

INTERNET OF THINGS

Oblig 3 – s364520

Innholdsfortegnelse

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Clarifications

It has been strictly advised from the teacher that any other answers than the list of criteria and answers will not be included in the word count for this obligatory task. Therefore, this assignment will not include any unnecessary definitions, excluding important context terms, and previous curricular terms (such as IoT and IoE and etc).

IoMT (Internet of Medical Things)

The internet of Medical Things (IoMD) “is the network of Internet-connected medical devices, hardware infrastructure, and software applications used to connect healthcare information technology” (Ordr, u.d.). As imaginable the IoMT is irreversible and impossible to now live without. It has proven too many upsides and positive effects overall. However, some challenges occur when it comes to sharing and generating of data. It is not always easy to determine who legally owns what data. An example is demonstrated by Ordr:

“If a city-owned medical device captures data from a patient, stores the data in a third-party cloud application, and shares the data with a private healthcare organization ... who owns the data? The city? The patient? The software provider? The healthcare organization?”
(Ordr, u.d.).

How the data is used can variate, but the owner still has the right to delete the data, and that can be complicated due to potentially constant replications on the internet.

How is Internet of Hospital (IoH) an IoT example and what functionalities does it offer?

Prior to Internet of Things, before a certain time, physician and patient interactions were solely limited, and it really was impossible to over time and distance continuously monitor patient health's.

In addition to the remarkable increase of interactions between doctor-patient, IoT has secured the potential for "healthcare that benefits patients, families, physicians, hospitals and insurance policies" (Head & Jindal, u.d.). Even with medical development and the technology rising, the remote monitoring decrease the economical expenses, and hospital stays are furthermore abbreviated for patients. Not only does the hospital boards benefit from the costs, but the mortality rates are improved, due to better prognosis for the patients. Internet of Hospital can be vaguely distributed into Internet of Patients and Internet of Physicians, then making these factors being dependent of one another, and creating a system.

Internet of Patients covers the end of medical technology at its best. It's a win-win situation where companies that makes medical products earns on it, the patient saves medical appointment costs, and the doctors can focus on the acute services that needs to be provided. The medical components can be such as blood-sugar measurers, fitbits, heart rate counting's and calorie monitors.



Internet of Physicians is related to the system with home monitoring equipment's, giving control over every patient, and is therefore embedded with IoT (Rimbey, u.d.). IoT enables a friendship with the attendings and doctors, and they together work in treating patients.

What data is collected, what actions follow from it, and the useability of IoH

In the IoMT field there is a lot of data collection such as glucose monitoring, heart-rate monitoring, hand hygiene monitoring, depression and mood monitoring and Parkinson disease monitoring.

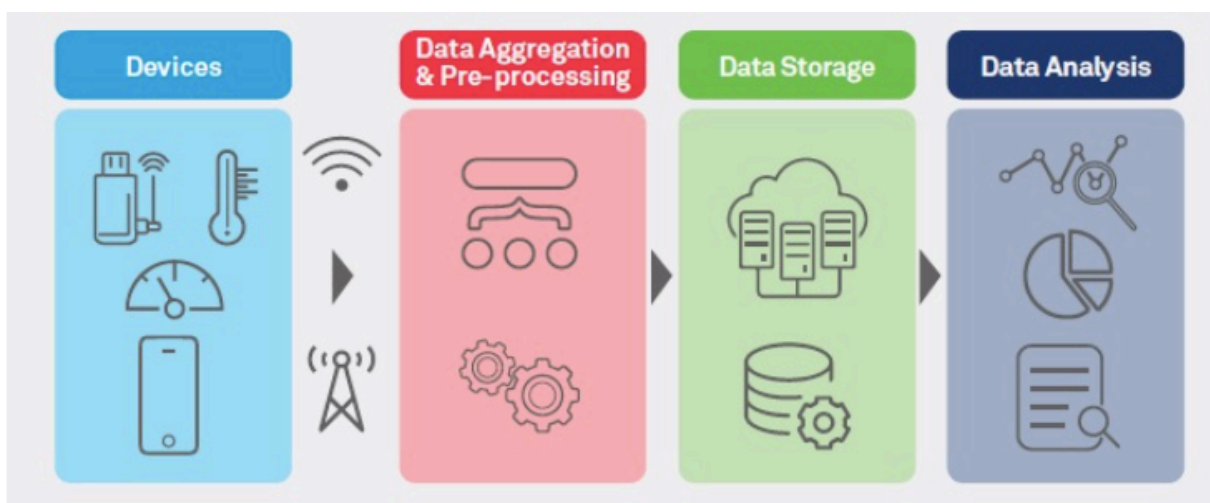
Some examples where IoT and IoMT meet can be connected inhalers: that help patients monitor frequent attacks, as well as collecting this data to understand what triggers these, ingestible sensors: making it possible to gather information from digestive and other systems in the human body with less invasive ways rather than cameras or probes stuck down the throat. There are several companies that are working hard with inventing devices that are

minimally enough to be swallowed easily and to also be able to dissolve or pass through the digestive system itself safely (Ordr, u.d.).

