

Application of IoT in Education

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ABSTRACT- Global communication among individuals all over the globe has become a reality as the global Internet has evolved through time. With the growth of the Internet of Things, sentient, human-to-machine, and device conversations have all been transformed into interaction among everyone and everything that is related to people, individual, and device communications (IoT). As a result, the Internet of Things has been enabled to capture all aspects of human life, including safety and security, medical treatment, recycle, ecological monitoring, and so on. This article discusses the relevance of IoT technologies in the field of schooling in terms of boosting the effectiveness of teaching and learning. We look at it from several angles, such as computer science training, medical, distance learning, consumers environmental schooling, and so on. The Internet of Things (IoT) in schooling has radically changed educational institutions by allowing Web connections amongst real things, sensors, and controllers. By embedding detectors in products and merging cloud computing, virtual reality, wearables, and big information in this platform, many aspects of the learning atmosphere may be observed and analyzed to provide relevant information. It has also created a new link between people and the environment in educational institutions.

KEYWORDS- IoT, Smart Classroom ,Internet, Connected devices, Education

I. INTRODUCTION

The Network of Objects (IoT) is a technology breakthrough that enables things, humans, and their environments to communicate in real time. The information will be collected by embedded sensors and actuators that are then communicated with specialized apps for generating actionable data One of the foundation stones has been identified as the Internet of Things (IoT)[1]. Because of Industry 4.0's ability to alter the status quo. Processes in industry and business with the arrival of and as the Internet of Things (IoT) expands, physical surroundings are getting more complex. It's smarter and more connected than it's ever been. This has resulted in improved our way of life by promoting sustainability. In virtually every area of life, efficiency, precision, and economy are essential. Our daily routines The Internet of Things (IoT) has been used in a variety of sectors, including Healthcare, traffic management, and

energy are only a couple of the problems that must be resolved. Administration, education, environmental monitoring, and smart technology are all areas that need to be addressed. Smart cities and smart houses. IoT is being used by governments and educational institutions [2].

To improve efficiency, make better use of data, and ensure long-term viability Smart items and wearables are being used more and more. In a handful of institutions, the use of gadgets is widely established. Sensors, semiconductors, and other enabling technologies wearable gadgets that are all well-understood and simple to use. In today's world, mass-produced and low-cost items have become commonplace. It is widely utilized in schools in the field of education. This investigation focuses on the impact of the Internet of Things on education. The rest is up to you. The following is a breakdown of the research: In the second part, we represent the history of IoT in higher education, as well as the commercial model for education The third section defines the. The project's goal is to explore the practical integration of IoT in the workplace. In the fields of campus energy in higher education management, access control in the classroom, and campus security finally, there's the health of the students, as well as teaching and learning. Improvements. The focus will then shift to the impact of IoT.

By bringing new value to the education business model. Based on the Canvas Business Model, we've come up with a few ideas. From a knowledge-transfer paradigm, education has evolved .To a collaborative, self-directed, active paradigm by the. In today's educational environment, technology has a disruptive effect. Institutions. Many institutions have been compelled to reconsider their strategies as a result of this. The influence of technology on education and studying might be considerable. Several aspects of education may be examined, from the learner to the instructor. From taking part in training and material creation to aiding others. Teachers create material that is tailored to each student's needs, and they are always improving. The results of students. Currently, there are seven distinct categories. of innovative technology, techniques, and tactics "Consumer Technologies, Digital Strategies, and Educational Technology" Learning Technologies, Enabling Technologies, Internet Technologies Visualization, Social Media Technologies, and Technologies". The Internet of Things (IoT) is a subset of the Internet. Technology,

which aids education in a variety of ways. IoT solutions allow educational institutions to gather a large amount of data the quantity of data collected through sensors and wearable devices readily and to take significant activities as a result of them data. Students may use such systems to investigate a topic. Embedded sensors, QR codes, and other technologies are being used to help the environment various types of technology They have access to educational resources and any data from any location at any time Teachers are also involved. In order to enhance teaching and learning, wearable gadgets and smart phones may be used in the classroom. A clever smart environment may be described as a classroom. Including many types of hardware and software modules[3]. Video projectors, cameras, sensors, and facial recognition software.

Recognition techniques, for illustration, are an instance of a modules. Various aspects of the surrounding surroundings are evaluated, as well as student attributes such as attention, achievement, and efficiency [4]. Experts from the business world and higher education have weighed in. Views on the Internet of Things and its possible effect on higher education IoT-related education, issues solved/created by IoT, and. For example Itai Asseo, Director of Strategic Innovation at According to Salesforce, one of the most significant advantages of IoT in Education is a customized and one-of-a-kind contact with others students. It not only helps students in obtaining personal information, but it also aids them in obtaining suggestions and intellectual subjects, but it may also be used to settle conflicts. When they are having difficulty in school, they may have learning difficulties sending administrators notifications. Maggie Johnson is a writer and a poet. Google's Director of Education and University Relations, the IoT is present at many colleges in the United States, according to the author. "Security cameras, temperature controls, and access controls" are examples of "security cameras, temperature controls, and access controls." to structures, lighting, and power". Bob Nilsson, the executive director of Extreme Networks' solutions marketing indicates that Smart objects may be utilized in the classroom to help students learn more effectively. Both teaching and learning are important.

