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The Internet of Things: Realizing Potential Applications and Challenges in Higher Education

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Introduction

- IoT- System where internet is connected to the physical world via ubiquitous sensors (Gokhale, Bhat & Bhat, 2018)
- IoT is a revolution in advancing technology to change the lifestyles of humans (Li, Xu & Zhao, 2015)
- IoT- Synonym for a fully interconnected world (Gubbi, Buyya, Marusic & Palaniswami, 2013)
- Gaining acceptance in the higher education sector
- IoT has the potential of revolutionizing education
- Iot narrows the gap between conventional education settings and modern-day education demands

Advantages of IoT to Education Institutions:

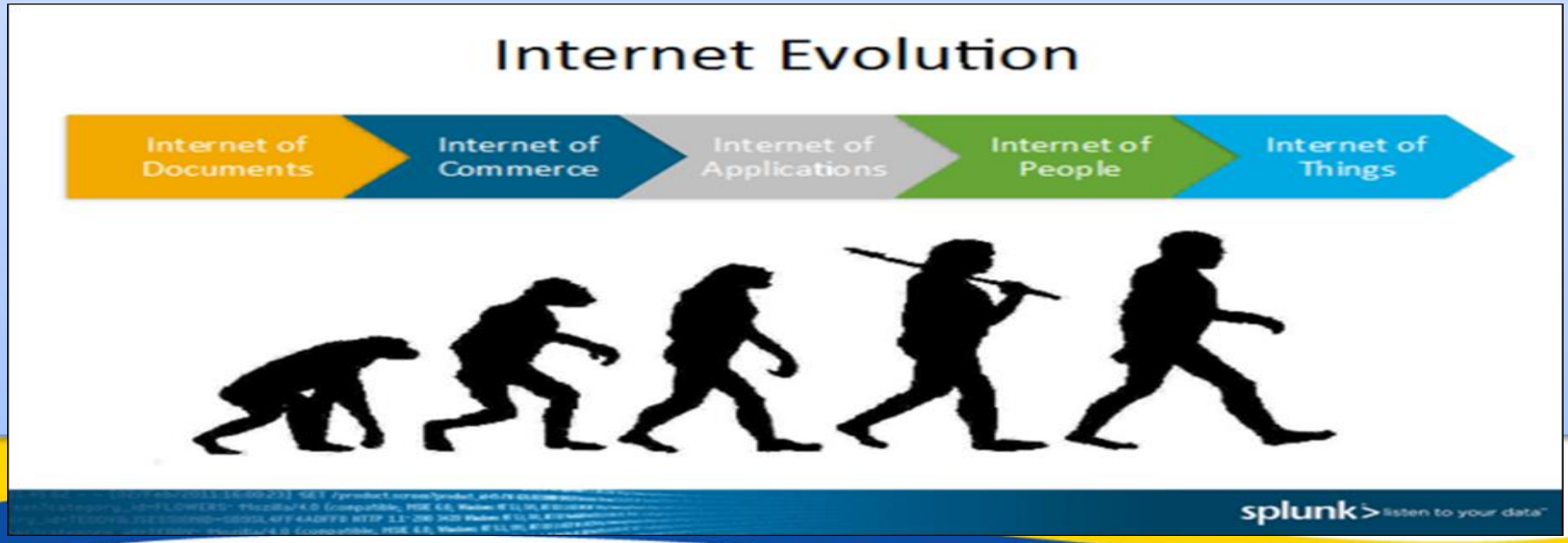
- Improvise how lessons are disseminated
- Support personalized methods
- Proactively monitor institutions infrastructure
- Utilize cost-efficient lighting, cooling and heating procedures
- Provide a secure environment for students as well as educators

Concept of IoT

❖ The evolution of the internet can be classified into five eras as shown below:

