Internet of Medical Things (IoMT)
Connecting Healthcare for a Better Tomorrow
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Introduction

The Healthcare industry has become more open to the latest technologies and IT services platforms, bringing drastic changes in the industry. Recent studies and statistics show that technological advancements are transforming the industry. Along with opportunities, certain concerns also arise.

What is IoMT or Internet of Medical Things?

IoT in broad terms is a collection of interconnected devices and applications which are linked through online computer networks. IoMT or internet of medical things is a sub division which deals with interconnected medical devices/ equipment and Medicare connected to Healthcare IT. Medical devices equipped with Wi-Fi or Near field communication technology allow machine to machine communication that is the basis of IoMT.

The IoT Market -
- 30.3% of IoT devices are used in healthcare since its introduction in the industry.
- The economic impact of IoT in all sectors will rise from about $3 trillion to $6 trillion by 2025.

Wearables and tracking devices
have become part of everyday healthcare processes, intertwined with an evolving healthcare delivery model. According to studies, wearable technology market is said to rise from $20 billion in 2015 to $70 billion in 2025. (1)

Patient centered care
which focuses on individual healthcare needs is found to eliminate or reduce unnecessary and costly treatment plans which need referrals to specialists.

Data security
is a big concern that everyone has, when dealing with huge amounts of data. Payers and providers are finding ways to increase data security and avoid violations of HIPAA and similar acts.

Increased data demands
is also a driving factor for the healthcare industry. 1 million GB is the expected amount of health care data generated by an individual in his/her lifetime. With such huge amounts of data available for determining every healthcare aspect of a person, from surgery plans to diet control, data needs to be warehoused and analyzed for getting the right healthcare approach.(2)

IoT started gaining prominence since 2011, and helped shape the functioning of various industries including Healthcare since then.
IoMT – New Advances in Healthcare

Clinical and home monitoring of patients has become more widespread with the growth of telemedicine:

Clinical Efficiency:
Hospitals and dedicated clinics are using connected objects to improve the delivery of Medicare. They can track treatments and perform automated electronic charting. Doctors can track patient visits and access EMR even from remote locations. IoT sensors can be used for location-tracking of patients and medical equipment in real-time. IoT has been used to develop pill bottles that tracks medicine adherence.

Consumer/Home monitoring:
IoT technology is directly marketed to consumers for self-monitoring and collecting biometric information. Eg: Smart thermometer which reads temperature using temperature sensors in smartphones or other devices. Nowadays, there are devices in the market that can get an ECG (electrocardiogram) at home. Such devices help track and collect patient information right from their homes and also assist in telemedicine services.

Presently, IoMT solutions offered by various organizations broadly fall under seven categories:

- Clinical Efficiency
- Consumer/Home monitoring
- Fitness wearables
- Infant Monitoring
- Biometric sensors/wearables
- Brain sensors/Neuro-technology
- Sleep monitors

The introduction of IoT made a world of connected devices and services that assist in providing care deliverance.

- Healthcare Industry stands as the third most advanced industry in IoT implementation, with 60% of healthcare organizations having introduced IoT already into their patient care activities.
- 87% of healthcare organizations across the globe plan to implement IoT related services by 2019, making IoMT one of the most sought after technology platforms in the next 2 years.
- Despite the concerns and possible issues, IoMT has helped in increasing workforce productivity, and has reduced Medicare costs considerably.
- 73% of the organizations utilize IoT for patient monitoring, according to studies.
- Security of sensitive medical data is a big concern. 89% of the healthcare IoT users have experienced some kind of a security breach.

31 billion devices and 4 billion people will be connected via IoT by 2020.
$2.5 trillion is the predicated global worth of IoT in Healthcare by 2025.
Advantages and Concerns

IoMT strongly impacts the Healthcare industry with certain advantages and a few concerns:

**Present day advantages:**
- Improved treatment outcomes as a result of round-the-clock patient monitoring and care delivery
- Decreased Medicare costs as real time and remote monitoring of patients is made possible, resulting in fewer clinic visits
- Visible improvement in disease management as patients are given care by careful real-time monitoring
- Enhanced patient experience as an individual gets complete and customized treatment and care
- Improved Drug management is another scenario that is possible as a result of IoT growth, where devices and applications can assist in drug research, deliverance and adherence.