He also emphasizes the significance of the IoT in allowing students' remote presence and optimizing the health and well-being of students in the classroom and on campus safety, as well as energy and resource conservation. Neti Chalopathy, According to IBM's vice president of education innovation, IoT enables administrators to comprehend the requirements of kids Improve the efficiency of building management. TJ's point of view IoT has revolutionized the public sector in the United States, according to Costello, Cisco's Director of IoT[5]. Students were given a chance by increasing their grades. Connected campuses provide a unique learning environment. It's also beneficial. Administrators to link everything on campus together and supports the administration of the campus. According to the report, In this article, we will discuss current IoT applications in education. Organize the ways in which the Internet of Things may improve higher education. We'll divide schooling into four categories and talk about how this new system works. The platform has the potential to

influence smart education in the future [6]. G eneration. A business model is defined as "a conceptual tool comprising a collection of assumptions." of things, ideas, and their connections to one another the goal is to explain a company's business logic." Osterwalder and Pigneur suggested "A nine-building complex[7]."

"Value Proposition, Channels, and Block Business Canvas Relationships with customers, customer segments, and revenue Key Activities, Streams Important Resources, Important Collaboration, Structure of Costs). The advancement of many technologies As a consequence, the organization evolves and improves. Business model and procedure Education, for example, has The Internet of Things (IoT) has had a significant impact. Cisco forecasts that the worldwide adoption rate of IoE (Internet of Everything) in education would rise from less than 5% in 2010 to more than 10% in 2020. By 2022, the percentage will have risen from 32% in 2013. This will take place via way of data gathering and customized training for creating Better choices may lead to a 10-year net present value. 175 billion dollars in worth The Internet of Things (IoT) may be used in education. Learners become knowledge co-creators. Data-driven Ad hoc decision-making is replaced with decision-making. A crowd-sourced interactive personalized curriculum with. Instructions that are scalable, recordable, and repeatable are used instead. Static instructions that are inflexible and one size fits all. The expanding. The use of IoT in education adds useful characteristics to the system. Current business model for education We'll go through it in the following section [8].

A. *Application Of IoT In Education*

- Energy management and eco-system monitoring on campus: To increase power economy and build a better responsible society, the Internet of Things has been employed in resource administration and eco-system surveillance. As a consequence, many national governments have implemented Smart Grid, a particular kind of IoT energy management application. By adding intelligence to existing infrastructure, utility firms may efficiently balance power production and energy consumption to offer more efficient operations. Energy consumption data will be collected automatically using specialized sensors and actuator systems in order to enhance system economy, efficiency, and reliability. These analytics are used by system operators to forecast a variety of variables, including grid status and meteorological conditions. Universities may use the same idea to Reduce CO2 emission, analyze and regulate electricity and water usage, and provide a healthful atmosphere for teaching and learning to establish a greener campus. Recommends the creation of a green campus to preserve energy by controlling laptops and air conditioner systems.
- *Controlled access to the campus and classrooms:* Providing a healthy and secure atmosphere in universities, as well as limiting individuals' accessibility to lectures, laboratories, and other locations inside institutions, are some of the issues that may be handled by incorporating modern technologies in schools. RFID (are two Internet of

Things (IoT) technology that may be used to improve college safety and admission control. The authors developed a true classroom software suite based on an NFC-based school access control mechanism. The school verification system is based on a network of connected sensors that collect and display statistics about teacher access. It is on a web-based application as well as on campus TV screens. In the author suggested putting RFID chips in student ID cards to track student attendance. When students enter the classroom, this system captures their IDs and uses geofencing technology to monitor their present position on campus.

- *Monitoring of the health of the students:* The Internet of Things is used in a variety of healthcare applications, from patient monitoring to illness prevention. This technology has increased access to better health care while simultaneously lowering the cost of treatment. Because a student's health is such an important element in determining his or her overall academic success, having access to a high-quality health-care service is critical in any educational setting. Wearable technology is a popular use of IoT in healthcare. A non-invasive and unobtrusive wearable gadget analyzes physiological signs over extended periods of time. The most popular use cases for these wearable gadgets are smart watches and fitness bands.
- Increasing the effectiveness of teaching and learning IoT may help institutions improve the level of teaching and learning by providing a richer teaching environment and real-time actionable about students' performance. It offers the ability to create a smart teaching atmosphere where students may customize environmental parameters such as room temperature according to their preferences. Based to Bob Nilsson, IoT devices such as e-books, ipads, cameras, fitness wristbands, and digital and mixed reality headsets are being used in teaching nowadays to track and monitor students in a variety of areas, including assessing students' learning patterns.
- *Instruction in a foreign language:* Absorption is one of the more efficient ways to learn a foreign country, and real-time information is its hidden weapons. In France, you may receive "free" real-time feedback from local speakers while studying French. It's impossible to replicate these settings outside of nations where the language is spoken. That's where the Internet of Things comes in. Teachers may give real-time feedback to students and automatically track student progress by using connected devices to assess if students have made the right statements or choices in foreign language simulation settings.
- *Smart Classrooms:* Future classrooms will be genuinely technologically advanced. By eliminating the need for real animals, AR will make dissection day considerably more compassionate. History lesson will be replaced with up-close views of Charlemagne plotting war, and science class will be replaced by a life-size display of the particles that make up life as we know it. These classrooms will be built on the basis of IoT applications in education.

