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Impact of Internet of Things on Future of Education - An Overview

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ABSTRACT

Surfing of marvelous technologies keeps changing rapidly in a way people interact with each other in this modernized digital world. This is due to the innovation of new technologies getting widened due to the dependency over the net. The need for the development of smart world raised due to the invention of new products getting developed in today's market which are unimaginable a decade ago. These factors which has led into the advent of Internet (Web) of Things (IoT). IoT produces a scenario of combining things to be connected with Anyone, Anytime, Anyplace following any route doing any service. This paper discusses on the objectives of IoT its technologies and how the implications of IoT getting interlinked inthe domain of education to identify requirements for the next generation of IoT experimental techniques.

***Keywords*:** Internet of Things, Smart Lab, Future Education, Sensors, Devices, *Buzz word* IoT, Zig-bee

1. INTRODUCTION

The *Buzz word* IoT has started growing in the middle of the world with various forms including wrist watches and bands, coolers, pens, wearable jackets, shoes etc. These devices are not limited to Internet-connected devices that include mobile phone, tablet, or handheld things connected together in a way to interact with others. All these objects get linked to each

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other through various objects. These objects include RFID, sensors, actuators, Nano of things, mobile phones, Zig-bee, Rasberry Pi etc. Hence there is a potential need for the invention of most convenient and smart devices. The adoption of different technologies in IoT for our day to day activities has become important as it makes all the personal and house hold work to get done in a most comfortable mode. The process of development of never-ending innovation has led to the complexity in standardization of the deliverable products, addressing and scalability problem. The four significant paradigms in IoT are People, Process, Data and Things. When people, data and things connect with each other, process plays an ever so integral part to the system. Process enhances connection by increasing the relevance of learning and optimizing its resourcefulness to what you need. Hence extended invention of research is needed in this scenario. *Creativity is thinking up new things. Innovation is doing new things*". Therefore the need of the era is to focus on invention of new smart devices. It is expected by 2020 this technology will transform the education system globally. Students will acquire knowledge in new ways and classrooms and teachers will be better equipped for education of students make the learning mode virtual. Classes no longer depend on blackboards and chalk to get the message across, and our learning centers are becoming more digital by the day. The future generation brings these aspects as a highlight into industry and society.

