

Potential of IoT in Higher Education

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ABSTRACT

In the coming years, technology will impact the learning experience in many ways. By supporting IoT, educational institutions can enable more advanced learning and improve learning outcomes. The purpose of this research is to find the potential of IoT in higher realms. It takes effort to realize the full potential of IoT systems and technologies. This article presents research on the impact of IoT on higher education, specifically universities. IoT will dramatically change how universities operate and improve student learning. Brings great potential to universities and other educational institutions. The Internet of Things requires developments in which universities can play a pioneering role. Researchers and students are uniquely positioned to drive IoT discovery and development. Furthermore, this paper provides evidence of this. The future of IoT in higher education in the coming years is a big challenge for higher education.

KEYWORDS : *Internet of things, Higher education, Aspect of IoT, Potential of IoT, Components of IoT.*

INTRODUCTION

The Internet of Things (IoT) is a transformative process in many aspects of our daily lives. Technologies differ from previous innovations because they are widespread and drive solutions. Advances in IoT are an important strategic technology trend. Ubiquitous sensors and the ability to bridge the gap between the physical world and the machine world. A major paradigm shift is the ability to integrate sensors into any object and use machine-to-machine (M2M) communication.

The Internet of Things is growing rapidly and is becoming an exciting and exciting topic. There are many signs that the Internet of Things will change the sector, including higher education institutions, especially universities. Become a pioneer in Internet of Things technology development with innovative and creative models.

IoT is a global physical network that connects devices, things and objects to the Internet. It is structures that communicate or interact with the internal and external environment as shown in Figure 1, the purpose is to

exchange information through speech recognition devices. Therefore, IoT can be connected to anything and anyone from anywhere. The goal is to identify, track and manage assets. Online networks expand human-to-human (H2H) communication. Human-to-Thing (H2T) or Thing-to-Thing (T2T), as shown in Figure 2.

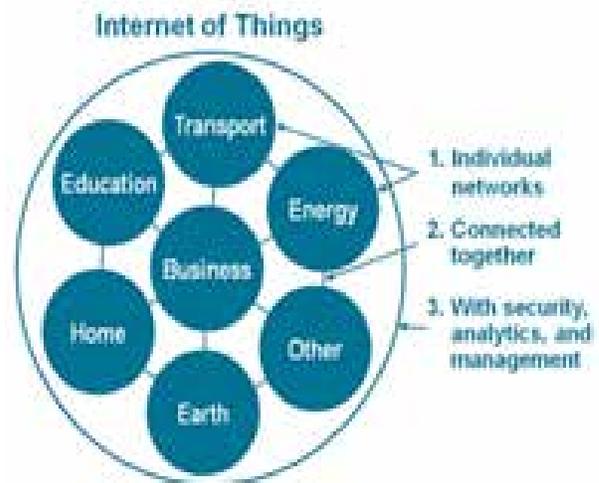


Fig. 1 IoT viewed as a global network
(Source: Cisco IBSG, April 2011)

BASIC COMPONENTS OF IOT

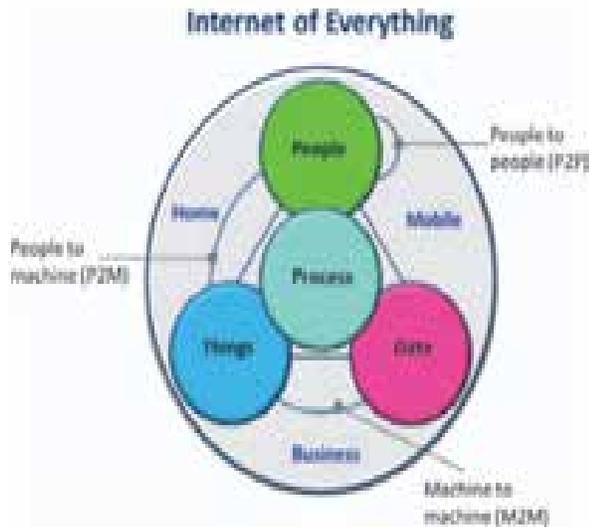


Fig.2. Internet of everything
(Source: Cisco, April 2011).

