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INTERNET OF THINGS (IOT) - APPLICATIONS AND CHALLENGES

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Abstract:

The internet of things (IoT) as the new influence to the human world and machine world is emerging as a new high tide wave in the development of internet. Internet of things is expected to have massive impact on the customer of electric equipment's, business which will all be integrated and synchronized and also the fact is these are the early days. Looking at the potential of the wide suitability to all most all the vectors of the core areas like business, industries, manufacturing consumer goods etc., has a very wide area of applicability. The information of the paper very specifically focus on the adoption of this concept in our homes, identifying the top players in the markets in the technologies which are driving the same. Bringing to light the statistical analysis of ongoing consumer sentiments about the new smart devices brings out the embryonic opportunities of internet of things.

Index Terms: Machine, Internet, Electronic Equipment & Embryonic

1. Introduction:

Internet has been significant over last few decades and made an impact in our economies and societies by bringing in remarkable communication and networking infrastructure. The www has been a driver for global information and media sharing. The Internet of Things is considered as the third wave of information technology right after Internet and mobile communication network, which is characterized by more comprehensive interoperability and intelligence. It was introduced by Electronic product code (EPC) Technology and research work of International Telecommunication Union (ITU).

Initially information was only shared online i.e. data content on the internet, later people were been connected by means of electronic-mail, social networking or social media networking but now the time has come for objects to be connected and that is what IOT achieves. It is advanced internet application and "Thing" in Internet of things contain the product's information. Hence all objects whether it is a television or a plant, can be connected to the internet. The object's information is shared across the globe using internet and hence the objects can be accessed from a remote place. The product's information is embedded in an electronic tag (RFID tag) using some standard words.

2. The Internet of Things (IOT):

It is a network of intercommunicating devices. The uniqueness about this is that integrates the ubiquitous communications, more, are readable, recognisable, locatable, addressable and/or controllable via the Internet. This helps in providing the basis for many new applications like energy monitoring, transport safety systems or building security. This aspect will surely change course of time, especially as synergies between Identification, Technologies, Wireless Sensor Networks, Intelligent Devices and Nanotechnology will enable a number of advanced applications.

3. Growth of IOT:

Internet has been the important part of human life. The internet first evolved as "internet of computers". Internet is an era of Information Exchange. Several social websites came into picture which kept people connected all the time which has led to

internet being filled with people rather than information. On the other hand, advancement of new technology has been improving day by day and simultaneously an era of "MobiComp" (mobile computing) had begun. Mobile helped man to be always connected to the internet on the move. Nowadays 3G and 4G mobile internet connections have led to faster internet access and deliver better quality in video calls.

Wireless technologies and mobile computing have become more cheaper compared to early years and have gained more popularity and advanced in time. Hence a new computing has emerged- Ubiquitous computing. This computing focuses on smart, intelligent space and minimal user involvement. Advancement in technology led to mobile and other handheld devices to diminish/reduce in size. Smart phones, Ipads, tablets and notebooks has replaced java mobiles and PCs. Hence there was a change in the device with which people access the internet. This in turn resulted in sophisticated features being configured in devices such as sensors, Global Positioning system (GPS) and actuators. In such a scenario devices were not only connected to the internet but also sense, compute and perform intelligent tasks. Later physical objects were configured with identification tags such as barcode and RFID so that they could be scanned by devices like smart phones and upload their information into the internet. This way of connecting the physical world with cyberspace with the help of a smart device led to internet being called as "Internet of Things". Hence IoT has its roots from Mobile computing, ubiquitous computing and information technology. IOT connects the objects in an intelligent way. The "thing" here refers to the physical object's information read through sensors and RFID reader and uploaded into the internet. The physical object can be anything from smart phones to objects at home. The International telecommunications Union (ITU) has pointed out four dimensions of IOT: object identification ("tagging things"), sensors and wireless sensor networks ("feeling things"), embedded systems ("thinking things") and nanotechnology ("shrinking things'). Hence from the above , IoT changes the connectivity view from "any-time , any-place" for "any-one" into "any-time , any-place" for "any-thing". These things once connected to the internet provide smart services beneficial to the environment and society. They play a major role in supply chain, energy, defence, healthcare and other useful applications

4. Applications:

App in this era place a new trend in people mind hence there are several applications of networked Things in Agriculture, Healthcare, Retail, Transport, Environment, Supply chain management, Infrastructure monitoring etc.

Agriculture: Agriculture has applications for Soil and plant monitoring, Monitoring of food supply chain, Monitoring of animals

Retail Management: Retailing application includes tracking customer or consumer behaviour and preferences, Shelf stock tracking, context based advertising and product promotions, vending machines, automated checkout, and theft control.

Health Care: Identification of various drugs is a major application in healthcare area. Other app areas are personal health monitoring, telemedicine, assisted living.

Security: Detection of counterfeit goods, Access control, restricted materials, Banknotes, Passports

Government and Public Sector: Disaster management, Forest monitoring, Tourism support, Homeland security, Pollution monitoring

Home: Home security, Smart - home (lighting, entertainment, energy management, assistance)

Sports: Sports equipment: user performance monitoring, Safety

5. Benefits:

There are many applications of networking physical objects; they need a strong value proposition to customers for their wide adoption and acceptance. Their potential benefits are:

- ✓ Improved performance, visibility & scalability of business process Automation
- ✓ Providing better, more cost effective service through real-time high resolution visibility /capture and analysis of real-time product performance information. This is useful for efficient decision making.
- ✓ Better transparency of physical flows and detailed status information. This is also important for regulatory compliance and public dissemination.
- ✓ Creation/transformation of new and existing business processes by enhancing efficiency, accuracy, mobility and automation.