2. OBJECTIVES OF IOT

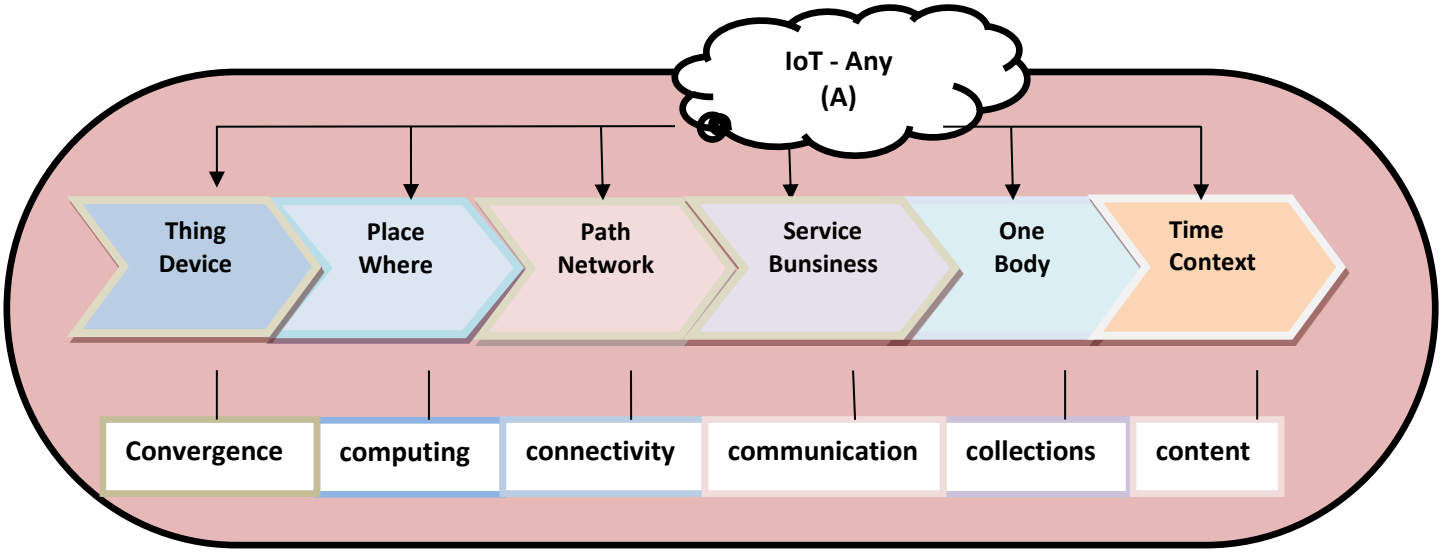

Figure 1. Objectives of IoT

The main goal of IoT is to extend the interconnection between informative devices such as tablets, mobile phones with smart objects to be available at anytime, anywhere and with anyone which is depicted in Figure 1. Some of the major objectives are stated below.

- IoT is to have extensive interconnection to meet the needs of the increase in the amount of the connected devices from several billions [1] to over hundreds of

billions which includes a massive amount of equipments, sensors, actuators, vehicles, and devices

- Secondly the aim is to go far more intensive information analysis due to the raise in networking devices powered by the electronic power [2] directly or by batteries
- The final goal is to provide intelligent service towards the extension of the devices that are connected in a wired or wireless mode communicating in different modes.

2. APPLICATIONS

The implication of IoT and its technologies has led to the innovation of new intelligent devices used for different applications. These devices are designed and developed holding the capacity of conversing with human. The end of 21st century (2020) will be a connected digital world with 8 billion connected devices 100 billion device with connections, making possibilities of anything being connected starting from cell phones, [1] coffee makers, washing machines, headphones, lamps, wearable devices in all modes. Man and Machine, Machine and Machine, Machine and Man and Man and Man. The scalability is to bring in *Smart Cities* where traffic signals are programmed to signal and guide in a right direction.

Table 1. IoT Devices and Domains

Intelligent Devices	Domain
Wearable, SmartPhones, Clothes	IoT & Private Needs
Education, Vehicles, Smart Houses	IoT in Groups
Smart Cities, Roads, Parks	IoT in Communication
Smart Industries, Crop Fields	IoT in Industry Sectors

The revolution of IoT has made the machines to think and act smartly. One simple design with smart devices which is the expectation in the near future of this digital world [2] and the way it reflects on the life style of a person is stated through the functioning of a *Smart Clock* device. *Smart Clock* is coded in such a way that after it wakes up the person, it will automatically send an instruction to *Smart Tooth Brush* to apply the paste and keep it ready and thereby parallely commanding the *Smart Coffee Maker* to make the morning coffee [4] ready at an ideal temperature as required by the user.

Hence, the need for the design and development of intelligent objects are endless. Few of the day to day activities from ordering food, provision shopping and payment of bills is likely to happen with just snapping of a button. Towards industrial development IoT [3] has focused on the extensibility of connected sensors for everything from tracking parts to and making orders. The various applications, intelligent devices in various domain are depicted as shown in Figure 2.