Many research institutions and analysts are predicting the future of IoT and its potential impact on the Internet. Billions of physical devices around the world are equipped with digital sensors and connected to each other using arbitrary networks. By 2023, 4 billion devices will be connected, more than the entire population on Earth at the time, and that number is expected to triple to 38. The ability to interact with many everyday objects connected to the Internet provides access to unlimited information anytime, anywhere.

The IoT vision is based on the belief that microelectronics are constantly evolving. Communication and information technology as we have come to know it in recent years will continue to exist for the foreseeable future. Applications of IoT are already being used in areas such as healthcare and customer service. Sometimes it's obvious how the Internet of Things will benefit education, but sometimes it's not so obvious. The biggest impact of connected devices is on higher education and its associated potential impacts.

The future of universities is not the use and application of new technologies. This article provides an overview of how IoT is impacting the future of higher education. Some aspects of IoT are relevant to the higher education sector.



Fig 3: Technology convergence
(Source: Friess, 2013)

IoT is helping technology researchers to develop cheaper wireless devices. It is a system that requires less energy and can be integrated into all kinds of devices . The three IoT components that enable seamless connectivity are: Hardware: sensors,actuators and embedded communication devices, middleware: storage and computing tools for data analysis and presentation: new and easy-to-understand ideas and interpretations Tools are available on various platforms and can be designed for different purposes. Communicating with IoT nodes, from embedded technologies like ZigBee to low power with wireless technology and the power of bit-by-bit transmission, IoT will surpass other formats. Develops industrial and personal technology systems that enable microcomputer design for wireless data Communication. Some of these technologies may add some form of wireless sensor (WSN) capability.

CONCEPT OF DIGITAL CAMPUS

In the digital campus, technology can reduce operational costs, increase security and provide tools for students ,staff and researchers . Its benefits provide real value to university activities, operation and development ,student and researcher experience. Firstly it reuses the IT service delivery platform (end-to-end infrastructure) to provide network connectivity, mobility and security to all applications and services to all over the camp. Second, there are many Internet of Things (IoT)

applications. It is managed through a platform system that supports academics and enables training and coaching. “To improve educational experience and improve performance”: IoT applications differ from traditional methods. IoT Digital campus applications include five main areas: Building Control and Management; security and access control; video and information systems; location and attendance system; Energy Monitoring and Control system as shown in Figure 4:

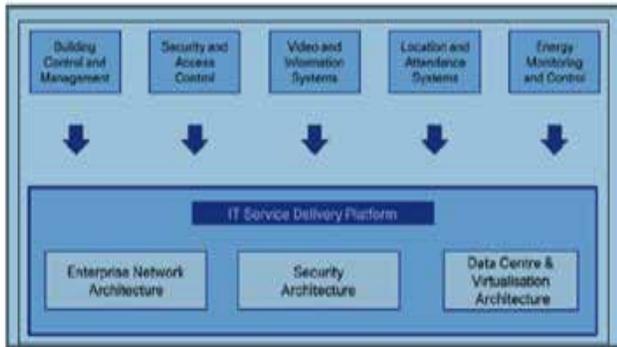


Fig. 4: IoT Applications for the Digital Campus
(Source: Cisco- Digitizing Higher Education to enhance experiences and improve outcomes.)

Wireless networks play an important role in digital schools and must be designed accordingly. There is a huge need for new universities.

Additionally, IoT is reinventing and transforming teaching and learning on campus. For example, IoT adopts a similar perspective on education, and by distributing educational spaces, training centers, sports venues, dormitories, restaurants, and students on campus, students can access the campus anytime and anywhere through the Internet of Things. You can go to physical, mental, and skill-based places where you can pick up a whole range of learning and training. This will lead to universities becoming ubiquitous learning and training .