**Concerns and future necessities:**
- New innovations in sensor technologies can drive the IoT platform forward
- Intelligent networks will be part of IoT in near future

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**Wearables are preferred by consumers over other IoT enabled devices, when it comes to everyday healthcare needs:**

**Biometric sensors/wearables:**
IoT can be implemented in connected biometric sensors for use in a clinical or hospital setting. Heart patches that monitor heart related readings, blood pressure reading armlets etc. can even be connected to clinical monitoring devices situated at a distant location. Recently, smartphone-enabled “auto-refractor” applications for vision testing are available.

**Fitness wearables:**
Fitness tracker/apparels or consumer wearables which can collect data and regulate the fitness regime of an individual are very much sought after in the market. These devices, connected with smartphone enabled applications, can track and give report on the fitness of an individual.

**The latest additions to IoMT are customized applications and devices for neural, infant and sleep monitoring:**

**Brain sensors/Neuro-technology:**
Researches are in progress to develop high-tech consumer-targeted cranial wearables. IoT devices capable of reading brainwaves, track and transmit mood-elevating neuro signals etc. can be used to help monitor the mental health of patients. Non-evasive neuro-tech (brain wave reading/recording) are also been researched on, which can be used for analyzing drug efficiency.

**Infant Monitoring:**
IoT enabled wearables which monitor and transmit infant’s moments, temperature, and sleep patterns to the parents’ hand held devices like smartphone is another application of this technology. It assists parents to be constantly aware of their baby’s physical condition, and respond accordingly.

**Sleep monitors:**
Sleep tracking and monitoring has been part of treating sleep disorders and other neuro-psychological disorders for years. IoT enabled devices can track and send continuous reports to clinicians situated at distant locations. Smart phone enabled applications which can be connected to hardware sleep monitors can further help in regulating sleep patterns without clinical help.
What we do at UST Global

At UST Global, we explore, innovate and contribute to the growth of IoT in every industry, including Healthcare.

Our solutions in the IoT space are focused on delivering enhanced and customized solutions for the future, and to tackle existing concerns.

- Developing high speed cloud computing platform can definitely assist in the growth of IoT
- Advanced analytics can help process large amount of data passing through IoT devices and use it as per need
- Stronger security should be provided to these devices so that consumer data is protected round-the-clock.

Integrate IoT and Big Data Analytics and help find means to analyze incoming data as it is collected and transported through connected devices.

E.g:Incoming data from monitoring a patient’s vitals in the hospital can be effectively collected, sorted, analyzed, stored and made available in a format which is easier to use for further treatment purposes.

Develop applications and device software for medical purposes which are enhanced or better versions of the existing ones.

E.g. Single wearable devices and smart phone applications which can monitor more than one physical activity, and collect and transport data to the main medical database of the individual.

Offer PaaS (Platform as a Service) by developing a high speed and highly efficient cloud computing platform, where users can have IoT applications running seamlessly by linking to it.

E.g. A cloud computing platform in which developers can build applications with social and mobile functionality, automatic data backup and which runs on the organization’s data center.

Addressing existing security concerns of IoT devices will definitely take us ahead of others in the race!

IoT and Cognitive computing together can create intelligent networks which learn from incoming inputs and respond accordingly to the user.

E.g. An IoT application which has a feedback system can give healthcare or fitness suggestions to the user based on the data collected. This can also act as a personal healthcare assistant, which regulates/schedules clinical visits, give diet control alerts and so on.

Instead of opting for private networks, collaborate with leaders in the IT services industry to create an open ecosystem with a standardized API which enables interoperability with a reliable and automatic patching system.

Devices must be well protected and tested before the final implementation, making sure that it adheres to all necessary security protocols. Connect these devices to secure networks alone. A collaboration between device manufacturers, enterprises and end users is necessary for this solution to take effect.
ABOUT UST GLOBAL®

UST Global® is a fast-growing digital technology company that provides advanced computing and
digital services to large private and public enterprises around the world. Driven by a larger purpose of
Transforming Lives and the philosophy of “fewer Clients, more Attention”, we bring in the entrepreneuri-
al spirit that seeks the fastest path to value in today’s digital economy. Our innovative technology
services and pioneering social programs make us stand apart.

UST Global is headquartered in Aliso Viejo, California and operates in 21 countries. Our clients include
Fortune 500 companies in Banking and Financial Services, Healthcare, Insurance, Retail, High Technol-
ogy, Manufacturing, Shipping, and Telecom. UST Global believes in building long-lasting, strategic
business relationships through agile and client-centric global engagement models that combines local
experts and resources with cost, scale, and quality advantages of global operations.

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