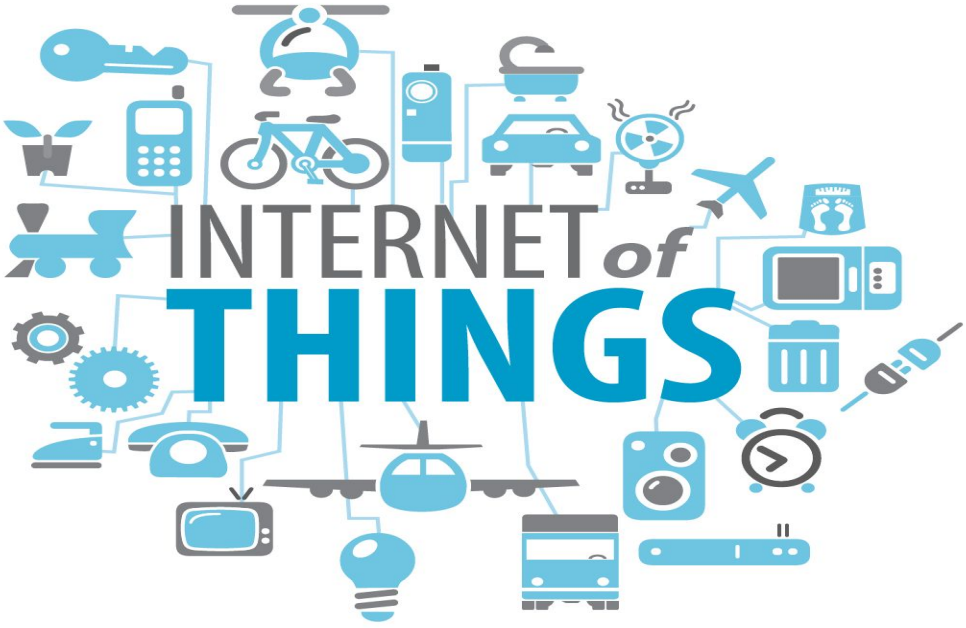
Assignment 3

Research on Internet of Things



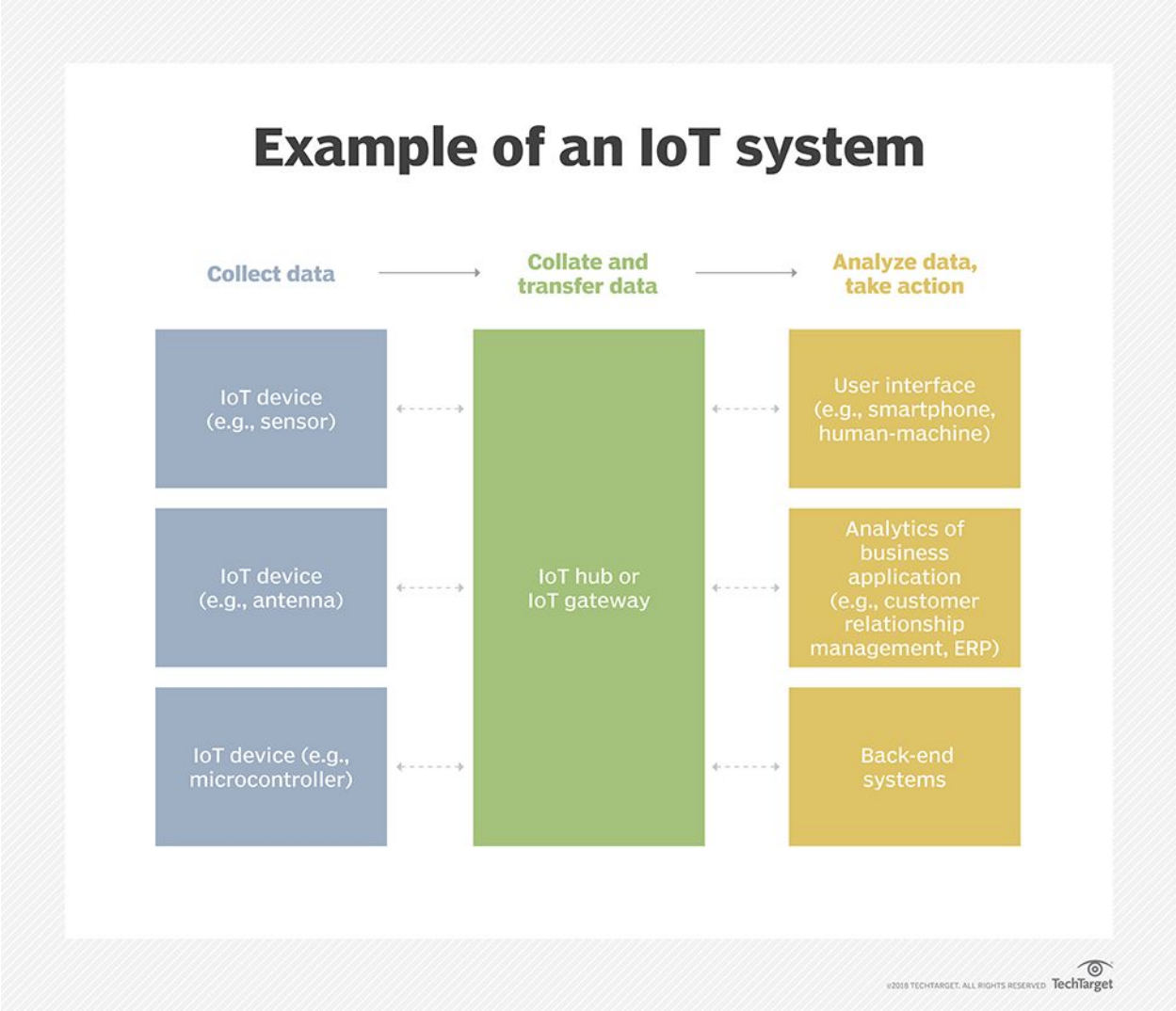
About Internet of Things(IoT)

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.[1] A thing in the internet of things can be an automobile that sends out an alert notification when tire pressure goes low due to built-in sensors, a man with implanted heart monitor, a biochip transponder in a field animal, or any object that carry and transfer data over a network and can be assigned with an IP address.

Most data on the Internet is generated and consumed by machines instead of people. Transmitting and communicating data between machines help improve the quality of the functionality it provides to the people. Wifi is the most common Internet technology used by smart devices to communicate with each other. Cloud is also one of the very common sources of Internet technology. Use of IoT has increased in organizations because it helps operate industries in a much more efficient way by helping them better understand their customers and to deliver enhanced customer service and eventually increase the value of the business.

In simple words, the idea behind IoT is to basically connect any machine to the Internet with an on and off switch. Including everything, starting from cellphones, washing machines, lamps, coffee makers, headphones, wearable devices and almost anything and everything a person can think of. The concept f IoT is not just limited to machines, it is also applied to parts of machines, for instance, the drill of an oil rig or a jet engine of an airplane. Anything that has on

and off switches has a high probability of being connected to the IoT. The Internet of Thing is an enormous network of connected "things" (including people). The relationship can b of the form people-things, people-people and things-things.



https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT

History of IoT

Kevin Ashton, inventor of the Internet of Things

Image Source: https://goo.gl/images/Dkv1Do

Kevin Ashton, the co-founder of the Auto-ID Center at MIT, first mentioned the internet of things in a presentation he made to Procter & Gamble (P&G) in 1999. Wanting to bring radio frequency ID (RFID) to the attention of P&G's senior management, Ashton called his presentation "Internet

of Things" to incorporate the cool new trend of 1999: the internet. MIT professor Neil Gershenfeld's book, When Things Start to Think, also appearing in 1999, didn't use the exact term but provided a clear vision of where IoT was headed. (2)

The IoT has been just recently got around. It has emerged due to a merging of varied technologies, including embedded systems, commodity sensors and wireless telegraphy, and the most critical of all, the Internet. The Internet began out as a section of Defense Advanced Research Projects Agency(DARPA) in 1962 and in 1969 developed in as ARPANET.

