

Trends in Internet of things

Jatindopal Kaur

Assistant Professor, Computer Science, Synetic Business School, Ludhiana, Punjab, India

ABSTRACT

We're entering a new era of computing technology that many are calling the Internet of Things (IOT). Machine to machine, machine to infrastructure, machine to environment, the Internet of Everything, the Internet of Intelligent Things, intelligent systems—call it what you want, but it's happening, and its potential is huge. Through internet of things one machine is connected to the other machine and shares the different information to each other and also one machine is shared by one or more peoples for example one printer is shared by different peoples ,this is possible by cloud computing which is part of internet of things. This paper give the light on the internet of things introduction, its elements and applications ,and future of it.

Keywords : IOT, Internet of Things, Technology, Wearables, Smarthomes

I. INTRODUCTION

Internet of things is the network of physical objects like device, vehicles ,building and other electronic gadget like mobile phones, laptops ,pad's etc. IOT allows the devices connected through the network to share the information into the existing network infrastructure.IOT is consist with the sensors and actuators ,sensors are help to sense the other device existing and actuators are help to control and convert the signals into the mechanical motion ,so every machine is connected to share and control each other's sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities.[1.0].

II. APPLICATIONS OF IOT

1. Smart homes

IOT makes the Smart Homes by connected the household devices to the internet, for example our

smart televisions are connected to our smart phones via Bluetooth ,WIFI ,data cable etc and Air Conditioner are also connected to our smart phones so that we can on and off our A/C from outside of the house and electronic lights can also be controlled by the remote controlled and phones. By this we can save our save time, energy and money.

2. Wearable's

Wearable devices are installed with sensors and software's which collect data and information about the users. This data is later pre-processed to extract essential insights about user.

These devices broadly cover fitness, health and entertainment requirements. The pre-requisite from internet of things technology for wearable applications is to be highly energy efficient or ultra-low power and small sized.

Wearable's devices are smart watch, headphones, goggles, light pen, digital jewelry etc.

3. Connected Cars

IOT gives its new experience in automobiles by connecting the cars with our smart phones ,through this peoples can understand their car features and functioning in efficient way ,for example if car is not start then we can connect our phone with the car and identify the problem in very way, many automobile companies offers the new features of car through this we control our car A/C and center locking system and many more .All of this things makes more comfort to passengers and less the maintenance cost as well.

4. Industrial Internet

IOT holds great potential for quality control and sustainability. Applications for tracking goods, real time information exchange about inventory among suppliers and retailers and automated delivery will increase the supply chain efficiency.

The driving philosophy behind IOT is that, smart machines are more accurate and consistent than humans in communicating through data. And, this data can help companies pick inefficiencies and problems sooner.

5. Smart Cities

Smart city is another powerful application of IOT generating curiosity among world's population. Smart surveillance, automated transportation, smarter energy management sy, water distribution, urban security and environmental monitoring all are examples of internet of things applications for smart cities.

IOT will solve major problems faced by the people living in cities like pollution, traffic congestion and shortage of energy supplies etc. Products like cellular communication enabled Smart Belly trash will send alerts to municipal services when a bin needs to be emptied.

6. IOT in agriculture

With continues increment in population ,the demand of food is increases day by day,IOT is helps the formers through the new technologies that increases the food Production in very short time which is increases the profit ,with less investment .The non seasonal vegetables can also be grow without any environment effects. By sensor the moisture and nutrients of soil is determine and also controlling water usage for plant growth with custom fertilizer.

6. Smart Retail

With the advantage of IOT in industry is that it provides the transparency between the company and their employs and their customers , for example if buyer can order a product by any shopping site then he/she will compares the actual price plus shipping chargers ,and also track the order delivery process , any company can touch with their customer , so they can identify their choices regarding products and offers them new shopping schemes and gifts just to satisfied them ,which is help to maintained the long-term relationship with customers.

7. Energy Engagement

Power grids of the future will not only be smart enough but also highly reliable. Smart grid concept is becoming very popular all over world.

The basic idea behind the smart grids is to collect data in an automated fashion and analyze the behavior or electricity consumers and suppliers for improving efficiency as well as economics of electricity use.

Smart Grids will also be able to detect sources of power outages more quickly and at individual household levels like near by solar panel, making possible distributed energy system.

8. IOT in Healthcare

Connected healthcare yet remains the sleeping giant of the Internet of Things applications. The concept of connected healthcare system and smart medical devices bears enormous potential not just for companies, but also for the well-being of people in general.

Many smart healthcare devices are available which helps the people to detect their sugar rate, blood pressure, body energy etc. It helps to collect the data of individual and helps the doctors to analyze their medical condition and helps to make strategy to combat illness.

