An overview of the Internet of Things

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About IoT

The internet of things (IoT) is a network that connects various types of devices, such as computers, mechanical and digital machines, objects, animals, and even humans, each of which is assigned a unique identifier (UID) and has the ability to exchange data with other nodes in the network without the intervention of a human. The term "things" in the context of the internet of things refers to any additional either natural or artificial objects that can be given an Internet Protocol (IP) address and transmit information across a network. Examples of such objects include a human with such a heart rate monitor transplanted, a farm animal with a biosensor navigation system, a car with installed sensor devices to alert the driver of low tyre pressure, and so onto. Businesses in a variety of sectors have increased their usage IoT to enhance the economy, acquire insight into their consumers so they can deliver quality service, make more informed choices and eventually improve the value of their company Dinesh, et.al. (2018); Tyagi & Kumar (2017).

Working System of IoT

An Internet of Things (IoT) ecosystem is made up of web-enabled gadgets that use embedded systems like processors, sensors, and physical gadgets to gather, send, and react to data from their surroundings. IoT devices connect to IoT gateways or other user equipment to exchange sensor data, which is then either forwarded to the cloud for study or method based. These gadgets converse periodically with other similar devices and take action on the data they exchange.

Figure 1: Internet of Things

Whereas consumers can interact with the equipment to build them up, provide instructions, or get data (Fig. 1), the devices primarily function without their assistance. The specific connectivity, networking, and modulation schemes used with these browser devices are greatly influenced by the IoT applications that have been deployed. In order to facilitate the data collection process and make it more dynamic, IoT can also leverage artificial intelligence (AI) and machine learning Varshini, & Karthikeyan, (2019).

Importance of IoT

According to a breakdown by Priceonomics, by 2020, there would have been over 50 billion Internet of Things devices, and this will have resulted in 4.4 zettabytes of data. To put it in perspective, in 2013 the Internet of Things produced 100 billion gigabytes of data, whereas a zettabyte is equal to one trillion gigabytes. The potential earnings in the IoT sector are also enormous, with predictions placing the market's worth in 2025 anywhere from $1.6 trillion to $14.4 trillion. By 2025, IoT Analytics Research projects that there will be 27 billion IoT connections (not including PCs, Macs, smart phones, or tablets). The persistent chip scarcity, which the business believes will affect the number of linked IoT devices beyond 2023, led to a reduction in the company's prediction. Smarter living and working, as well as more independence, are all possible thanks to the IoT. The Internet of Things is not only useful for home automation thanks to the

smart gadgets it provides, but it is also crucial for commercial enterprises. IoT, which contains information on everything fromperformance, reliability, availability and logistics activities, allows organisations to examine their systems in real time. Businesses may streamline operations and reduce overhead costs with the use of IoT. It lowers the cost of production and distribution, improves service delivery, and provides transparency into client interactions. As more organisations recognise the potential of connected devices to maintain their competitiveness, IoT is poised to continue expanding crucial technologies of daily life Tyagi & Kumar (2017).

Devices with IoT Examples

Any device that can gather and transmit data about the actual world is welcome to join the Internet of Things.Some examples are RFID tags used in retail and industrial sensors used in factories. These sensors have a wide variety of uses, from tracking temperatures and pressures in factories to checking on the health of patients and tracking their water and energy consumption. A wide range of autonomous vehicles and robots used to transport goods around factories and warehouses can be categorized as IoT devices. In cities that are experimenting with smart city ecosystems, Internet of Things (IoT) and machine-to-machine (M2M) sensors are enabling applications like traffic monitoring, street light control, and crime prevention through video feeds.Wearable fitness trackers and home security systems are two more examples. In addition, you may construct your own IoT endpoints using more general devices like the Raspberry Pi or Arduino. In addition to serving as a portable computer, smart phone may also be transmitting information about your whereabouts and actions to servers in a manner reminiscent of the Internet of Things Tyagi & Kumar(2017).

Organizational Benefits of IoT

There are several ways in which businesses might profit from the IoT. There are certain advantages that are only relevant to one sector, while others may be used in several. Common IoT advantages allow companies to do things like:

- Keeping a close eye on their business's entire operations;
- Boost the quality of the client service you provide;
- Budget effectively by saving money and time;

- Boost worker efficiency;
- Combining and modifying existing business concepts;
- Improve decisions related to business; and
- Increase your earnings.