The first IoT machine, for instance, was a Coke dispenser machine at Carnegie Mellon University(CMU) in the early 1980s. With the help of the web, programmers would verify the status of the device and decide if there would be a drink expecting them and if they should to make a trip to the dispenser machine.
The evolution of IoT was from devices connecting to each other via a network with no human interaction i.e. machine-to-machine(M2M) communication. M2M is connecting a machine to the cloud, collecting data and then managing it.
Taking M2M to the next level, Internet of Things is a sensor based network of millions and billions of smart devices that help connect people to the system and other machines to collect and manage data. As its base, M2M communication offers the connectivity that facilitates IoT. However, until the middle of 2010, the concept of the IoT didn't really come into its own. It's only when the Chinese government announced it would give IoT a strategic priority in its five-year plan it gained popularity.

Applications of the Internet of Things(3)

This fresh flow of connectivity is beyond smartphones and laptops, it’s moving in the direction of smart homes, smart cities, connected cars, connected healthcare, and connected wearables. In accordance with the Gartner report, by 2020, across all technologies, the number of connected devices will reach up to 20.6 billion. A small survey was conducted by HP to estimate the rise in the number of connected devices over the years beginning from the year 1990 and estimating the number in the year 2025. The results of the survey are as follows:

YEAR	NUMBER OF CONNECTED DEVICES
1990	0.3 million
1999	90.0 million
2010	5.0 billion
2013	9.0 billion
2025	1.0 trillion

Image Source:https://www.analyticsvidhya.com/wp-content/uploads/2016/08/Iot2.png

Also, as per the Cisco Report to measure the impact of IoT on the economy suggest that IoT will make $14.4 trillion across all the industries in the coming decade. Following is the glimpse of how applications of IoT will help transform different sectors:

Smart Home: The smart home is likely the most popular IoT application at the moment because it is the one that is most affordable and readily available to consumers. From the Amazon Echo to the Nest Thermostat, there are hundreds of products on the market that users can control with their voices to make their lives more connected than ever.

Wearables: Watches are no longer just for telling time. The Apple Watch and other smartwatches on the market have turned our wrists into smartphone holsters by enabling text messaging, phone calls, and more. And devices such as Fitbit and Jawbone have helped revolutionize the fitness world by giving people more data about their workouts.

Smart Cities: The IoT has the potential to transform entire cities by solving real problems citizens face each day. With the proper connections and data, the Internet of Things can solve traffic congestion issues and reduce noise, crime, and pollution.

Connected Car: These vehicles are equipped with Internet access and can share that access with others, just like connecting to a wireless network in a home or office. More vehicles are starting to come equipped with this functionality, so prepare to see more apps included in future cars.

Internet of Things Benefits:[(4)]

IoT has displayed a tremendous potential to alleviate daily activities, make humans understand how technology can help change their life in a good way by making smarter devices. It has proved itself to be impactful, which simply comes from a huge list of perks that it has, few of which are:

Benefit 1: Safety, Comfort, Efficiency
Imagine measuring and managing hazardous environments while juggling many factors and without putting people at risk. Optimizing all physical environments for comfort and productivity. Also, control those energy costs. Now imagine monotonous tasks automated and done by machines. For example, smart assembly lines could report errors in real time. This produces higher yields and less downtime.

The result is more time for productive and rewarding work. This would drive higher employee satisfaction and retention, while dramatically improving profit margins.

