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INTERNET OF THINGS: A SURVEY ON MACHINE TO MACHINE COMMUINCATION (M2M) WITH IOT AND ITS MAJOR CHALLENGES

J.Abdul Aziz Khan[1], S.Jayalilly[2]

[1]Assistant Professor- Department of Electrical and Electronics Engineering, V.R.S College of Engineering and Technology, Villupuram District ,Tamil Nadu, India.
[2]Associate Professor- Department of Electronics and Communication Engineering, V.R.S College of Engineering and Technology, Villupuram District ,Tamil Nadu, India.

Abstract

Internet of Things (IoT) is an ecosystem of connected to objects that are accessible through the internet. The 'thing' in IoT could be connected with industrial and medical applications for controlling and monitoring purposes. IoT can connect devices embedded in various systems to the internet. In this paper a rapid survey on the two technologies M2M and with IoT for accuracy, reliability and security reason and major challenges and future scope has been discussed. And this can make promising technologies in future.

Keywords: Internet of Things (IoT); Machine to Machine Communication (M2M); Major Challenges; Future scope.

1. INTRODUCTION:

MACHINE-TO-MACHINE (M2M)

Machine to machine (M2M) is a broad label that can be used to describe any technology that enables networked devices to exchange information and perform actions without the manual assistance of humans. The Internet of Things (IoT) world may be exciting, but there are serious technical challenges that need to be addressed, especially by developers. In this handbook, learn how to meet the security, analytics, and testing requirements for IoT applications. M2M communication is often used for remote monitoring. In product restocking, for example, a vending machine can message the distributor when a particular item is running low. M2M communication is an important aspect of warehouse management, remote control, robotics, traffic control, logistic services, supply chain management, fleet management and telemedicine. It forms the basis for a concept known as the Internet of Things (IoT).

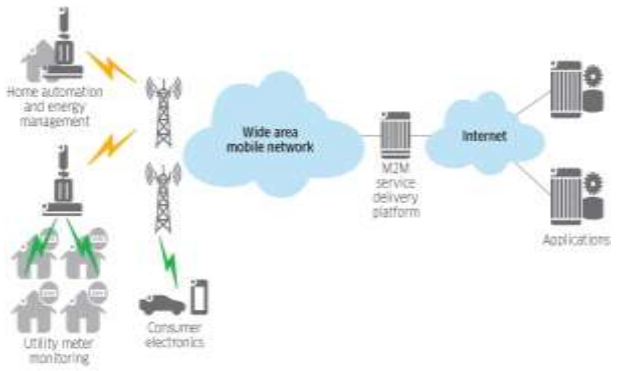

Figure 1:M2M service delivery platform

Key components of an M2M system include sensors, RFID, a Wi-Fi or cellular communications link and autonomic computing software programmed to help a networked device interpret data and make decisions. The most well-known type of M2M communication is telemetry, which has been used since the early part of the last century to transmit operational data. Pioneers in telemetrics first used telephone lines and later, on radio waves to transmit performance measurements gathered from monitoring instruments in remote locations. The Internet and improved standards for wireless technology have expanded the role of telemetry from pure science, engineering and manufacturing to everyday use in products like home heating units, electric meters and Internet-connected appliances. Products built with M2M communication capabilities are often marketed to end users as being “smart.”Currently, M2M does not have a standardized connected device platform and many M2M systems are built to be task or device-specific. It is expected that as M2M becomes more pervasive, vendors will need to agree upon standards for device-to-device communications.

2. HOWMACHINE-TO MACHINECOMMUNICATION WORKS

A car's microchip tells the engine how to operate under various conditions so that the car can achieve the best fuel economy. Computers link production plants together to monitor and maximize production. For years, the machines used to make our life easier have been getting smarter as their internal computer processors and software tell them what to do based on the parameters we provide. When machines "talk" they do so in a language known as "telemetry." The concept of telemetry -- remote machines and sensors collecting and sending data to a central point for analysis, either by humans or computers -- certainly isn't new. But an emerging concept is taking that idea to a whole new level by applying modern-networking technology. Three very common technologies -- wireless sensors, the Internet and personal computers -- are coming together to create machine-to-machine communications, or M2M. The concept holds great promise in promoting telemetry's use by business, government and private individuals.

