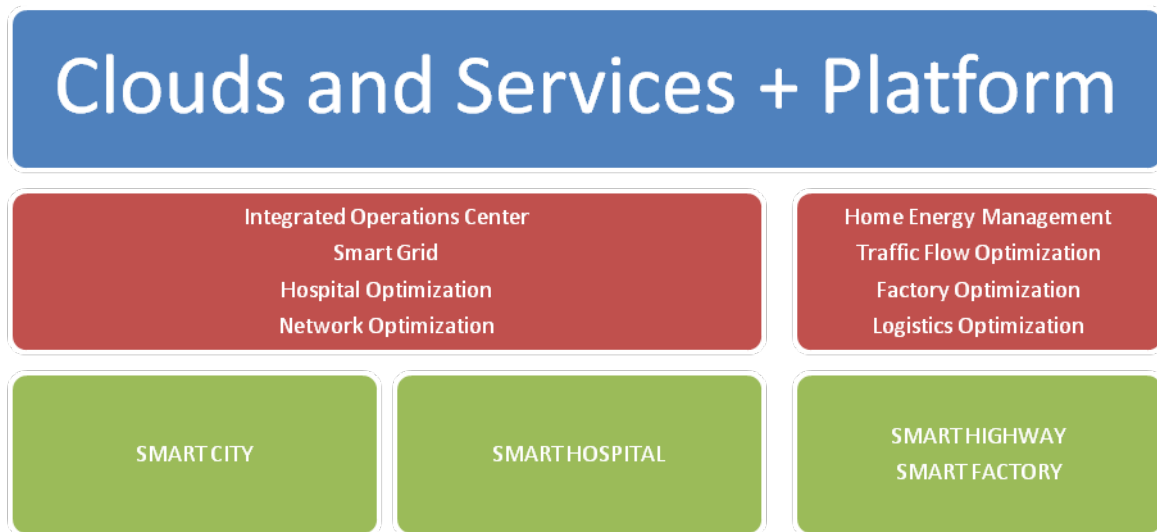
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### 1. Introduction

Enabling interaction of machine to machine and intervention of real time solutions to radically transform the delivery, affordability and reliability of healthcare in near future is the basic task of Internet of Medical Things (IOMT). Due to increased engagement of patients in decision making or

boosting compliance of healthcare service, leads to increase in technology adoption rate that will reach to about \$156 billion by year 2020. Figure.1 depicts utilization of IOMT devices and services currently and in near future (Anyia, O., & Tawfik, H, 2016)



**Figure 1.** IOMT Devices and Services

IOMT evolved from Internet of Things (IoT) having a complex architecture where multiple components keep on interacting, enabling in providing solutions for the end user. IOT is an interdependent system enabling real time data acquisition connectivity of devices, transfer of data and different analytics for controlling applications of end-user. A connected environment of cyber physical systems integrating data driven human and computer intervention that facilitates decision process is the basic workflow of IOT. Various technologies encompassed by IOT are:

- Smart Grids
- Intelligent Logistics
- Smart towns
- Integration of Data Analytics and Sensors

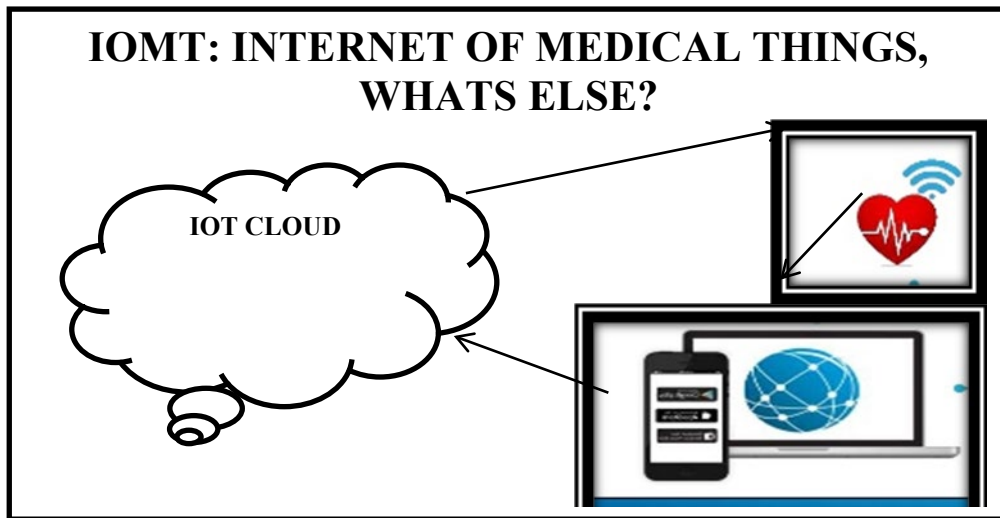
All the above technologies are augmented by:

- Actuators
- Communication Protocol Networks

The various industry segments where IOT is being utilized and will cause transformation in near future are:

- Manufacturing Industry
- Construction Industry
- Power Distribution
- Healthcare

IOMT is the healthcare application provided by IOT that develops a network comprising of real time sensing of vital data by connected devices. IOMT lead to personalized care for patients, hence providing a high standard of living, promoting individual patients regiment treatment that is data driven and also according to the physiological conditions optimizing the healthcare devices (Ashton, K., 2009). Figure.2 specifies importance of IOMT in medial industry.