The Internet of Things (IoT) inspires organizations to reevaluate their operations and provides them with the resources they need to enhance their operational strategy. Using sensors and other IoT devices, manufacturing, transportation, and utility companies dominate the IoT landscape. However, IoT has also found uses in the infrastructure, smart appliances, and agriculture industries, leading to a digital transformation in some of these industries

Routh & Pal, (2018)

The Internet of Things (IoT) has the potential to simplify farming for farmers. Rainfall, humidity, temperature, and soil composition are just some of the variables that may be monitored by sensors to inform automated farming practices. The Internet of Things is useful because it allows for better infrastructure monitoring. Buildings, bridges, and other infrastructure might be monitored for events or changes using sensors. The elimination of paper from the workflow process is only one of the many positive side effects of this development. To keep tabs on and adjust the building's electrical and mechanical systems, a home automation company can employ the Internet of Things. Broadly speaking, smart cities may aid residents in cutting down on garbage and utility bills. Businesses in the medical field, financial sector, retail sector, and manufacturing sectors are not immune to the effects of the IoT technologies. Routh & Pal, (2018)

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Industrial IoT

Connected sensors and instruments for machines in the transportation, energy, and industrial sectors make up the IIoT, a component of the Internet of Things. Some of the most established parts of the IoT industry are found in the IIoT, including the successors of devices that were in use long before the IoT term was coined. Some IIoT devices have a lifespan of 10 years or more,

making it challenging to upgrade to newer platforms that may be more compatible with their current technology.

Consumer IoT

Although the consumerization of IoT is relatively new, the impact it has had on people's daily lives has been profound. Wearable fitness trackers are only one example of a connected item; internet-enabled thermometers are another. The home assistant, such as Amazon Alexa or Google Home, is likely the most well-known IoT device for consumers.

Benefits and Drawbacks of IoT

A few benefits of the Iot technology include the ones listed below:

- Flexibility in accessing data regardless of location or device;
- Enhanced ability for electrical gadgets to talk to one another;
- Transport of data packets through a network, which can reduce costs and wait times; and
- By eliminating repetitive operations and minimizing the need for human interaction, automation may help businesses enhance the quality of their services while saving money.

The following are a few advantages of the Internet of Things:

- The likelihood that a hacker may obtain confidential info rises as there are more connected devices and more data being transmitted between them.
- Businesses may eventually have to manage a large number of Iot nodes, making it challenging to gather and handle the data from every single one of them.
- If a system fault is present, all connected devices are susceptible to corruption.
- Due to the absence of a global standard for interoperability for the Internet of Things, connecting devices from different manufacturers might be difficult.

IoT Security and Vulnerabilities

When it comes to safety, Internet of Things gadgets have a poor reputation. "General use" machines like PCs and cell phones are engineered to survive for years and offer advanced, user-friendly operating systems with built-in automatic patching and security capabilities. Devices used in the IoT, on the other hand, are often more simplistic in nature, running on bare-bones operating systems. They can't be patched, monitored, or updated because they're made for one-off activities and minimum human engagement. In the end, many IoT devices are running a version of Linux, and this, along with the many network ports they offer, makes them easy pickings for hackers.The Mirai botnet, which launched one of the greatest DDoS assaults in history, is a prime example of the dangers of using default passwords on devices like home security cameras and baby monitors Zhang, et.al, (2014).

References

1. Dinesh, K., Gobinath, M., &Subathra, M. (2018). A survey on Intelligient internet of things-technology and its application. 2018 InternationalConference on Inventive Research in Computing *Applications.(ICIRCA)*. https://doi.org/10.1109/icirca.2018.8597205

2. Routh, K., & Pal, T. (2018). A survey on technological, business andsocietal aspects of Internet of things by Q3, 2017. *2018 3rd International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU)*.https://doi.org/10.1109/iot-siu.2018.8519898

3. Tyagi, V., & Kumar, A. (2017). Internet of things and social networks:A survey. *International Conference on Computing, Communication and Automation (ICCCA)*.https://doi.org/10.1109/ccaa.2017.8230013

4. Varshini, R., &Karthikeyan, A. (2019). Internet of things –Evolution,

architecture and real time application- Survey. *2019 International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN)*. https://doi.org/10.1109/vitecon.2019.8899584

5. Zhang, Y., Zou, W., Chen, X., Yang, C., & Cao, J. (2014). The security forpower Internet of things: Framework, policies, and countermeasures. *International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery*. https://doi.org/10.1109/cyberc.2014.32