There is also something called “connected contact lenses” for collecting “healthcare data in a passive, non-intrusive way” (Ordr, u.d.). It is also possible that these include microcameras which can make the user take pictures with their eyes, something that Google also have (Cowan, 2014).

In addition to improving of quality life there are other areas where IoT devices and the system plays huge parts in being useful. A combination of IoT devices and sensors are to be found in multiple places in a hospital and boosts “tracking of real time location of medical equipment like wheelchairs, defibrillators, nebulizers, oxygen pumps and other monitoring equipment” (Head & Jindal, u.d.). Where the staff are deployed, at what time, and how they can be paged through pocketdevices, has turned out to be some of the most effective methods of communicating during situations, and is called “Hospital Pager System” (Cornell, u.d.). All logistic data will mostly be stored and collected from the IoT devises to assist physicians with efficient prognose and treatment processes.

When it comes to IoT can health insurance companies grasp data through hospital devices, and leverage these for “their underwriting and claims operations” (Head & Jindal, u.d.). Insurance companies may therefore offer rewards to their users and share the stored data from the IoT devices, which will furthermore be used for statistics and data science.



The Four stages of IoT solutions.

According to Wirepro, a modern high-tech enterprise, IoT consists of four layers:

1. Deployment (with interconnected devices that collect data such as sensors, actuators, monitors etc.), (Wirepro, u.d.).
2. Data that needs to be aggregated and “translated” into the digital language for data processing afterwards.
3. The pre-processed data from step two is digitalized and is rerouted to the center of Cloud.
4. “Final data is managed and analysed at the required level. Advanced Analytics, applied to this data, brings actionable business insights for effective decision-making” (Head & Jindal, u.d.).

By less costs due to hospital visits, better treatment and care, and real-time tracking on healthcare providers, Internet of Things is redefining the entire healthcare industry. Some of the major advantages, according to wiPro, include:

- ⇒ Mistake reduction: data registered from IoT devices collected and improving mistake rates, providing better healthcare
- ⇒ Equipment: keeping track on real-time levels of drugs by connection to medical equipment leading to better prognosis
- ⇒ Quick disease diagnosis: technology developed so that imaging and scans can help discover problems that the human eyes cannot find. Helping healthcare providers to keep track of problems, and any change in the health of the patient. This is also the main tool that physicians use.
- ⇒ Cost reduction: fewer hospital visits, less admissions therefore leading to a reduction in healthcare costs

An example of the how useful IoH is: Robotic surgery

One of the many connections that IoT and IoMT has include robotic surgery. Robot assisted surgery helps physicians to perform many types of different surgeries, and gain control over vaster areas that are much harder to reach than usual. These types of surgeries are minimally invasive and reached through tiny incisions, however it can be exploited with open surgical procedures as well.

A robotic surgical kit may include mechanical arms with camera so that the surgeon has insight on every move. The advantages with robotic surgery can be less pain, quick recovery, less blood loss and minimal scarring (Shelby, 2021).



Ways IoT can improve care for aging populations

The world's population is constantly expanding, baby boomers have reached a critical inflection in healthcare, with the largest generation alive of 72 million people, and they are in necessity of more care. Caring for members who are not there full-time, in addition to not having full time nurses, technology can help to adapt care into such routines. The first way can be confirmed quality care by adapting IoT connected timecard readers that watch, and bill based on how long nurses have been precisely. Not only can one save money by this but also get the patient care they need.

According to *U.S. Centers for disease Control and Prevention*, one in four Americans (older than 65) fall each year. According to *HIT Consultant* “the total cost of these fall-related injuries was \$50 billion in 2015—and the financial toll is expected to increase as the population ages, expected to reach \$67.7 billion by 2020” (Prince, 2020). Wearable IoT devices with connected technology can assist related to these dangerous injuries and prevent medical expenses. Such IoT devices have long lasting times and often can one charge last for months.

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