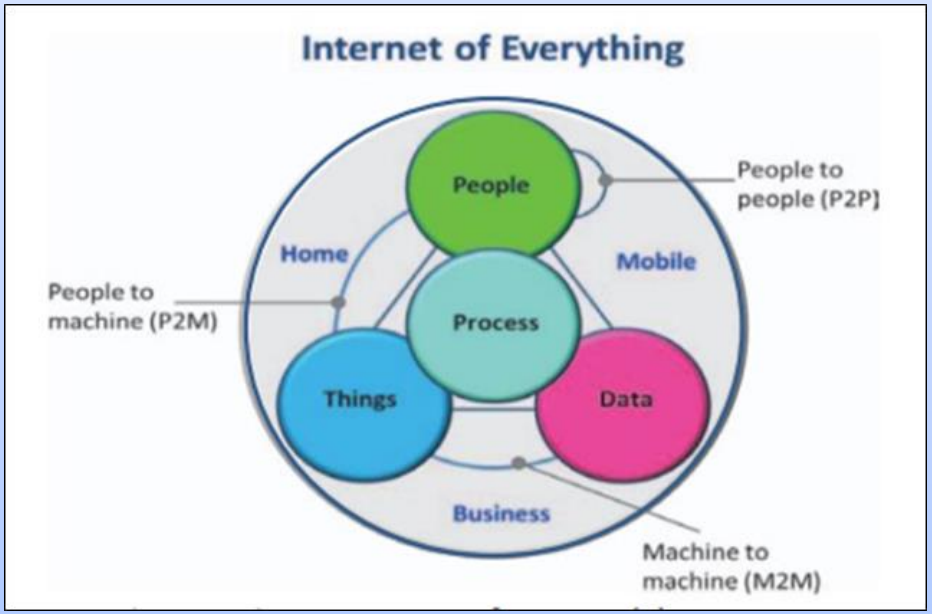
(Li, Xu & Zhao, 2015)

- The Internet of Documents-e-libraries, document based webpages
- The Internet of Commerce- e-commerce, e-banking and stock trading websites
- The Internet of Applications- Web 2.0
- The Internet of People-Social Networks
- The Internet of Things-Connected devices and machines



Concept of IoT

- IoT which is also known as the ***Internet of Everything*** is an extensive Internet-based network which multiplies tremendously the communication between **Human to Human (H2H), Human to Things (H2T) and Things to Things (T2T).**



Internet of everything

(Source: Cisco White Paper, April, 2011)

IoT Scenarios in Education

- Magnify content delivery, augment learner and faculty interaction
- Radio Frequency Identification (RFID) codes can be used to identify and trace people, processes, data, and things

(Selinger, Sepulveda & Buchan, 2013)

- IoT devices to initiate a campus lockdown system

(Lutz, 2014)

IoT solutions for higher education :

- Improving instruction and optimizing learning
- Reducing energy consumption by innovations
- Locations of students are monitored
- Security for educators, students
- Cutting-edge and automated systems in key areas of study

Potential IOT Applications in Higher Education

- ✓ Internet-capable innovation and smart devices (e.g. tablets, smart boards, and so on)
- ✓ Massive Open Online Courses (MOCC), online software application and education applications

(Brandt, 2016)

- ✓ The IoT assists lecturers to make their work more practical and effective
- ✓ Wireless Sensor Networks (WSN), Radio-Frequency Recognition (RFID) chips and Cloud-based applications

(Ralhan, 2017)

Potential IOT Applications in Higher Education

The smart devices executed in the classroom, such as digital highlighters and interactive boards improve the collaboration amongst students, instructors, mentors and colleagues throughout the world

(Maksimović, 2017)

Challenges of IoT Utilization

1. Malware.

- Malware and cyber-attacks are a growing problem which needs to be addressed immediately
- Malware (such as viruses, worms and trojans) can be spread by social media, email, documents, removable media, programs, or by downloading sources from the Internet.
- Cybercriminals are capable of hacking into campus' network

2. Distributed Denial of Service (DDoS)

- 'Denial-of-Service'(DoS) is a cyber-attack which occurs when an individual or a group of people disrupt a website which in turn denies access to clients.
- A large-scale DoS attack where the perpetrator uses more than one unique IP address is known as a DdoS

(Khalifeh, Soltanian & Reza, 2015)

- DDoS makes university resources inaccessible to students and staff

Challenges of IoT Utilization

3. Data management.

The massive amount of data from sources around the world that will be generated by IoT will create issues concerning data storage.

4.Data Security and Privacy

Students, faculty and staff would have no control over personal information embedded in object tags

(Simmers & Anandarajan, 2018)

5. Connectivity

One of the most significant challenges will be to connect as many devices as possible as it would counterattack existing structures and technologies associated with it.

Suggestions to overcome challenges

- ***New methods of selecting storage of data on a cloud***
- ***Reliability of the network which manages IoT applications should be enhanced.***
- ***Research and development on designing and developing IoT devices***

Conclusion and Future work

- The digitization of education is a powerful vision as the IoT is making an impact
- Utilization of the full potential of IoT applications with complete and effective security systems.


obrigado
Dank U
Merci
mahalo
Köszi
спасибо
Grazie
Thank you
mauruuru
Takk
Gracias
Dziękuję
Děkuju
danke
Kiitos