REVIEW ON IOT IN ENHANCING EFFICIENCY AMONG HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

Educational institutions can utilize modern technologies such as IoT to deliver an interactive learning experience. The introduction of IoT in education will give rise to multiple applications that can enhance student safety, offer communication channels for global students, and assist disabled pupils. Today folks square measure creating most out of the technology; web accessibility has created procuring knowledge and staying connected terribly simple. Basically, web of things is simply associate degree extension of web property into hardware to assist in everyday tasks with the assistance of sensors has the potential to attach and act with things over the internet; management and monitor their performance.

IoT can provide an engaging medium for educating students and improve efficiency by automating certain administrative tasks. With this approach, educational institutions can make learning more agile and improve the quality of education.IoT created education additional interactive and fun means of learning. This paper reveals some of the areas where IoT has influenced in higher education sectors.

Keywords: E-learning, Student Tracking System, Physically Challenged, Smart Classroom.

INTRODUCTION

Internet of Things is also called as Internet of Objects. It usually connects sensors, devices, things and smart technology. It links or connects the object-to-object, object-to-machines, machines-to-infrastructures, person-to-objects and so on. In other words, we can say that a network that connects simple/ordinary physical objects to identifiable addresses that provide intelligent services and produces huge amount of data can be called IoT. In this point of time people connect a greater number of objects as compared to the number of people connected, that to from anytime and anyplace and one of the advantages is each being unique identifiable objects. These connections are multiplying at every point of time and forming a network of networks.IOT in it's in an early stage and is beginning to get attention worldwide. Even though the concept of IOT was coined by Kevin Asthon in 1999, the arrival of the microprocessor in the 1970s sparked the concept of IOT. There is a long way to go for us to make the vision of IOT practical as it is vast, it is predicted that IOT will grow more in the future.IOT has a vast scope in the education sector. Education is one of the most important macro activities in human life and the implementation of IOT in the educational has become a necessity. Be it developing countries or developed countries IOT would help easing the lives of human kind. In countries like India start-ups like Vedantu is one of the example of educating with the help of the internet. IOT is becoming a reality and according to prediction by the year of 2020 IOT will contribute to 6% of the global GDP.

IoT can be defined as smart devices communicating and interacting with other machines, infrastructure, objects and environment which produce data which are processed to provide useful action. Smart machines provide a very efficient and effective user interface which reduces human interventions in it. Creativity of today's era is IoT. It is being widely used in many areas such as healthcare, environmental monitoring, security, agriculture, education, efficient use of energy. IoT being an emerging technology which is try to make a very big footprint in the digital world have the capability to transform the traditional education system into a scalable, flexible, and highly interactive with its competent tools, sensors, actuators and storage technology. Making things much easier and more efficient by using embedded processing, sensors and more reliable connectivity in present technology is IoT. IoT will make it possible to develop the intelligent e-learning systems according to the student needs and educator capabilities in a highly interactive and effective way.

Introduction of IoT in education will lead to complete reforming of educational institutions. It changes the instructors, campus, management, teaching process, learning process etc. IoT also increases learning experience by providing various features in student learning. Nowadays many universities and other educational institutions have removed traditional learning processes. They have been currently replaced by technologies like tablets and laptops. This helps students learn at the pace at which they are comfortable. Also, it helps students have a similar learning experience at both home and college. IoT in education not only helps students, but also the instructors. The teaching process can be made a lot easier through the introduction of various technologies. It helps professors identify the pace of leaning of students and to focus more on those who need additional help in learning. This is indeed a huge advantage for the educational sector. IoT widely supports the concept of e-learning. The conventional system of books and papers is replaced by electronic devices and gadgets. This proves as a big change to students, thus increasing their interest in the process. Due to the introduction of intelligence in the process of learning, students are enabled to learn in a more interactive manner. It

also provides students the facility to learn from any geographical position. E-learning also makes the process of learning much simpler and helps students in their weak areas. It provides methods for the grasping of concepts more effectively. Carrying heavy books to college everyday would not be a problem for students anymore as they would be using electronic gadgets. It also helps in the conservation of environment as it leads to reduced usage of paper. Thus e-learning is an eco-friendly method of learning.

Concentration is a very common problem faced by students when it comes to learning. Most students are quite bored of the same old pen-and-paper method of learning. Introduction of new methods of learning would help them overcome their boredom and help them learn with more concentration and interest. Introduction of electronic gadgets in the educational sector helps in the increase of students' interest. Introduction of new features in their learning process helps them become more inquisitive and enables them to think and apply concepts in a much effective manner. IoT also helps to increase the level of enthusiasm in students. Interactive e-learning session help students understand easier and encourage them to come up with more questions. Student-friendly e-learning helps students in clearing their subject-related doubts. IoT also enables students to access vast resources and improve their knowledge in their field of interest. Instructors and educators can also get timely feedback from students regarding their education-related queries and doubts.