**Figure 2.** IOMT the Need of Hour in Medical Industry

IOMT provides an ecosystem of connected health through affordable sensors, cloud networks and mobile big data domains. With increase in utilization of IOMT devices and services, leads to increased healthcare frauds which are treated as a white collar crime in present day world. It involves various filings of dishonest claims of healthcare, DOS and malware attacks on user sensitive data stored in healthcare database for profit turning or illegitimately accessing healthcare services. The healthcare frauds and attacks lead to intentional deception or misrepresentation of an individual's entity causing unauthorized benefits to an individual or an organization (Baker, L. A., 2014). Figure.3 depicts various parameters of attacks and frauds on IOMT devices and data.



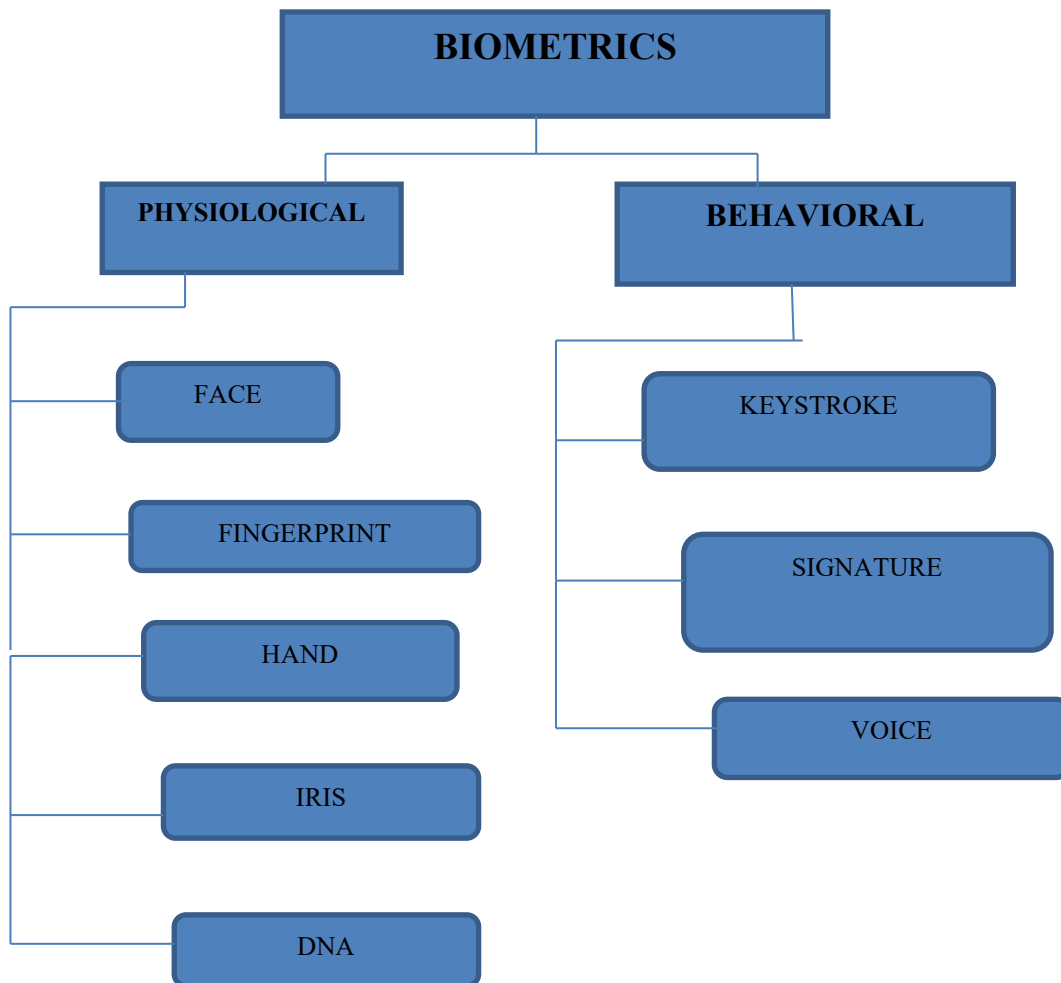
**Figure 3. Parameters of Medical Breaches**

<http://www.iritech.com/blog/biometric-healthcare/>

There are various forms of fraudulent health care schemes that include false statement, deliberate omission or misrepresentation by a healthcare recipient for gaining payable benefits. The attacks and frauds of IOMT are criminal in nature varying from state to state and country to country leading to deployment of “biometrics” as a security solution for this sector. Biometrics is defined as the measurable physical and behavioural characteristics of an individual for establishment and verification of its identity (J.Daugman 2004; Blair, L. M., 2016).The biometrics pattern includes:

- Fingerprint
- Iris Scan
- Palm Prints
- Gait
- Facial Recognition
- Voice Recognition

Figure.4 represents various biometric traits that are utilized for verification and authentication.



