



Artificial Intelligence Meets Internet of Things

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Abstract— The next biggest evolution would be iot. This concept deals with the basic principle that everything would be connected through a /internet. Several countries are linked together to exchange data and news through internet. Here, physical objects are programmed to interact in the way computer devices do. This is a new technology, where devices communicate with each other using sensors.

Most of the companies are investing in IOT, and it is believed this is the area which would see immense growth. This paper gives an overview of IoT and its application areas.

Keywords— Internet of Things (IoT), Artificial Intelligence, Machine Learning

I. INTRODUCTION

The Internet of Things (IoT) is a new prototype of Internet which is quickly gaining popularity in the 21st century. It can be viewed as a network of physical devices which are ingrained with electronics, software and sensors. This enables it to achieve greater value and service. Each object is uniquely identifiable through its embedded computing system.

When the Physical world is connected to the Internet, everything around us are seen as “things”. According to recent research, it is estimated that there would be nearly 27 billion devices on IOT.

A. What is “thing”?

To understand IoT, the concept of “thing” must be understood. A thing is “THING”. Thing is literally everything and anything around us, literally.

The Things that we encounter in our day to day lives like Goods, Machines, Buildings, Animals and People are things. Current market examples include smart thermostat systems and washer/dryers that utilize Wi-Fi for remote monitoring.

Besides the new application areas, IOT is useful in obtaining large amounts of data from far off location

B. How does IOT work

For communications among several Things in IoT, each object is uniquely identified so it is possible to locate these objects from anywhere. They are addressed with the help of IPv6 addressing scheme which offers a large address space. Objects in the IoT will be controlled over the Internet through sensorial capabilities of the devices and actuation capabilities which are monitored by the computer system over the internet.



The above figure depicts Internet of Things

II. TECHNOLOGIES INVOLVED

The actual implementation of Iot in the real world is done by combining various technologies available. This is possible with any one of the following:

A. RFID – Radio Frequency Identification

This is a wireless device that uses electromagnetic fields. The objects are connected with the help of tags attached to them. An RFID is a small microchip attached to the object-new version of barcodes.

This tag can be stuck onto the wrist, and it picks up all the RFID tags in the vicinity.

B. Near Field Communication

This is a set of thoughts and technologies with the help of which the smart phones and other objects that want to communicate under IoT.

C. M2M - Machine to machine

In this technology, information between the machine is exchanged and work is executed without any manual help.

D. Wireless Sensor Network (WSN) –

It is a set of large number of sensors which monitor environmental conditions.

E. Addressing schemes (IPv6 addresses)

Addressing scheme is the basic tool by which IoT concept can be implemented by giving IP addresses to each object which we want to communicate.

III. APPLICATIONS OF IOT AND USE OF ARTIFICIAL INTELLIGENCE

The following are the application areas of IOT:

1. To buy fruits and vegetables, one would check the refrigerator to see which the items out of stock are. With artificial intelligence and IOT, sensory capabilities can be added. This is done with the help of special sensors so the fridge can communicate with the person and list the items which are not available. Using this concept, IOT BUCKET can be identified. The bucket is connected with a wireless display device fitted with an inbuilt RFID technology. When one goes to the supermarket to purchase groceries, this Bucket will tell what the items to be purchased are. Parallely, the objects must have an RFID tag attached to it, where the prices are calculated simultaneously. This would ensure the person has sufficient money to buy items.
2. Consider a diabetic person, where constant monitoring of sugar levels is needed. The patient can wear a wireless insulin monitor, A smart phone with insulin monitoring app together with the device can assist in monitoring the insulin level.
3. Preventive health-Google x nanoparticles:
Google x is researching the use of nanoparticles. By swallowing a pill these are released into the bloodstream. These particles can detect and diagnose diseases, impending heart attacks or other diseases based on the changes in the body.
A wearable wristband gives the readings of the nanoparticles. Machine learning can be applied in order to diagnose diseases and changes in biochemistry levels in the body. Unattached nanoparticles moves differently in a magnetic field from those clustered around a cancerous cell.
4. Detecting Body Movements by Atlas Wearables
This fitness band measures heart rate and calculates the calories burnt.
It's machine learning algorithms helps to classify one's exercise routine. It distinguishes between push-ups and squats effortlessly. These datasets can be extended further to understand movements like walking, sitting or interaction with others that would give clues about the energy level and mood.
5. Emotion Measurement
Consumers' emotions can be assessed using Brand Emotions. Surveys and questionnaires give feedback but emotions of the consumers cannot be measured. BrandEmotions helps to measure how consumers feel about a brand, their experience, quality and marketing. Emotional reactions of participants are visualized using BrandEmotions.
It allows brands to maximize their experience, target products and services at the right time. The capability of the device to sense emotion and machine learning ability measures physiological information captured through wearable devices.
6. ENORASIS project in Farming
ENORASIS uses network of sensors in the fields to determine the amount of water that is needed by the crops. These sensors collect soil conditions and

environmental factors to quantify water added to the fields.

This model combines weather conditions and sensor data about the crops and creates a detailed daily irrigation plan best suited for each plant.

It assists the farmers to decide whether extra irrigation would yield profits or incur loss.

7. Other areas of application:
 - a. Brain-machine interfaces (Emotiv)
 - b. Classifying DNA sequences
 - c. Information retrieval & search engines (Google, Yahoo, Bing)
 - d. Protein prediction (Noble Research Lab)
 - e. Speech and handwriting recognition (Google Translate)
 - f. Text categorization (Gmail, Outlook)

IV OPEN ISSUES

Major areas of concern include:

1. Security- This includes authentication of the entity which is being conveyed. In Iot, wireless devices are used to connect and thus authenticity must be provided.
2. Data Integrity- All the data inIOT is conveyed through wireless media. There are chances of theft or hacking in the path.
3. Data Storage Complexity-Machine learning and IOT would make our lives more comfortable, but the main issue lies in storage of all the data. Integrity of the stored data must be maintained.
4. Expensive- The devices with which Iot works are very expensive. The initial cost for proper working of any idea would be high and not easily affordable.

V. CONCLUSION

IoT is a new emerging trend, the future of mobile technology and coupled with machine learning increases the usefulness of the Internet. It makes communication between smart-phones equipped with touch screens to unattached objects.

The first IoT devices are already in the market including NEST (a thermostat), LOCKITRON (remote control locks), Pay By Phone (parking system)

This concept of IoT will be adopted by many, and the future shows lots of possibilities and discoveries in this area. IoT will change the lives of many, where the input and support of people is needed.

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