M2M communications, for instance, can be used to more efficiently monitor the condition of critical public infrastructure, such as water treatment facilities or bridges, with less human intervention. It can help businesses maintain inventory or make it easier for scientists to conduct research. Because it relies on common technology, it also could help a homeowner maintain the perfect lawn or create a shopping list at a button's touch.M2M communications expands telemetry's role beyond its common use in science and engineering and places it in an everyday setting. People already are using M2M, but there are many more potential applications as wireless sensors, networks and computers improve, and the concept is mated with other technology.

3. TELEMETRY VS M2MCOMMUNICATION

In machine-to-machine communications, a remote sensor gathers data and sends it wirelessly to a network, where it's next routed, often through the Internet, to a server such as a personal computer. At that point, the data is analyzed and acted upon, according to the software in place.

Older systems worked similarly, using "telemetry." Telemetry technology, in many ways, was the forerunner of the more advanced M2M communications systems. Both telemetry communication and M2M communications transmit data through a sensor. The major difference between the two is that rather than a random radio signal, M2M communications uses existing networks, such as wireless networks used by the public, to transmit the data.

Why is it the future of code?

The next great horizon may well be machine-to-machine (M2M) technology. At the recent Oracle conference, the company was touting "an ecosystem of solutions" that uses embedded devices to facilitate real-time analysis of events and data among the "Internet of Things," according to the website. Much of the M2M information is delivered in the form of sparse data, which can come from sensors and other non-IT devices. The data may itself be only a couple kilobytes and wouldn't make much sense out of context. But there is so much of it being generated and taken together it can create a full picture. Applications are needed to not only enable devices to talk with others using M2M, but also to collect all the data and make sense of it.

Pretty much any device can be connected with M2M technology. In fact, Machine Research, a trade group for mobile device makers, predicts that within the next eight years, the number of connected devices using M2M will top 50 billion worldwide. That connected-device population will include everything from power and gas meters that automatically report usage data, to wearable heart monitors that automatically tell a doctor when a patient needs to come in for a checkup, to traffic monitors and cars that will by 2014 automatically report their position and condition to authorities in the event of an accident.

4. FUTURE SCOPE:

The next great horizon may well be machine-to-machine (M2M) technology. At the recent Oracle conference, the company was touting "an ecosystem of solutions" that uses embedded devices to facilitate real-time analysis of events and data among the "Internet of Things," according to the Dr. Dobbs website. Much of the M2M information is delivered in the form of sparse data, which can come from sensors and other non-IT devices. The data may itself be only a couple kilobytes and wouldn't make much sense out of context. But there is so much of it being generated and taken together it can create a full picture. Applications are needed to not only enable devices to talk with others using M2M, but also to collect all the data and make sense of it. Pretty much any device can be connected with M2M technology. In fact, Machine Research, a trade group for mobile device makers, predicts that within the next eight years, the number of connected devices using M2M will top 50 billion worldwide. That connected-device population will include everything from power and gas meters that automatically report usage data, to wearable heart monitors that automatically tell a doctor when a patient needs to come in for a checkup, to traffic monitors and cars that will by 2014 automatically report their position and condition to authorities in the event of an accident. Although M2M has actually been around since the early days of computing, it has recently evolved to where devices can communicate wirelessly without a human or centralized component. The most popular M2M setup thus far has been to create a central hub that accepts both wireless and wired signals from connected devices. Field sensors would note an event, be it a temperature change, the removal of a piece of inventory or even a door opening. They would then send that data to a central location where an operator might turn down the AC, order more toner cartridges or tell security about suspicious activity.

The model for M2M in the future, however, eliminates the central hub and instead has devices communicating with each other and working out problems on their own. So an M2M device will be

able to automatically turn on the AC in an overheated space, order more toner when it senses that supplies are low or alert security if a door opens at an odd hour. Many M2M devices rely on cellular technology to get their messages out, which is why mobile companies such as Verizon and Sprint are ramping up their M2M efforts. Devices don't have to communicate over the cell network, as many still use land lines. But the ability to do so, especially if they also have an independent power source like a battery for backup, unfetters the devices from the organization they are assigned to. And the more the machine can operate independently, the more work it can do without human intervention. Humans probably will still need to be in the chain to oversee the different processes, but they will become more of a second pair of eyes and less of a direct supervisor. If everything goes well, the machines will do all the work, and the humans will only need to step in if a machine reports a problem, like a communications failure. With 50 billion connected devices coming online soon, the need for applications (and developers) to manage all of that, to make the connections between devices work and to make sure it all runs smoothly will be tremendous. Agencies wanting to know more about M2M development can visit the Eclipse Foundation to learn more.