9. Manufacturing

Manufacturing Network control and management of manufacturing equipment, asset and situation management, or manufacturing process control bring the IOT within the realm on industrial applications and smart manufacturing as well.

10. IOT in Poultry and Farming

Livestock monitoring is about animal husbandry and cost saving. Using IOT applications to gather data about the health and well being of the cattle, ranchers knowing early about the sick animal can pull out and help prevent large number of sick cattle.

III. IOT ELEMENTS

1. Sensing

The first step in IOT workflow is gathering information at a "point of activity." This can be information captured by an appliance, a wearable device, a wall mounted control or any number of commonly found devices. The sensing can be biometric, biological, environmental, visual or audible (or all the above). The unique thing in the context of IOT is that the device doing the sensing is not one

that typically gathered information in this way. Sensing technology specific to this purpose is required.

2. Communication

This is where things start to get interesting. Many of the new IOT devices we are seeing today are not designed for optimal communication with cloud services. IOT devices require a means for transmitting the information sensed at the device level to a Cloud-based service for subsequent processing. This is where the great value inherent in IOT is created. This requires either WiFi (wireless LAN based communications) or WAN (wide area network... i.e. cellular) communications. In addition, depending on the need short range communication, other capabilities may also be needed. These could include Bluetooth, ZigBee, Near-field or a range of other short range communication methods. For positioning, GPS is often required as well.

3. Cloud Based Capture & Consolidation

Gathered data is transmitted to a cloud based service where the information coming in from the IOT device is aggregated with other cloud based data to provide useful information for the end user. The data being consolidated can be information from other internet sources as well as from others subscribing with similar IOT devices. Most often, there will be some data processing required to provide useful information that is not necessarily obvious in the raw data.

4. Delivery of Information

The last step is delivery of useful information to the end user. That may be a consumer, a commercial or an industrial user. It may also be another device in the M2M workflow. The goal in a consumer use case is to provide the information in as simple and transparent a method as possible. It requires execution of a well thought out, designed and executed user interface that provides an optimized experience across multiple device platforms – tablets, smartphones, desktop –

across multiple operating systems – IOS, Android, Windows, etc.

Our firm is unique in having deep and long standing expertise across all these elements. We are excited to be engaged in current projects from medical devices and appliances, to consumer products and machine control IOT devices. In my next article, I will expound on some examples demonstrating the use of IOT in unusual new ways as well as products which pre-date the phrase Internet of Things and formed the basis for its development.[1.3]

THE 4 STAGES OF AN IOT ARCHITECTURE

In old architecture when one machine is connected to other machine to exchange the data and when machines was update then it was fail. But through more advancement in Engine manufacturers embed sensors that measure temperature, pressure, and other conditions to improve their products. If any organization want to install the IOT with their existing infrastructure then they need to invest inthe kind of four-part architecture that supports many IOT systems today. Picture these four parts as stages in a process.

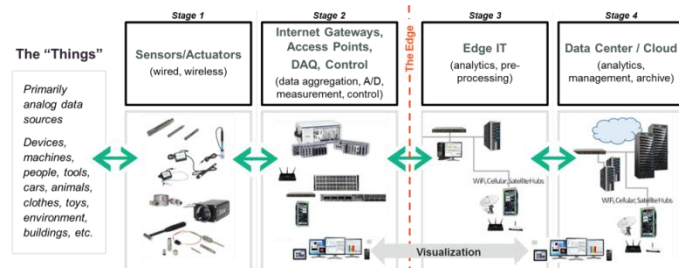


Figure 1

Stage 1. Sensors/actuators

The sensors are collect the data from the environments and objects and convert into the useful information. Sensing can be in form biometric, biological, environmental, visual or audible. Actuators are change the physical location of devices by changing the signals into the mechanical motions . for example on/off and move the electronic motor in

some device. The sensors and actuators can be wired and wireless. The sensing/actuating stage covers everything from legacy industrial devices to robotic camera systems, water-level detectors, air quality sensors, accelerometers, and heart rate monitors. And the scope of the IOT is expanding rapidly, thanks in part to low-power wireless sensor network technologies and Power over Ethernet, which enable devices on a wired LAN to operate without the need for an A/C power source.

Stage 2. The Internet gateway

Data come from the sensors in analog form ,this data need to aggregate and converted into digital form to the further processing that perform in 3 stage.

The data acquisition system connects to the sensor network and perform analog to digital conversation. The Internet gateway receives the data from sensors and digitized data and routes it over Wi-Fi, wired LANs, or the Internet, to Stage 3 systems for further processing.

