Role of Internet of Things (IoT)

In Promoting Sustainable Economic Growth in India 2047

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4. ROLE OF INTERNET OF THINGS IN HIGHER EDUCATION

G. KAVIYA & DR. M. MEHAR BANU

Abstract

Technology will impact the learning experience in many ways. Internet of Things (IoT) continues to confirm its important position in the context of Information and Communication Technologies and the development of society. With the support of IoT, institutions can enhance learning outcomes by providing more affluent learning experiences, improved operational efficiency, and by gaining real-time, actionable insight into student performance. The purpose of this study is to find out the potential of IoT in higher education and how to maximize its benefits and reducing the risks involved with it. Further efforts are necessary for releasing the full potential of IoT systems and technologies. Therefore, this paper presents a study about the impact of IoT on higher education especially universities. IoT stands to change dramatically the way universities work, and enhance student learning in many disciplines and at any level. It has huge potential for universities or any other educational institutions; if well prepared to ensure widespread and successful implementation by leadership, staff, and students. IoT needs development where universities can lead. Academics, researchers, and students are in a unique place to lead the discovery and development of IoT systems, devices, applications, and services. Moreover, this paper provides an evidences about the future of IoT in the higher education during the next few years, which have

offered by a number of research organizations and enterprises. On the other hand, IoT also brings tremendous challenges to higher education. Hence, this paper also presents the perspective on the challenges of IoT in higher education.

Keywords: Iot Education, Higher Education, Enterprises

Introduction

Internet of Things (IoT) is the transformation process in numerous aspects of our daily life. IoT technologies differ from previous innovations as they are ubiquitous, and encourage solutions to be intelligent and autonomous. Advances in the IoT are a major strategic technology trend. Ubiquitous sensors and the ability to bridge the gap between the physical world and the machine world were perceived as the conceptual framework for the new learning model. The thinking behind this great paradigm shift is the ability to embed sensors into any object and use Machine-to-Machine (M2M) communication to connect billions of objects/devices to the current Internet infrastructure. The entirety of the physical world is coming online rapidly IoT is developing quickly and becoming an increasingly growing topic that creates excitement and anxiety around the world. There are plenty of indications showing that the IoT will to change many sectors, including higher education institutions, especially universities. Now, universities has an opportunity to lead the technical development and the innovations models for the IoT, and to build the leaders of the IoT into the future, as well as to address the TIPPSS risks which stands for Trust, Identity, Privacy, Protection, Safety, and Security related to the IoT.

Basic Components of IOT

The IoT is empowering technology researchers to develop smaller and more affordable wireless systems that consume less power

and can be integrated into almost any type of device. There are three IoT components which enable seamless connections which are: Hardware: made up of sensors, actuators and embedded communication hardware, Middleware: on demand storage and computing tools for data analytics, and Presentation: novel easy to understand visualization and interpretation tools which can be widely accessed on different platforms and which can be designed for different applications [10]. There are a number of potential approaches for introducing low-power communications to an IoT node, ranging from purpose-designed protocols such as ZigBee to low power variants of Bluetooth, Wi-Fi and NFC. Although Wi-Fi is the most popular form of integrated wireless technology and the best power-per-bit transmission efficiency, IoT enhances other formats including Radio Frequency Identification (RFID) technology which is used throughout business, industry and personal technology systems and enables design of microchips for wireless data communication [10]. Some of this technology can add wireless sensor capabilities (WSN) to any type of device, like FitBit wearable fitness trackers, and books.

Impact of Internet of Things on Higher Education

The IoT is going to affect every part of society at some point in the near future. Higher education institutions in general, and universities in particular, can work across disciplines and lead the progress of the IoT technologies, business models, ethics, and leaders of the IoT enabled economy of the future. For instance, university instructor of computer science and engineering are directing IoT labs for the development of IoT technologies. In addition, Informatics College can teach how to leverage the sizes of IoT data, with TIPPSS. Also, they can work with business colleges to set and design IoT courses to create new business models. Medical colleges can empower the Internet of Medical Things as well as, Law colleges can teach IoT ethics, privacy, and policy. According to Zebra technologies, as higher

education institutions commence to develop and leverage solutions such as radio frequency identification (RFID) and cloud computing through IoT technologies, they will be able to analyse and manage Big Data.