IMPACT OF INTERNET OF THINGS ON HIGHER EDUCATION

Higher education institutions in general, and universities in particular, can collaborate across disciplines to advance advances in IoT technologies, business models, and ethics, and drive future IoT-enabled economies. We can also collaborate with business schools to define and design his IoT courses to develop new business models.

According to Zebra Technologies, higher education institutions will begin to develop and use solutions such as radio frequency identification (RFID) and cloud computing using his IoT technology, allowing them to analyze and manage big data.

The Internet of Things is not only renewing technology and developing the industry, but it is also leading the industrial development. Extending the changes to the wider community, including higher education institutions. Leading change and innovation in higher education. The Internet of Things will cause changes in educational technology, changes in education, changes in teaching, and changes in functional observations of student performance. These days, especially university students, E-learning applications allow students to learn at their own pace and relearn. Classroom and home experiences increase progress and satisfaction. Teachers can provide individual training and continuous assessment of students . IoT technology allows teachers to collect data on student performance and make informed decisions. This data analysis helps educators make the right changes. Connected tools allow educators to intervene and to keep attendance records simplified. It offers warm-ups and exercises that students can do on their own equipment. Educators can monitor students’ mental performance during class. Addition, these tools can divert the student’s attention.

This knowledge enables organizations to make informed decisions to enhance knowledge and experience of student learning, administrative skills, and campus safety. According to Zebra Technologies (2015), by improving asset knowledge, educational institutions can improve operational efficiency and a safer campus design.

Likewise, outside the classroom, universities can use connected devices to conduct assessments and monitor students, staff, resources and assets and reduce operating cost. Mobile technology and IoT can help universities improve campus safety and enhance access to information and applications at any time from anywhere. IoT is transforming not only facility management but also the learning experience for students by connecting people, data, and things.

FUTURE OF IOT IN HIGHER EDUCATION

Universities have long recognized that technology can disrupt teaching, learning and assessment. Furthermore, technological change is essential. If the modern university is to differentiate its students' access to high-quality educational programs and content then they must have the ability to train students to use new technology effectively. With the development of IoT, many universities have benefited from it. The Internet is firmly entrenched in universities, and e-learning is common in most university systems, as well as IoT enables better operational efficiency and learning environments. IoT can support classroom teaching by improving the learning environment. It also improves teaching resources, improves teaching methods and techniques, increases administrative efficiency and saves administrative costs. Learning resources on devices such as e-books however, there is a need for new teaching technologies. Technology enhances the learning experience in many ways. The learning experience continues to become more virtual, students will consume knowledge and learn in new ways and classrooms. In the end, learning is an amazing experience. Teachers and students accelerate knowledge while providing new ideas and solutions. It also prepares students for their future careers and workplaces.

Technology will always have a place in all education sectors. Opportunities to study science, technology, engineering and mathematics (STEM) courses, e.g. IoT technology. It's easy to imagine how IoT capabilities could be used in STEM fields, robotics, and anything that involves collecting specific data. And all of this within the potential of the Internet of Things. Ultimately, however, educators must be able to identify the right technology and properly integrate it into the classroom for successful learning. While the core technologies of IoT are not yet clear, the point is certainly that much of the content is a result of 's new development phase. Given the need for advanced study, choosing the Internet of Things major is relatively easy and applies to graduate students. However, undergraduate students still require a wide range of core courses, so it is not easy to choose an IoT major on your own like other majors . New teaching methods for undergraduate students need

to be explored . Different universities should consider the appropriate approach according to their specific characteristics. The system approach and course content must be gradually established and improved. As IoT achieves unity between the virtual world and the physical world, many new learning methods and cross-sectional areas will emerge in the future .

Additionally, the future IoT economy can be shaped by experts and leaders in higher education. Therefore, the field of higher education must work together, Companies and industries to shape and build the future of the IoT-enabled economy. The higher education sector, particularly universities, has the potential to drive the future of IoT course design Technologies for technical and business leaders and student support and researchers are working in a variety of ways to develop new business methods that utilize IoT technologies.