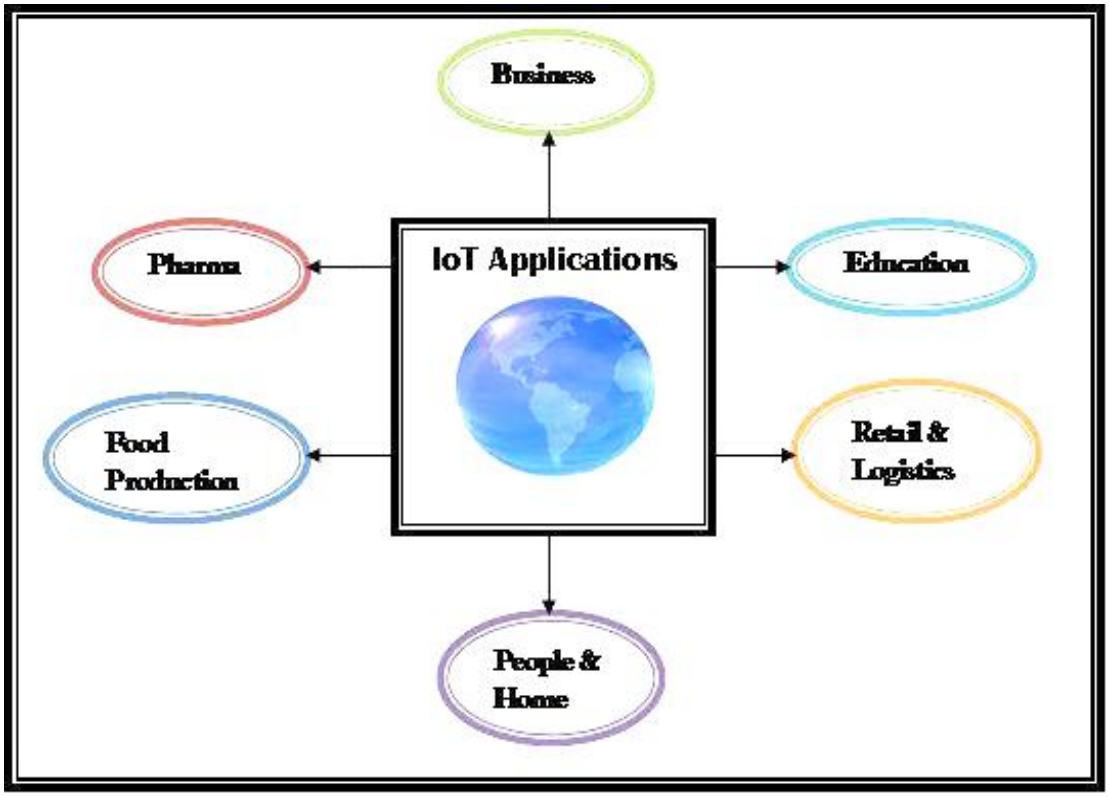

Figure 2. Applications of IoT

3. ROLE OF IOT IN EDUCATION

The growth of technology and the implication of IoT in education are huge and is expected widely that volume of data will transform the educational process perpetually. Students will be able to monitor their environment and collect real-time data like never before, and this will enhance their learning experiences. Students will become aware of every valuable information and all these *Smart Devices* will certainly make them appealing to come out with new ideas. *Intelligent Sensors* permit boundless connections through multitude devices that will allow content to be created anytime and anywhere with anybody. IoT has emphasized at another level of collaboration enabling the students [5] to access resources easily which was possible only within the campus. This platform connects the students with the availability of the teachers brings in a new wave of transformation among students and educators. As students walk into the classroom, attendance could be logged automatically using or through a wearable "smartband or RFID. IoT is expected to transform how we live, work and play by bringing remote automation to every facet of our lives, while also deliver advanced industrial applications. Student ID, for example, may be linked to a student's health record or family financial information. IoT in education makes students to meet with new challenging technologies [6-10] and as end process to raise up with new and smart devices. Hence the Internet will connect students to a world of experts who will be able to answer queries in real time and bring the full digital learning experience to life. The design and development of IoT in Future Education is shown in Figure 3.