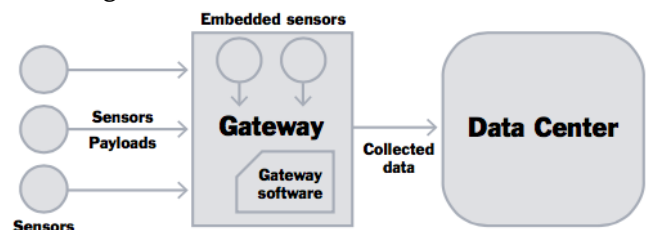


Figure 2

Stage 3. Edge IT

When data is digitize in 2 stage and then it need further processing before entering the data center , edge IT perform more analysis on the digitize data.

The Edge it systems located at the remote offices ,it located where the sensors reside closer to the sensors, such as in a wiring closet. The IOT data eat up network bandwidth and full the data center resources so it's best to have systems at the edge capable of performing analytics as a way to less the burden on core IT infrastructure. If the data is not analyze by Edge IT then you face security concerns, storage issues, and delays processing ,for this you need one large data pipeline to transfer data to data center but this

producer take lot of time, to solve this problem a staged approach is use, you can preprocess the data, generate meaningful results, and pass only those on. For example: You might use machine learning at the edge to scan for anomalies that identify impending maintenance problems that require immediate attention. Then you could use visualization technology to present that information using easy-to-understand dashboards, maps, or graphs. Highly integrated compute systems, such as hyper-converged infrastructure, are ideally suited to these tasks because they're relatively fast, and easy to deploy and manage remotely.

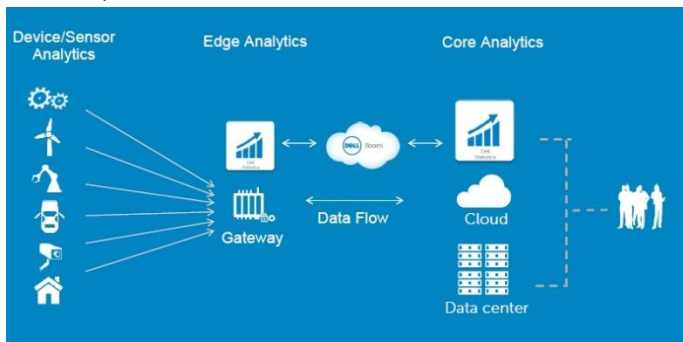


Figure 3

Stage 4. The data center and cloud

Before entering into 4th stage the data need processing, IT systems analyze ,manage and securely store the data into data center or cloud based systems. Stage 4 processing may take place on-premises, in the cloud, or in a hybrid cloud system, but the type of processing executed in this stage remains the same, regardless of the platform.[1.4]

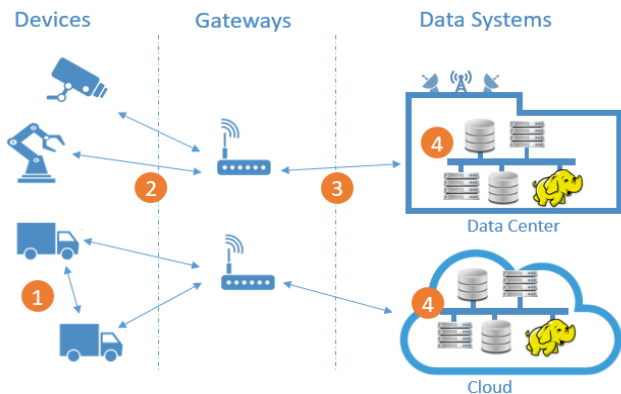


Figure 4

TOP 5 IOT TRENDS TO LOOK FORWARD IN 2018

By research that there will be nearly 20 billion devices connected to the IOT by 2020 and that IOT products and service supplier will amount to a business of \$300 billion revenue.

So there are top 5 IOT trends that will define the future of IOT in 2018.

1. Smart Home Devices

Many advancements in IOT in smart home technology which makes the life so easy by powered smart home devices ,these devices are huge popular n 2018,many innovation are make in this year many home appliances are available now which make life so easy and smart. Smart home appliances like smart refrigerator ,microwave, smart television etc. This year many peoples are adopt the many new IOT devices.

Another big driver of the IOT smart home adoption is the energy saving systems. Which are consist with Smart thermostats and smart lighting help conserve energy and keep the bills down, which will be another big reason more and more people are adopt powered devices in 2018.