CHALLENGES OF IOT IN HIGHER EDUCATION

The Internet of Things brings a lot of challenges and opportunities to higher education. The unique growth of ubiquitous computing, the development of his IoT technologies such as cloud computing, big data, and analytics not only improve the core values of education and the quality of research, but also contribute to the development and promotion of education. will also contribute. New digital culture of IoT society. With an increase in online degree options and seamless access to course content in structured and unstructured formats, IoT is introducing digital dynamics to higher education institutions. The IoT represents a dramatic shift in traditional educational paradigms, while integrating a broader range of disciplines, including the social sciences, to enhance the value of big data available on social media. Some of his IoT challenges in higher education include:

Cloud Computing

Many universities are using hybrid cloud as their enterprise architecture to host IoT applications. Millennials, the most tech-savvy students in college, and the rise of tablet and mobile technology have opened new ways to increase the effectiveness of enterprise architecture, educational technology, and research and learning environments. With ubiquitous computing,

the cloud provides seamless connectivity and services for information technology services. Currently, many higher education institutions' enterprise architectures rely on hybrid cloud infrastructures with private cloud computing platforms, but enterprise and educational applications are gradually moving to the public cloud. The demand for content in educational technology, the significant increase in audio and video content for education, and the need for active enterprise networks require that the enterprise architectures of these institutions reduce latency.

Instructional Technologies

The use of LMS learning management systems such as Moodle and Blackboard is increasing and creating large amounts of structured and unstructured data, including audio and video. It gives an opportunity for students to access educational programs on demand at any time .

Mobility Applications

IoT applications can integrate mobile learning applications. The ideal application helps students improve their learning effectiveness. Some of these applications are also used by teachers to teach highly specialized concepts, complex physics, scientific simulations, and social topics.

Security and Privacy

Deploying IoT technology brings new and unique security and privacy challenges. Ensuring the security of IoT devices and services requires addressing these challenges and issues. One of the fundamental criteria of IoT is reliable privacy and security mechanisms . Higher education is vulnerable to security. The industry needs to develop standards to secure IoT applications. Because higher education creates millions of people. Applications must morally and ethically engage the future workforce to address cybersecurity issues. Society is becoming increasingly dependent on IoT applications. Therefore, developing effective and appropriate solutions to address IoT security challenges requires a collaborative approach to security and protection. Additionally, realizing the full potential of IoT requires strategies that consider people's privacy. Therefore, to take advantage of these opportunities, new strategies must be developed that take into account.

Research Computing

Higher education will continue to benefit from the introduction of the IoT. Using big data, small universities can increase the breadth of interdisciplinary research and put in high performance computing (HPC), big data platforms and analytics. The need to define cooperation with the IoT ecosystem that uses mobile technology. Technical laboratories use audio and video, UAV, Raspberry Pi and open source systems for improving the learning process in engineering programs. A lot of big data generated by social media and general computing is still being used. through distributed computing platforms such as HPC, GPU clusters, Hadoop clusters and big data analytics to improve IoT research.

Quality and Ethics

The quality of learning both online and on campus and the rising cost of higher education has been intensely debated in latest years. The IoT offers unique opportunities to deliver digital courses. However, it also introduces challenges to maintain the quality of instruction and evaluation of students' work. IoT educational applications need tools and technologies for instructors, professors and the scientific community to improve the quality of research and address ethics issues within higher education.

Financing

The cost of information technology increases over the years depending on content and application. In addition to information technology IoT infrastructures operating costs, information technology infrastructure and services cost is increasing. Higher education needs to develop new ideas for funding information technology infrastructure and services.

FUTURE WORK

Technological advances such as the Internet of Things will help universities solve many challenges. IoT systems have great potential to create greater value.

CONCLUSION

The aim of this research is to examine the potential of IoT in higher education and find ways to increase it. You

can reap the benefits of solving the problem and reduce the problems associated with it. The project focuses on the implementation of IoT in higher education.

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