5. KNOW THE DIFFERENCE BETWEEN IOT AND M2M

Although the Internet of Things and machine-to-machine communications have remote device access in common, that's about where the similarities end. Learn how to specify the right solution for your needs. Once a trend, the Internet of Things has become a reality that is changing the world in which we live. However, buzzwords can sometimes lead to confusion and cause questions to arise. So, are IoT and M2M the same thing? What is the difference between them? Interestingly enough, this same question has spurred a discussion on Quora, and has been tackled by professionals within the industry. Some use both terms interchangeably, whereas others are adamant that they are not to be confused. First of all, we can be certain that these two concepts do indeed have different meanings. Most conclude that Internet of Things is a broader concept, which will evolve from M2M and other technologies. Simply put, Machine-to-Machine is where "Machines" use network resources to communicate with remote application infrastructure for the purposes of monitoring and control, either of the "machine" itself, or the surrounding environment. The potential interconnection of smart objects and the way we interact with the environment is what The Internet of Things is envisioned to be, where the physical world will merge with the digital world.

Figure 2: How things connected with M2M with IOT

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The Internet of Things is when objects, or even animals, are connected directly to the internet, allowing them to relay information to the network without human intervention. M2M, or Machine to Machine technology, is a tool to build IoT, enabling a network of connected devices to communicate information to each other. In an attempt to explain the relationship between both concepts, Matt Hatton compares M2M to the plumbing of the Internet of Things. M2M is what provides The Internet of Things with the connectivity that enables capabilities, which would not be possible without it.M2M with Internet protocols could be considered a subset of the Internet of Things and understood from a more vertical and closed point of view. On the other hand, the Internet of Things encompasses a more horizontal and meaningful approach where vertical applications are pulled together to address the needs of many people.

6. MAJOR M2M AND IOT CHALLENGES

There are so many considerations to take into account when implementing machine-to-machine (M2M) and industrial Internet of Things (IoT) technologies and every aspect must be carefully considered, ranging from cost and power to long-term product-life-cycle challenges and interference.

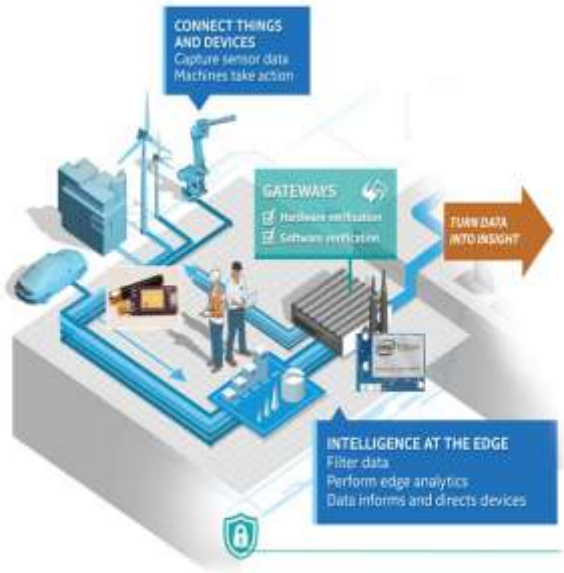

Figure 3: Major Challenges

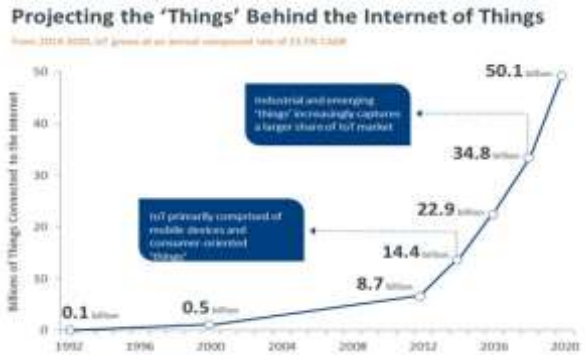

Figure 4: Rapid Growth behind the IOT

CONCLUSION:

We proposed the two technologies M2M and IoT for accuracy, reliability and security reason. The real promise challenging is that the system in which IoT with various industries, ranging from

connected cars to connected smart homes, smart cities, industrial application, and medical application all driven by advancements in machine-to-machine (M2M) communications. The billions of "things" that are connected in these M2M networks have the same security requirements as mobile phones, computing devices, consumer electronics devices and Medical applications. It is very complex process to "implement" those technologies into IoT will be the great challenging in research under embedded system.

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