

Internet of Things(IoT)-Overview

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Abstract: The Internet of Things(IoT) gives is the inter-networking of physical devices, buildings and other items-embedded with electronics, sensors, actuators and network connectivity that enable these objects to generate, exchange and consume data with minimal human intervention. This paper gives an introduction to Internet of Things(IoT).

Index Terms: 5G; Internet of Things(IoT); Smart Home; Smart wearables.

1 INTRODUCTION

The Internet of Things (IoT) is an emerging topic which includes the entire world. This technology includes a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. It is going to transform many aspects of the way we live. For consumers, new IoT products like Internet-enabled appliances, home automation components, and energy management devices are moving us toward a vision of the "smart home", offering more security and energy efficiency. Other personal IoT devices like wearable fitness and health monitoring devices and network enabled medical devices are transforming the way healthcare services are delivered. This technology promises to be beneficial for people with disabilities and the elderly, enabling improved levels of independence and quality of life at a reasonable cost.

The platform that support such an environment is obviously High speed Internet which should become a utility. IoT will not be seen as individual systems, but as a critical, integrated infrastructure upon which many applications and services can run.

2 WORKING

Devices and Objects with built in sensors are connected to an IoT platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.

These powerful IoT platforms can pinpoint exactly what information is useful and what information can safely be neglected. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.

Simply, we can say that the IoT enabled devices gather, process information. It will detect the defects, patterns and make possible recommendations which are to be followed by a user as per his/her wish.

3 COMMUNICATION MODEL

There are four types of communication model which are used commonly by IoT devices:

3.1 Device to Device Communication: In this 2 or more devices can directly connect and communicate with each other rather than through intermediate application server. They can communicate using different types of networks and they use protocols like Bluetooth ^[1], Z-Wave ^[2] or Zig Bee ^[3] to establish direct device-to-device.

3.2 Device to Cloud Communication: In this communication model, the IoT device connects directly to an Internet cloud service like an application service provider to exchange data and control message traffic. This approach uses existing communications mechanisms like traditional wired Ethernet or Wi-Fi connections to establish a connection between the device and the IP network, which connects it to the cloud service.

3.3 Device to Gateway Model: In this the IoT device connects to application-layer gateway which acts as an intermediary between the device and the cloud service and provides security and other functionality such as data or protocol translation. This model is found in many consumer services.

3.4 Back End Data Sharing Model: The back-end data sharing model refers to a communication architecture that enables users to export and analyze smart object data from a cloud service in combination with data from other sources. In this the user allows the third parties to access the uploaded sensor data.

4 RELATION BETWEEN IoT AND 5G

Higher bandwidth will truly power our constantly connected world.

When 5G, the fifth generation of wireless communication, arrives in 2020, engineers expect that it will be able to handle about 1000 times more mobile data than today's

cellular systems. It will also become the back bone of Internet of Things(IoT), linking up fixed and mobile devices becoming part of a new industrial and economic revolution. Actually 4G is good for now, however if you would look at it in five or ten years, 4G will obviously not be able to meet requirements for new applications coming up in the next few years. With 5G we will increase the data rate, and improve coverage. These properties are particularly important for many applications related to IoT. An example is that a lot is happening with interactive mobile games, which are really band width hungry. Unfortunately, the current 4G cannot support them.

We think the Internet of Things will be the ideal application of 5G. What currently stands in the way of the IOT are disconnected systems. For example, we have smart watches which use short-range communication like Bluetooth and this could be a problem in the future if we talk about a bigger picture like a smart city, where a unified framework for seamless connection is required. 5G is a good opportunity to provide this unified network.

5G represents the next generation in telecommunications data transmissions beyond the leading 4G Long Term Evolution (LTE) standard. As of right now, there is no single 5G standard and the 5G ecosystem is still under development. Don't expect to see widespread 5G rollouts until around 2020, when 5G will start to play a greater role in the emerging IoT landscape. In the meantime, most businesses and consumers will continue to rely on 3G, 4G, 4G LTE, Wi-Fi and satellite networks for connectivity.

Along with 5G connectivity comes faster data transmission speeds, along with much lower latency. Right now, for instance, the fastest fiber broadband speeds currently being offered in India are hovering around 1 Gbps. 5G connectivity could enable speeds of up to 10 Gbps.