The IoT is not just a technology update and development within the industry, but can lead to expand the change to the whole society including higher education institutions. IoT will lead the change and reform the higher education institutions. According to, IoT will lead to changes in educational technology, reform the education, change in teaching, change in learning, management of change, experimental and practical changes, changes in campus, teaching resources changes and others. With the development of IoT, the prospective application in higher education lies in the three aspects: students' progressive evaluation, integration of current teaching platforms and development of educational middleware. This change provides increased convenience for students, and makes the teaching process more effective for instructors and professors. The flow in connected devices and technology means that instructors and professors can focus on the actual learning that is more useful to the students rather than perform the routine task.

Future of IoT in Higher Education

Universities have long realized the ability of technology to disrupt teaching, learning, and assessment. Furthermore, technology disruption is fundamental if a modern university is to distinguish its student offer, so increasing admissions, improving retention, and delivering desired outcomes. But preparing students to be confident for the world of work is complex. It requires strong academic leadership, access to a high quality curriculum and content, and the exposure of students to the effective use of new technology. With the development of IoT, many institution of higher education have started

to focus on the related technology and application of the IoT. This attempt is also used in university. The Internet has deeply rooted itself into colleges and universities, and e-learning has become common practice in most universities systems. Although it is not an obvious application of the IoT, however, education is on that list and the applications of the IoT in universities are numerous, and the implications for this are massive. IoT will allow for better operational efficiency in all learning environments. IoT can support classroom instruction by improving learning setting, enhance learning resources, improve methods and techniques of learning, raise management efficiency, and save management costs. The resources available for learning on devices, like e-books, are more engaging and interactive. However, there is a constant need for new technologies for learning process, for instance, high-speed wireless networks with the bandwidth for streaming audio and video lessons.

Moreover, the future IoT economy can be shaped by experts and leaders in higher education sector and by educating the students [23]. The development within higher education systems will visualize, improve, and lead the new technology innovations. Therefore, higher education sector must work with business and industrial sectors to shape and build the future of an IoT-enabled economy. Furthermore, higher education sector, especially universities, have the opportunity to lead the future of IoT technologies by designing courses for technical and business leaders and by facilitating students and researchers work to build new business methods that leverage IoT technologies in a multidisciplinary way.

Challenges of IoT in Higher Education

IoT brings tremendous challenges and opportunities to higher education. The unique growth of ubiquitous computing, developing IoT technologies such as cloud computing, and big data and analytics

are helpful not only in improving the core values of teaching and quality of research but also developing an IoT society and encouraging a new digital culture. With increasing online degree opportunities and seamless access to instructional content in both structured and unstructured formats, the IoT leads digital momentum into higher education institutions. IoT is a dramatic shift in the traditional instructional paradigm while integrating broader disciplines, including social science, to enrich the value of big data available from social media. Some of the IoT challenges in higher education sector include:

I .Cloud Computing

Many universities are using hybrid cloud as their enterprise architecture for hosting IoT applications. The combination of millennials, the most tech-savvy students in the universities, as well as the rise of tablet and mobile technology, has opened new methods to increase the effectiveness of enterprise architecture, instructional technologies, research and learning environments.

II. Instructional Technologies

The growing use of learning management systems LMS like Moodle and Blackboard is creating massive amount of structured and unstructured data such as audio and video content. Sophisticated electronic schoolrooms equipped with lecture capture systems and web streaming provide an opportunity for students to access instructional contents on demand at any time

III. Mobility Applications

IoT applications are being increasingly used to integrate mobile learning applications and for assessment and grading systems. The ideal application can assist students to benefit from learning resources, manage assignments, and work on tasks. Instructors also use some of

these applications to teach highly specialized concepts, complex physical, scientific simulations, and social topics.

IV. Security and Privacy

The implementations of IoT technologies present new and unique security and privacy challenges and issues. Addressing these challenges and issues to ensure security in IoT devices and services should be a fundamental priority. One of the fundamental criteria for IoT is the need to include effectual and trustworthy privacy and security mechanisms Higher education is vulnerable to the security and privacy of the IoT ecosystem.

V. Research Computing

Higher education continues to benefit from IoT integration. As the cost of hardware reduces, interdisciplinary research has gained momentum in the last years. In addition, with the availability of big data, even smaller universities can increase their interdisciplinary research footprint and put in high performance computing (HPC), big data platforms, and analytics.

Conclusion and Future Work

With the advancement in technology i.e. Internet of Things, universities can resolve many challenges such as; keeping track of essential resources, develop access to information, build smarter plans, and design safer campuses. IoT systems have tremendous potential to bring significant values to higher education by engaging and motivating the students and staff, and to increase speed of learning. The purpose of this study was to find out the potential of IoT in higher education and how to maximize its benefits while addressing its challenges and reducing the risks involved with it. Therefore, our future work will be to focus on IoT implementation in higher education.

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