2. Edge Computing Will Take Prominence Over Cloud Computing

For a long time now, IOT devices are store their data on cloud .IOT developers and manufacturers are now starting storing, computing and analyzing the data.

The data send by IOT devices are now sorting, filtering, Proper analyze then send it over the network so that the network traffic should be minimize.

The edge computing is helps in better manage the large amount of data each which send to the device. the cloud helps in storing the data of applications faster with less latency. When the data is gather and process data locally, the IOT application consumes less bandwidth and works even when the Internet

speed is slow. The edge computing is adopted now days in IOT so that the performance can be increase.

3. Healthcare Will See Increased IOT Adoption

One of the most important applications of IOT is definitely in the field of healthcare, and the coming year will see healthcare truly embrace the prowess of IOT. According the Survey, the internet of medical things could be Increase annual growth rate of 26.2% and reach \$72 billion by 2021. Devices like sensors, wearable devices, medical equipment, health monitors and other medical devices are connected with IOT. The IOT adoption in the medical world for good for the future advancements. Mobile health applications are monitor patient health at home, smart wearable's and implants that communicate patient parameters, smart Ambulance that monitor patient during transit and a host of other smart connected devices are set to reshape the medical world.

4. IOT Security Will Be a Bigger Priority

As adoption increases, more and more devices get connected to the Internet of Things. The network expands, the is data increase and more information is at risk. Increased use of IOT must be accompanied by need the IOT security. The large number of personal data floating about in the cloud, such as health of patients and safety of homes is at risk and IOT will have to be more secure.

Now days all IOT devices Such as laptops and PCs are equipped with new security features, In the coming year, that will have to change. Machine-to-machine authentication feature , biometric logins and other machine learning and big data techniques will be used to identify and data breaches.

Symantec's Internet Security Threat Report April 2017 identified weak passwords as the main reason behind IOT malware. But now IOT is work on their weak passwords by providing the feature of change

the password with different options .In2018 will see both manufacturers as well as consumers getting more aware about their IOT security.

5. AI and Big Data

With billions of consumer and industrial devices being connected to IOT and transmitting data, the amount of data than needs to be processed and analyzed which will be further use. The idea is not just to gather the data but also process the it by using the some big data analyze techniques, In IOT AI and Big data plays very important role in processing and analyzing It is also will give rise to a wave of next-gen applications and advancements.

IV.OTHER INVENTION IN IOT

Internet refrigerator

Internet refrigerator is also known as a smart refrigerator. It has been programmed to sense the type of products are being stored inside it and watch the level stock. this is possible by Barcode or RFID scanning This kind of refrigerator is often equipped to determine the which kind of food needs ,how much coolness.

Smart Healthcare system -

IOT comes with new smart systems which like Smart biosensors- The doctors install biosensors in body of patients which can measure and continuously monitor the patient vital stats like blood pressure, heart rate, sugar level, etc. This producer is non stoppable . The biosensors are also measures certain vitamin, mineral deficiencies in the diet and warn the patient accordingly and advice them to consume or not consume certain foods, make changes in the diet. It gives the warning about cholesterol level increases beyond certain limit and gives advises on type of food you should eat and not eat. If patient have a family history of certain genetic disorders like cancer then I.O.T devices detect the tumor before it

becomes malignant, not only detects but also destroy it.

Smart glasses - I.O.T glasses which adapt changes according to the surroundings and adjust the brightness and optical parameters so that your eyes do not strain. It is also warn about the sunny rays which is harmful for the eyes , and also help in taking prevention action on it.

Smart earphones & earplugs- the smart earplugs which adjust the noise levels according to the environment . They detect damage to your ear buds due to immoderate noise and immediately take preventive action. These earplugs also detect user's mood and play music accordingly to keep the user cheerful and happy.

Smart cars-

Now days smart cars are equip with Sensors which will detect if you are drunk and not in a proper mental state to drive a car the car will not start. Sensors are also detect incoming dangerous obstacles and take control of the car in case of early signs of an accident. They will help automatically prevent the car from causing an accident. Sensors installed in the wheels which prevent them to slippage and provide optimum braking to prevent cars from skidding.

Smart furniture-

Think about smart chairs which adjust their size and shape automatically according to the size and shape of the human body. Chairs and beds which can also detect and monitor the way you are sitting and prevent from the chronic back ache problems.

Smart early warning systems-

Imagine sensors in natural surroundings which can detect and give warnings about incoming natural calamities like tsunamis, floods, snow storms, earthquakes etc. so that humans can take preventive action way before it actually occurs.