The current learning methods tent to suppress the creativity of students as they follow a uniform system. E-learning methods would be specifically designed to cater to the needs of each student individually. This enables students to spend more time on their area of strength and interest. Increase in level of creativity helps them to involve more in research work. Also, they tend to apply their knowledge in practical situations of life, thus giving rise to more and more useful inventions. This helps in the emergence of many new science enthusiasts. Thus, IoT helps immensely in building up the future of science and technology.

IoT carries incredible openings to higher education. The unique growth of computing or smart 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. The inimitable development of smart computing, rising IoT skills such as analytics, big data and cloud computing are supportive not only in increasing an IoT culture and inspiring a new digital ethos but also cultivating the principle standards of teaching and excellence in research.

LITERARY SURVEY

Abbasy, M. B., & Quesada, E. V. (2017) The IOT has a relatively lesser implementation in higher education but now has a new perspective about how IOT can enhance the learning capabilities of student but now one of the most common application of IOT would be education, it is very useful and efficient compared to the older methods of education as with IOT we have a bigger database and tons of resources. It also helps in better engagement of students as students are more attentive, curious, motivated and passionate about learning through the means of videos rather than just reading from a textbook. It promotes creativity as IOT is diverse and helps look at the world with a different perspective and the ability to connect the virtual and physical world. E-learning is also an important topic to talk about when we discuss IOT in education. E-learning not only helps to tutor but also connects the world. For example - a teacher can teach his/her no matter which part of the world they are in. Not only E-learning IOT also promotes self-learning. The internet is full of information it depends upon the individual's ability to take it. We can learn a lot of things from the internet from mastering a musical instrument to buildings a prototype of cars, helicopters,

etc. IOT promotes research opportunities as IOT connects the all the research papers, universities, journal, etc. It would be easier to collect the necessary information and process it. Hyper connectivity usually refers to billions of devices connected to each other simultaneously, many have predicted that the size and scale for IOT can reach 26 billion connected devices by 2020 and several others predicted 50 billion connected devices by 2020. A survey conducted showed that most of teachers believe that IOT is composed of the huge number of hyper-connected objects interacting between themselves it also showed that a majority of the instructors believed that the introduction to IOT in higher education increases cognitive aspect of learning.

Abdel-Basset, M., et.al.(2019) IoT enables advanced attendance tracking systems reducing proxy attendances in the institute. Advanced security measures will be improved within the campus restricting illegal bunking of classes. Wireless access of lockers using our own devices. Adaptive E-books provide human cantered learning better. Various security and privacy challenges have to be dealt with, due to the large amount of data flowing hence making students and faculty security at danger. The introduction of all these devices requires a huge investment as capital which puts up another challenge. Proper administration of these devices requires a lot of accuracy and efficiency. Sensors track busses and simultaneously delay school timings if required. International standard teaching available everywhere free of cost and uniformly across the globe.

Mathews, S.P., & Gondkar, D.R. (2017) High potential of IoT in education attracts the parents to choose this method to yield the full potential of their ward. Digital content is easily shared with every student and encouraged to do so. With high speeds of data flow there will not be any delay in acquiring the details and shortening disadvantages. Research also shows that in a physical environment created by IoT the output from the student is also relatively higher and more efficient. Different parameters like temperature, humidity etc was controlled and helped to produce a more successful student.

Sarıtaş, M.T. (2015) IoT helps schools and institutions shape their curriculum, assignments, tests etc to the developing world and innovations contradicting other theories. According to person to person IoT modifies the way it teaches, visually for better understanding and will help physically challenged persons included. Automated student tracking system helps track individual achievements and improves their co-scholastic skills as well. After installation it will allow the smooth flow data, but before it has to be setup accurately and maintained with up to date security and virus protectors. Protection of students with the use of IoT using multiple tracking signals and geo-fencing, this also allows monitoring of present location and status of their ward.

Aldowah, H., et.al. (2017) Data collection will be simplified and will be available 24/7 minimizing the physical effort to collect data repeatedly. Every object presents the information to the students when scanned by the RFID reader. Students can learn anywhere and share content with ease with IoT. Printing errors, typos, man-made errors will be cut down as this can be efficiently handled by technology. Personal expert advice or learning from distant places will now be simplified. Apt learning for everyone, depend upon their own capabilities and pace, which will be automatically recognized by technology. Instructions and deadlines will now never be forgotten, will be displayed to us base on our location as we leave the house.IoT will certainly play a very important role in education looking at the way it is expanding today. Students are interested in technologies and if they are surrounded by tech all around, they will discover their true potential.