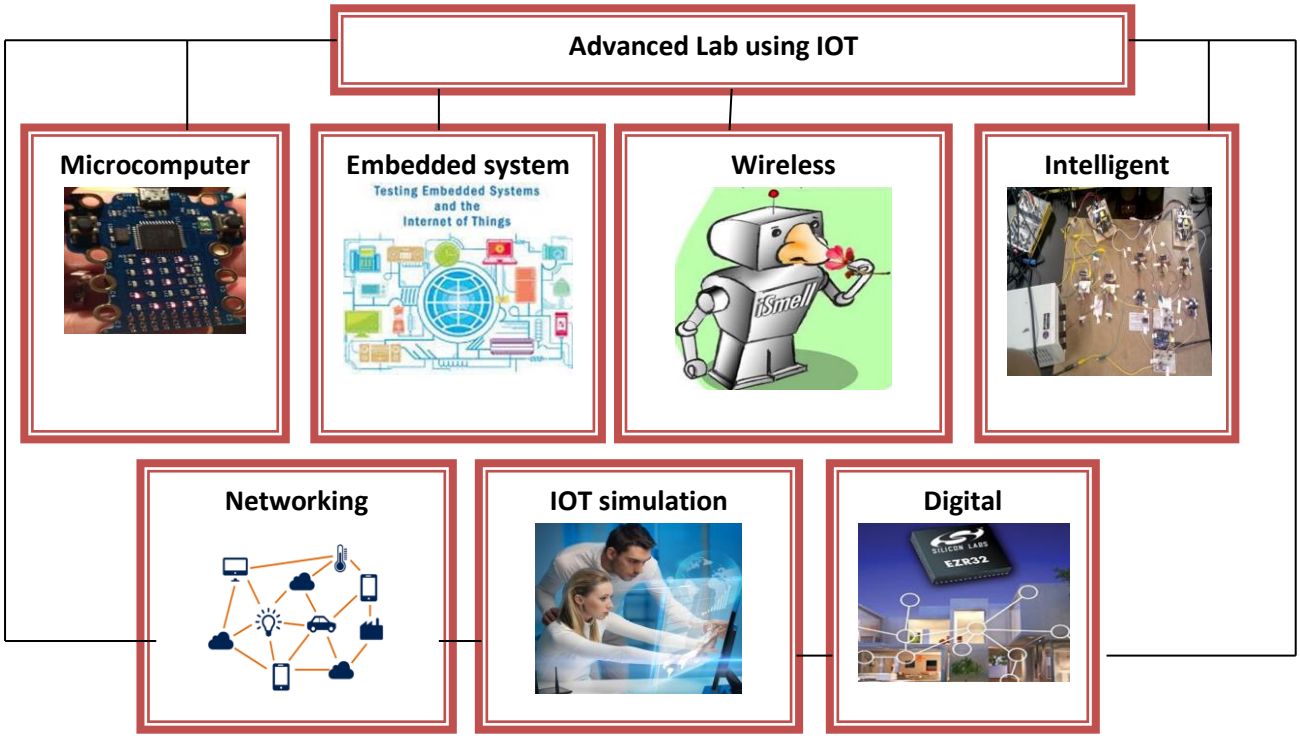

Figure 3. Future IoT Lab

The following table Table 2 refers to NMC Horizon Reports stating the upcoming technologies in the domain of teaching and learning.

Table 2. Upcoming Technologies in Education [NMC Horizon Reports]

Years of Inventions	Upcoming Technologies in Education		
2015	Bring Your Own Device (BYOD) Flipped Classroom	Makerspaces Wearable Technology	Adaptive Learning Internet of Things
2014	Adaptive Learning Internet of Things	3D printing Gratification	Quantified self Virtual assistants
2013	Massively open online courses (MOOCs) Tablet computing	Games and gamification Learning analytics	3D printing Wearable technology

2012	Mobile apps Tablet computing	Game-based learning Learning analytics	Gesture-based computing Internet of Things
2011	Electronic book & Digital Content Mobiles	Augmented reality Game-based learning	Gesture based computing Learning analytics
2010	Mobile computing Open content	Electronic books Simple augmented reality	Gesture based computing Visual data analysis
2009	Mobiles Cloud computing	Geo-everything Personal web	Semantic-aware applications Smart objects

4. CONCLUSION

Various technologies and issues with respect to green IoT, plays a significant role in achieving a sustainable world. The best way to *predict the near future is to invent* it. Laboratory based on IoT intelligent management system designed interconnection provides a user-oriented intelligent application and advanced laboratories to the best service level through "smart" lab for biometric user services, video surveillance, electric power, environmental protection, equipment operation , maintenance management system and intelligence.

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