Samsung showcased the power of 5G connectivity at Mobile World Congress this year when the company demonstrated a 5G-enabled robot arm measuring at a speed of 0.75 percent latency that was able to track and catch a moving ball. Interestingly, when the robot was equipped with 4G LTE with 25 milliseconds of latency, it was unable to catch the ball. So as you can see, 5G is critical for enabling certain advanced IoT use cases that require ultra-fast response times.

5 APPLICATIONS

5.1 SMART HOME: Smart home is the residential extension of building automation. It involves the control and automation of lighting, heating, ventilation, air conditioning and security, as well as home appliances such as washer/dryers, ovens or refrigerators/freezers. They use Wi-Fi for remote monitoring and are a part of

the Internet of things. Modern systems generally consist of switches and sensors connected to a central hub sometimes called a "gateway" from which the system is controlled with a user interface that is interacted either with a wall-mounted terminal, mobile phone software, tablet computer or a web interface, often but not always via internet cloud services.

5.2 SMART WEARABLES: These are smart electronic devices that can be worn on the body as implant or accessories. The designs often incorporate practical functions and features. These are installed with sensors and software's which collect data and information about the users. The data is later pre-processed to extract essential insights about user. These devices mainly cover the fitness, health and essential requirements. The pre requisite from IOT technology for smart wearables is to be highly energy efficient and small sized.

5.3 SMART CITY: It is another powerful application of IOT generating curiosity among world's population. Smart surveillance, automated transportation, smarter energy management systems, water distribution, and environmental monitoring all are examples of IOT applications of smart cities. IOT will solve major problems faced by the people living in cities like pollution, traffic congestion and shortage of energy supplies etc.

The future of IoT is more fascinating than this where billions of things will be talking to each other and human intervention will become least. IoT will bring large difference in the way we live and work. There are many more areas where IoT is making an impact. Networked Toys is one application of IoT which will change the playing experience of your kids. IoT can also be used in the detection of environmental issues.

6 SECURITY & PRIVACY

The IoT is connecting more devices every day and we are headed for a world that will have 24 billion IoT devices by 2020. This growth carries several benefits, as it will change the way people carry out everyday tasks and potentially transform the world.

But with all of these benefits comes risk, as the increase in connected devices gives hackers and cyber criminals more entry points.

Suppose a hacker gets into a smart home and hacks the oven present in the home. The hacker can blackmail the house owner to give him some money for not blowing his

house. It can also be the other way around like he can blackmail them to post their information into the public domain for some ransom.

6.1 SECURITY ISSUES:

6.1.1 PUBLIC PERCEPTION: If the IoT is ever going to take off, this is the first problem that the manufacturers address. Many people are in a fear that the possibility of their information getting stolen from their smart home, and with that worry consumers would be afraid to purchase connected devices.

6.1.2 VULNERABILITY TO HACKING: Researchers have been able to hack into real, on-the-market devices with enough time and energy, which means hackers would likely be able to replicate their efforts.

6.1.3 TRUE SECURITY: Securing IoT devices means more than simply securing the actual devices. Companies build security into software applications and network connections that link to those devices.

6.2 PRIVACY ISSUES:

6.2.1 TOO MUCH DATA: The sheer amount of data that IoT devices can generate is staggering. A survey found that fewer than 10,000 households can generate 150 million discrete points every day. This creates more entry points for hackers and leaves sensitive information vulnerable.

6.2.2 EAVESDROPPING: Manufacturers or hackers could actually use a connected device to virtually invade a person's home. German researchers accomplished this by intercepting unencrypted data from a smart meter device to determine what television show someone was watching at that moment.

6.2.3 CONSUMER CONFIDENCE: Each of these problems could put a dent in consumer's desire to purchase connected products, which would prevent the IoT from fulfilling its true potential.

7 CONCLUSION

In future IoT is going to become a reality. It will change our lifestyle. But there are many challenges related to the deployment, growth, implementation, and use of this technology. First of all, people should be ready to accept this technology without any fear and the manufacturers should make the consumers feel confident to use this technology.

References

- [1] <http://www.bluetooth.com>
- [2] <http://www.z-wave.com>
- [3] <http://www.zigbee.org>

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