Benefit 2: Better Decision Making
If you can analyze larger trends from empirical data, you can make smarter decisions. This takes assumptions off the equation. Instead, it's giving you data-backed visibility into every aspect of your business. Consider testing cycles. They would radically shorten, lowering the costs to optimize a process. Also, the visibility into system behaviors can yield new insights and ideas. This can guide your business like never before.

Benefit 3: Revenue Generation
At first, the above benefits will impact your bottom line by reducing expenses. The IoT will also help to improve efficiency. But, it's only a matter of time before IoT data analysis helps you realize new business functions. Also, this will lead to new revenue opportunities. The IoT may be that special "X factor". It's uniqueness gives many organizations a strategic advantage over the competitors. This advantage will be valuable to companies now and into the next decade.

Internet of Things Unintended Consequences[(4)]:

Threat 1: Security and Privacy

The hacking of companies
Stolen Identities
The hijacking of app-connected cars

These scary events are all enough to cause some serious anxiety. It is not difficult to understand how digitally-connected things have definite security risks. Often, default device settings equate to "wide open". Many organizations don't have strong security protocols in place. This is even when access controls are present. This is the IoT equivalent of having a username/password combo of "admin" and "password".

Even if you're savvy enough to configure the connected device the right way, other gaps exist. Connected device manufacturers are often slow to update firmware or release patches. These companies may not provide support at all. Instead, they prefer to resolve security issues with the next version of the "thing". So, security and privacy on your network of things has to be your responsibility. This may seem unfair as you are the user implementing the tech.

Internet of Things Outcome:

The internet of things attracts a huge amount of audience. This new technology affects each of them by the potential effects that it shows. Emerging consensus prove that very soon, virtually, all walk of life and business will be soon transformed by IoT, including major sectors like supply chain management, agriculture, manufacturing, transportation, household living, and health and wellness. IoT has had major effects in the area of the following sectors:

Global Society

If society cares a little more about its data protection, privacy, and other social issues of the Internet of Things then opinion, public attitude, and behavior will be considered critical, as crossed by the possible benefits in terms of safety, lower costs, and energy conservation. When we look back at the development of the Internet of People, it is evident that how rapidly society has changed also, the techniques of accessing information from a variety of sources

Creation of huge quantities of data could be a major source of IoT related problem. Data that hold no importance but are still generated can be misused in ways that may lead to false conclusions. But, to look on the brighter side, data from everyday work and life can lead to great opportunities to find life-changing inferences.

Government

Government agencies are working actively to accomplish quality services in an environment that is getting complicated as each day passes by. To add value to citizens, streamline processes, enhance capabilities, the public sector is trying hard to apply IoT technology.

One small security breach can lead to the entire system. One reason for this could be the different ways the Internet of Things affects the discreteness and confidentiality of critical information received by the government. The support of the government is a must for applications such as smart cities to succeed. A number of activities in the government too can make use of Internet of Things to streamline their methods and decrease financial burden and assist the citizen in a better way

Businesses

A very thin line exists between the Internet of Things and a business that can lead to making and breaking one's business. If applied in as suggested, IoT impact can lead businesses in ways that may lead to huge profits. The volume of data that is collected can help discover different business insights that the higher management would never know about, only if it is analyzed the right way. Knowing everything in your business, this is what the internet of Things aims to bring in a person's life irrespective of the distance.

Citation:

(1)Rouse, M. (2018, June). Internet of Things. In *Internet of Things*. Retrieved October 21, 2018, from https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT

(2) Rouse, M. (2018, June). History of Internet of Things. In *Internet of Things*. Retrieved October 21, 2018, from https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT
(3) Meola, A. (2016, December 18). Application of IoT. In *Internet of Things devices, applications & examples*. Retrieved October 30, 2018, from https://www.businessinsider.com/internet-of-things-devices-applications-examples-2016-8
(4) Atlantic BT, (2018, May 7). Benefits of IoT. In *3 Threats and 3 Benefits of the Internet of Things*. Retrieved October 27, 2018, from https://iot-analytics.com/10-internet-of-things-applications/