6. Challenges:

The development of the Internet of Things would depend on various factors but one of the critical factor is depending on progress in machine-to-machine interfaces and protocols of electronic communication, embedded systems, wireless communication, RFID, sensors, actuators, location technology, energy harvesting techniques, and software. In IOT each of the networked object need to have an uniqueness and that uniqueness is Identity. Managing a globally integrable unified ID with mechanisms for naming, addressing and discovery are of paramount importance.

Governance, standardisation and interoperability are necessary to communicate things with each other. Communication protocols and standards must be scalable, power efficient, secure and fully global. Scale will be such that traditional internet management approach will not work efficiently. This will demand autonomic features such as self organisation and self management built into the devices.

While RFID is one of the most important sensors, there are n number of sensors in the market with different technologies, packages, specifications and it contributes majorly to the cost of the whole solution. Large scale applications can standardise some of the sensors to reduce the cost.

Robustness is one of the key requirement where the smart devices are able withstand any kind of harsh environment and harvest energy from their surroundings. Efficient implementation of energy neutral platforms with non polluting energy sources is of great social value. Reducing carbon footprint by eliminating or minimizing the use of batteries is an important aspect of this.

Another central issue of the Internet of Things will be related to trust, privacy and security. Here there is also a concern regarding the ownership of data and mechanisms of managing it dynamically. For example the medical data of a patient need to be accessed by the doctor to whom the patient gives consent and this permission may be revoked once the consultation is over. But what happens to the data which is already downloaded by the doctor? Who is the owner of the data once the patient is dead?

Creation of awareness among public regarding these technologies is very important for its success in the market. This can be more convincing with some real-life implementations and help in building customer confidence.

7. Internet of Things - Indian Perspective:

It is the fastest growth market for cellular technologies, India has demonstrated its appetite for technologies to revolutionise the life across all its diversity. The value, impact on daily life, and competition has helped the cell phone to reach the masses across all strata of the society.

Urbanisation of India is happening at a great pace. Migration from rural places to cities and vice versa is ever increasing. One way to address this is to enhance the opportunities at villages to reduce the overburdening of the cities. Experience shows that this is not that easy. We need scalable architectures and funding models for building our city infrastructures to handle large populations.

There is a requirement for efficient systems for transportation, utilities, healthcare, safety & security, education, environment, governance and entertainment. Deployment of advanced ICT technologies would be affordable and cost effective considering the improved quality of life of citizens and enhanced GDP growth from the resultant productivity improvements.

A large percentage of Indian population is in rural areas and there is a constant drive for addressing those sections of the society. Majority of the human resource is spent on farming and agriculture. In many cases they are resource constrained in terms of water, energy, fertilisers, and market opportunities. Systems for monitoring and improving the efficiency of resource utilisation will be highly beneficial. Health care is another area of attention here remote monitoring can enable the skilled doctors in cities to extend their services to villages.

8. Challenges:

Five important challenges:

- ✓ **Scalability**: Size of the systems tends to be large in size, the solutions should be scalable. Also many times the deployments happen in stages and the architecture should be able to scale up incrementally without taking too much overhead.
- ✓ **Affordability of Products and Services**: Affordability is one of the major and important aspects for success. It may not be low cost always, but the right cost for a specified target group with a clear business case or cost benefit. Standardised platforms, tools and manufacturing processes can bring the cost down with increased volumes.
- ✓ **Integration with Legacy Systems:** Since there are no widely deployed IOT applications, there may not be any major challenge with legacy technologies in that space. However there may be legacy devices and systems which are not amenable for new standardisation and need to coexist.
- ✓ **Robustness:** While there is a pressure for low cost, there is a strong demand for robustness and reliability of products and services. One of the approaches for addressing this is to build upgradable/disposable systems which take care of current requirements and strip of the low priority features to reduce cost. A Robust solution will get a buy-in even if it is less sophisticated.
- ✓ **Social and Cultural Sensitivity:** Social response to an IOT application has many aspects. It can have cultural, linguistic, geographic, political dependencies for the acceptance. Help of awareness and regulations are to be explored for the success of large scale social applications.

9. Conclusion:

Internet of things is a new internet application where there exists thing-thing communication rather than human-human communication. Each and every object in this world can be identified through this appconnected and take decisions independently. It has taken its birth from mobile computing and ubiquitous computing. Technologies such as RFID, wireless sensor networks and embedded systems play a vital role in forming an IOT application. It is used in many applications in healthcare, agriculture, smart buildings, transportations etc. Though IOT is used in many domains, its path to success is not smooth. There are many issues that need to be addressed

among them privacy and security is one of them. If these issues are addressed, then Internet of Things will definitely be the global mantra

The development of the Internet of Things, based on the synergistic combination of several scientific disciplines and technologies, creates tremendous opportunities for improving economic competitiveness and citizens' quality of life.

IOT also raises complex non-technical issues, especially with respect to ethics, privacy, security, governance, spectrum, interoperability, and more, which deserve to catch the highest attention from public authorities, preferably within the context of a sustained and well focused international bodies.

To achieve the vision of communicating things, there are several technical and non-technical challenges to be solved. We have also discussed the impact of IOT for developing countries like India with specific challenges and priorities. Open areas for standardization have been identified where organizations like GISFI could work in conjunction with other global standardization bodies. It is also necessary to bring together the eco-system partners such as government, Industry and academics to conduct research and developments to create IPRs and business models to proliferate the IOT technology for mass benefit.

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