**Figure 4. Biometrics Traits Utilized for Verification and Assessment**

Biometrics science recognizes an individual based on his/her physical as well as behavioural traits. The Biometric Based Internet of Medical Things (BBIOMT) Authentication Systems are much more reliable than the traditional password systems for individual verification and ensuring their identities.

## 2. Internet of Things (IOT)

Today in the digital era, analysts evaluate that by year 2020 IOT development of remote associated gadgets will surpass the value of forty billion. IOT is an arrangement of computing integrated gadgets, mechanical and computerized machines and items, various creatures and individuals.

Various IOT devices, gadgets, machines, individuals, creatures are all furnished with an identifier that exchanges information along the system with no PC (Personal Computer) and human intervention. Figure.5 represents rise in Internet usage from year 2012 onwards that leads to development of IOT. IOT is gaining attention both at workplace and outside for impacting life and work. Use of IOT leads to reduced loss, costs, wastes and repairs, reviews and supplants items having new or past expiry dates. A basic example of IOT is a smart fridge causing alerts about no milk through the internal camera inside. This research study presents internet as an essential part of day-to-day life, future web-vision and security issues and other gigantic difficulties for IOT world (Brewka, G., 1996).

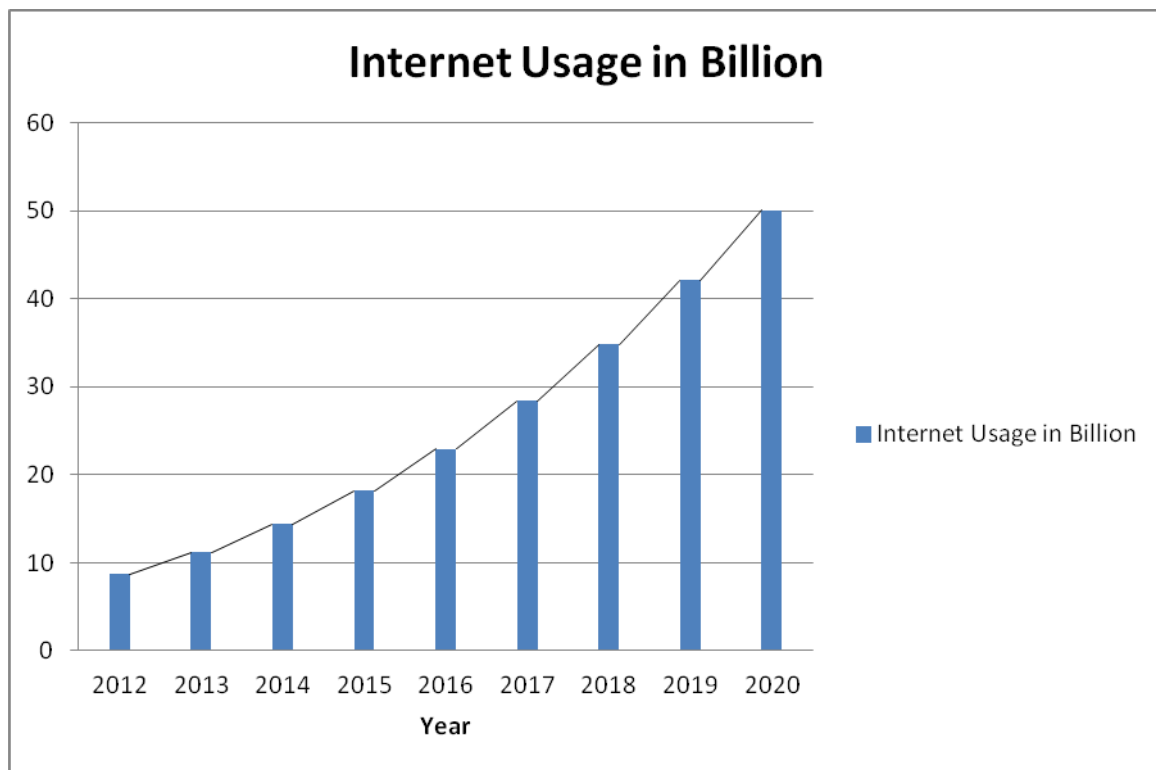


Figure 5. Rise in Internet Usage from Year

## 3. IOMT

Relating IOT to broad terms it's a collection of various interconnected devices and applications that are interconnected devices and applications that are linked through online network of computers. Its subdivision IOMT (Internet of Medical things) deals with the interconnection of medical devices and equipment that are related to Medicare-IT and Healthcare-IT. IOMT devices are equipped with a wi-fi or some near field communication (NFC)

technology that allows machine-to-machine (M-M) communication. 30.3% of IOT devices are utilized in healthcare. IOT economic impact is expected to rise from \$3 trillion-\$6 trillion in 2025, connecting about 31 billion devices and 4 billion people together. IOT in healthcare is predicted to raise around \$2.5 trillion by year 2025. Healthcare stands 3rd most utilized sector for IOT where around 60% of healthcare organizations are utilizing the Internet of Things technology and around 87% organizations are planning to implement the services of IOMT in their usage by 2019 making IOMT the most utilized technology







































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