Smart traffic management systems-

No more traffic jams. Smart roads, smart traffic signals, smarter toll plazas. Why do you need toll plazas in the first place? Let's say we can design a system in which Governments and private road builders will be able to monitor the frequency of your highway usage and automatically generate a bill according to your usage. Thereby we could create a virtual toll-plazas which will eliminate queues and the need for physical toll plazas. Consider smarter roads which provide you real-time info on parking spaces and warn you if you are violating any parking rules. This smart parking system will charge users real-time for parking in congested areas and less for parking in empty spaces. Also consider systems which warn users about traffic jams and manage traffic real time providing accurate information and direction to drivers to direct them in areas with lesser traffic.

Smart defense systems-

smart borders and smarter surveillance systems could prevent wars before they start. Sensors installed on borders which detect movement and prevent people from crossing over. Also consider smarter drones which can automatically detect and recognize the enemy and innocent civilians and target only the enemy.

Smart Ring

The iPhone and Android introduce its smart ring in 2017 . It is just 8mm wide and comes in rose gold or slate grey finishes of titanium. It is available in seven size which is fit both male and female fingers. It's a fitness tracker that will monitor steps, distance, and active minutes and also detect heart rate by heart rate sensor. The battery will last five days long and it's even waterproof to 50m.



Figure 5

This rings available in stylish look and easy to wear because it is light in weight, comfortable. This rings are alert the user about the missed call, message and other notification.[1.5]

V. WORLD TOP PROJECTS IN IOT

1. Electronic Door Lock

It is programmed to measure the door opening time, it is shows the last opening time of door in form of hours, minutes and seconds. This type of projects are adopted by the people for home and office security.

2. IOT motion Controlled Servos

This device is based open the human motion of hands , it is mimic the directions on which the human hand is move. It is programmed to display the different colors when the hands are move in different direction. It is equipped with a sensor which sense the hands movements and then display the different color patterns .

3. Microsoft windows IOT core door

These IOT devices are stores the data of the person in the form of pictures and with some basic information like person name, type of relationship etc which is enter by user . so that when the any person is arrive then this device is scan the face of that person and match it to data which is store into the database ,if it is authorized then the door is unlock otherwise the door is not opened.

4. Mark Zerkerbug AI-Jarvis

The Jarvis is programmed to control the home electronic devices like lights , refrigerator, toaster , cloth cannon ,music system etc,. Mark spend his 100 hours to make his house fully automatic, in 2016 he build an artificially intelligent, voice-controlled assistant for his home. The Jarvis server have language recognizing ,face recognizing, speech recognizing capability to control the home system , In this message bot ,IOS voice app and door camera is provide the user interface which is shown in this fig. 7.

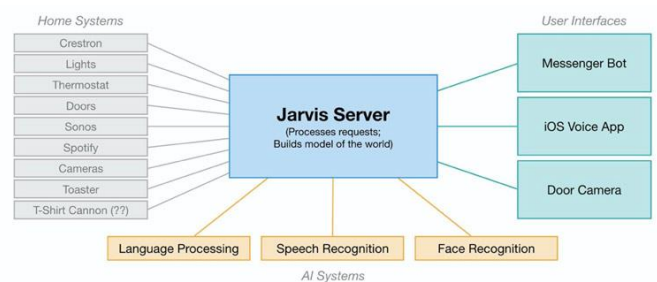


Figure 7

5. Zelda ocarina controlled home automation

Allen is invent the IOT device by inspired from the game ,which is control the home appliances through the different musical notes ,he has used a Raspberry Pi to detect and recognize key tunes from the game, with each tune being *linked* to perform a specific task. When certain notes are played in a specific sequence, the Raspberry Pi detects the tune via a microphone within the Amazon Echo-inspired body of the build, and triggers the action related to the specific task.

VI. IOT IN ARTIFICIAL INTELLIGENCE

There are many applications of IOT which are combined with the Artificial intelligence which is being used in Industry today. There are some applications of IOT in the field of AI:

Automated vacuum cleaners, like that of the iRobot Roomba

The first iRobot vacuum cleaner was introduced in 2002. Founded by MIT roboticist, the company developed technology with help of puck shaped vacuum robots to remember the home layout and also adapt the different surfaces or new items of the house, clean a room with the most efficient movement pattern. It is equipped with its own battery charger.

VII. CONCLUSION

Currently there are 10 billion I.O.T devices, i.e. more devices than combined human population. By 2020 it is predicted that around 50 billion devices will be connected to the internet. Nest Labs which makes smart thermostats and smart smoke detectors was acquired by Google for 3.2 billion dollars. GE and IBM are also working on I.O.T applications. In one of the famous surveys we found, up to 2020 26 billion devices will be part of Internet of Things.

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