Ning, H., & Hu, S. (2012) The IOT presents itself as a combination of virtual and physical objects to present transformation as real

world intelligent objects. As per the European research cluster. The 3 major effects of IOT are based on technology, humans and safety. The platform of IOT is combined to be used as an efficient model for decision making by collection and processing of information using network via crowed-sourcing. The concept for small learning due to personalized and human controlled design may have few challenges with regard to privacy and security. Though a final verdict in reference to the IOT can't be provided, yet the concept holds the power to let one complete effecting in the advancing knowledge arena.

A complete interactive session keeps the students engaged and alert giving real time feedbacks and communication through various possible means. The vast number of appliances connected together generates both the thinkable and unthinkable outputs hence not only giving the mainstream ideas but also creative ones. E-Learning is also advanced due to the high level of intelligence acquired from vast databases and smooth object-user interface. IoT promotes independent learning done by students by providing resources everywhere. It connects various institutes, research centres real time hence providing required and genuine information for R&D. Smart researching can help in working on more than one topic simultaneously and implementation faster. Integrated working of students from different parts of the world makes collaboration much easier without restrictions. The big volume of data available from various institutions can be accessed at high speeds.

Ali, M., et.al.(2017) IoT, as of now is in the early stages and there is room for further improvement and evolution of IOT itself in the educational field. It can redefine teaching and the instructional pattern can change completely. There are few keep factors that play a major role in the implementation of IOT. One of the key factors in the implementation of IOT are the people, the people play an important role as they are both the end user and the internet learns from the user and modifies itself accordingly. The interface is supposed to be user friendly as even a person who has no prior knowledge of the specific topic should be able to gain information from it.

Bulla, C., et.al. (2016)One can adopt the use of cloud computing in several ways for different levels of education. In the case of primary and secondary schools the implementation of a state wise server which is common through the state and each district could have a sub server which would sync with the main server. This would motivate children to learn and the subjects can be taught through animation. In the case of the pre-universities online tutorials could be uploaded where the students can access the information taught at school anytime and ask any query online to the instructor. Cloud computing helps redefine the traditional way of teaching and enhances the efficiency of the students.

MAJOR FINDINGS
There are incalculable possibilities for using IoT as a part of the educational system. People are making innumerable efforts in order to make IoT as a major in all colleges so that the work of the faculty members is reduced to just teaching and hence students can learn with an interest and interact with other students using the smart board enabled classrooms. Colleges all over the world are introducing IoT as a subject now because it has become a very important part of everyone's life. They desire to hire professionals in this particular field as professors who can help the students to learn what IoT exactly is and what all it can do. They help the students in making prototypes based on their own idea which later on turn out to be fully working projects that are being implemented all over the world.

IoT not only provides a learning platform for students but also ensures their safety and their progression towards the goal they have in mind. IoT helps us to monitor activities of all students in a huge campus easily using microchips and sensors. All the information about their location and their marks can be checked by the concerned authorities at any moment of time according to their desire. Scientists predict that in the coming years, those microchips might even become distress trackers which immediately inform the concerned authority if the student is in some danger which might help them to take an action immediately. IoT is an emerging field and has a vast scope still. Many things are still to be invented and people have been trying to get into this field to do so. The trained professionals have made use of a number of opportunities and have invented mind-blowing things just using some sensors and wires. IoT will help us in overcoming our hardships and shall help us to complete all sorts of tasks way faster than we are able to complete them today.

In educational sector IoT has contributions; it has brought the correct meaning for smart learning and smart education concept. It is making learning process more interesting and interactive. IoT is improving accuracy and efficiency by which easily committed errors can be prevented. This helps learners to save their precious time. Distance learning is also coming up as a fruitful way for educating mass at the same time and with quality faculty or resource. There is much in the distance learning which is being developed and in coming years it will become a great source and help in development of the county. It is a great source for the research fellows as they can easily access to the data and information required. IoT also helps students in promoting their creativity. Also, e-learning is an eco-friendly method of learning. The new features in learning process helps learners become more inquisitive and enables them to think and apply concepts in a much effective manner.

IOT in education has progressed drastically in the past decade. We have achieved many feats which would have been considered impossible. IOT in education has improved the quality of education. The advantage of IOT is that it benefits both developing and developed countries. It enhances the learning ability and is motivating many students to study. In a few cases the education quality provided by IOT is better and far more advanced than the traditional method of learning. It has made life easier. The advantage of IOT is that we can use it in every educational field from kinder garden to high schools to even universities. Even though not a lot of students have been able to adapt to the methods of IOT in education I believe with the development of every stream in the world one day each and every student would get access to the internet. As everything in life has its pros and cons even IOT has its cons, with every year, more and more smart devices like tablets and electronic books (e-books), smart boards, smart tables, interactive whiteboards, cameras, 3D printers, student identification cards, etc. are presented in the classroom the amount of e-waste and the electricity consumption increases. This is really bad for the environment as we are at a critical point where we need to think about sustainable use of IOT. One of the major popularity of IOT is that we can access the data from any part of the world. IoT in education will have a huge impact on the lives of students. As this will include various adaptive methods of teaching, sharing information and person oriented skill enhancement. It will also allow faster and easier research to be conducted by people due to the linking of institutions and databases. Even though there are some challenges like security of all these data, privacy of all student's identity, investments to start this huge revolution.

Internet of things is a growing technology that connects virtual things to real-life objects. It is a very important part of future of internet as it connects ordinary objects with artificial intelligence. The world is developing at a rapid rate and hence it is necessary to be in pace with our surroundings. IoT helps us in this process by making day-to-day activities easy for us by merging technology in our life. As the processes are completely driven by machinery and there is no human intervention

required, it is quite efficient. IoT enables objects to be sensed and controlled using networking sources like the internet. Thus, IoT allows connectivity for anything and anyone around the world to be networked. IoT was mainly introduced to reduce load on humans as controlling objects through networking is much easier. It is also time-efficient and reduces the possible glitches and errors. This system allows connections to multiply and create an entirely new network of interconnections. This technology mainly relies on the use of sensors and telecommunication.

A very important sector where IoT is beginning to make an entry is education. The education sector is one of the most important sectors. It has been witnessing drastic changes and development since ancient times. In modern times application of IoT in education sector has been viewed very significantly. Online education provides a wide platform for the process of e-learning. E-learning is a comparatively better way to increase efficiency and learning process. IoT offers a variety of features for easy learning to students. It greatly influences the learning process by drastically changing the common way of learning and making learning process much more interesting. E-learning also introduces components like intelligence and object interaction in the process of learning. Due to virtualization of learning, students get access to a wide database of learning resources. This widely helps students to gain vast knowledge and helps those who are greatly interested in research projects.

CONCLUSION

IoT will become a reality in the near future, with great investments and more advanced security for the huge volume of data stored in clouds which will be accessible anytime to all students. In my point of view these should be done keeping in mind the fact that it should be human-centered, secure, well-planned and well executed because a fault in the implementation could cause the identity of millions of students in wrong hands. IoT in education is about the skill of learning new things especially. Like, if a student wants to study an object, then only by touching the object information will be displayed. Using mobile which are now-a-days connected with our PC and we can access it anywhere and anytime is contributing a lot towards smart learning. The availability of the educational tools or the material is easy. And, the educational material can be easily shared among the students and also by the teachers. The distance learning program are introduced by which millions of students can learn at the same time or anytime and as many times they want, the institutes provide them a source(workstation) through which they can access to the server and study. There are many free channels as well which are easily accessible. Experts in fields can relate to, instead of going through a long process. For the students who are homesick or health issues or any other reasons can not only attend the lectures but also, they can participate in it wherever they are. IoT has enhanced assistant for special students, disabled students are provided with good-instructors and student to teacher interactions which will enhance the quality of education. This will ultimately contribute towards the development of the country. In the country like India where the youth population is very high so educating everyone is a big mission for the Indian government, the HRD department and IoT can help us to provide education to everyone. The educated youth will surely contribute towards the development of the county.

With increasing online degree opportunities and easy access to instructional content, 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. Developing a system of IP address where each student and instructor is given one we can connect each and every one to one platform that is the internet.

Students and instructors as the educational objects can interact in a real time.IOT removes the existence electronic walls, time limitations and other barriers between learners and large volume of resources such as experienced teachers, results of researches and solutions, and advanced lab tools. Students or teachers can access e-information that they need in seconds or minutes. It also minimizes the use of papers. Smart cities by using the IOT technology can provide an effective and collaborative e-learning or e-training platform to e-communities who can collaborate and bring cooperation to experience sharing, competency, new models of the e-business and that are needed for sustainability and maintenance of the city. A well-educated community will be compromised to the order, law, and participation, functionality of a city and life quality to the citizens

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