When the bell sounds, students will be immediately counted as present or tardy. Whiteboards will capture all notes made in a class, and wearable gadgets will detect when the class is too weary or disengaged and needs a break. When a teacher says that a homework assignment is due, smart microphones may detect this and update students' calendars appropriately.

- *Task-Based Instruction:* The transition from a knowledge transmission paradigm to a collaborative, information-sharing system is one of the fundamental changes taking place in education. Because linked devices relieve instructors from documenting and monitoring pupils, they can focus on facilitating learning rather than regurgitating knowledge, the Internet of Things will have a significant effect on how we educate. Students learn by doing in task-based teaching, and instructors help as required. IoT solutions automatically offer feedback, support, and classroom monitoring. No student falls too far behind or goes too far ahead by alerting instructors for assistance and raising difficulty as needed a issue that has always existed in the classroom.
- *Automated Recording of Attendance:* Teachers are worried regarding pupil punctuality, and it is a daily task at schools where there are no other options. The Internet of Things (IoT) might help with the tough task of recording and assessing attendance for a variety of reasons. IoT has the potential to reduce workload in almost every class. Fingerprint attendance or raster participation with the student's identity card number may be used to immediately register attendance as learners enter the classroom. This method almost eliminates the risk of dispute or storage. Although this will not enable teachers to devote more time to their primary goal of teaching students, like systems might be rendered more effective by delivering a straight message to the students' parents notifying them of their absences from class.
- *Special Education:* It utilized to be nearly difficult and very difficult for children with special needs to get a regularly and full schooling. Thanks to the incorporation of IoT technologies and smart devices, the educational content is being precisely altered and classroom environments are being rendered noise and light to satisfy the special needs of students having sense impairment.
- *AR-enabled devices:* Augmented reality may be defined as a digitally improved representation of the actual world that is presented in a more comprehensible manner using technological technologies. AR may be used to make IoT-based devices and systems even more efficient; appropriate marks and information can be given to students simply by scanning a barcode against the subject they are learning. AR may offer improved information and 3D views of the subject being taught by combining visuals and sounds with a software system. For example, the anatomy of a human ear can be better comprehended in an animated manner than by theoretical explanations read out loud in the classroom.

II. LITERATURE REVIEW

Authors propose that the Internet of Things enables people and things to connect at any time and from any location, ideally via any path/network and using any service. There is a short review of IoT topics and potential solutions for application in the Education sector in this article. The article is divided into three sections: the first provides an introduction of IoT applications, the second discusses IoT in the Education Sector, and the third discusses value-added items in education via IoT (1). Propose that The Internet of Things (IoT) in schooling has radically changed education organizations by enabling Web exchanges among real things, detectors, and computers. Different characteristics of the educational by integrating sensing in products and merging internet computers, virtual realities, wearables, and big data on this platform, the surroundings may be watched and analyzed to provide important knowledge. It has also created a new link among people and the surroundings in education organizations. We will classify the use of IoT in education into four categories based on current IoT projects in education: energy management and real-time ecosystem monitoring, monitoring student's healthcare, classroom access control, and enhancing teaching and learning. We'll look at and analyze how the Canvas Business Model has altered the Education Business Model and introduced new value propositions in companies that use it (9). Propose that The Internet of Devices (IoT) is a network of many "linked things" that is rapidly increasing. The usage of IoT in academics is akin to a new tsunami of support that has opened up new opportunities and opportunities for enhancing either the having taught processes and classrooms' infrastructures. The relevance and uses of IoT in the area of education are discussed in this article. It also aims to highlight current research findings, problems, and the effect of IoT on future education (10).

III. DISCUSSION

In the future, the Internet of Things will enhance the teaching and learning process. Both kids and instructors will benefit from the Internet of Things. Students will learn more effectively, and instructors will be able to complete their tasks more quickly. IoT technologies are expected to offer a more attractive, adaptable, engaging, and measurable educational system that meets the diverse requirements of a large number of pupils. In a classroom, the typical American student spends 1025 hours per year. Sadly, less over 308 of the 1025 days are devoted coping with predicted problems. disruptions including delivery of class materials, transitions, and time spent at the start and conclusion of a session. According to this statistics, a student spends one out of every five minutes in the classroom on tasks that might easily be eliminated utilizing an IoT network. Teachers would be able to spend less time on routine processes and more time monitoring students' development. They can also assist students understand complex ideas in a short amount of time, automatically record attendance, utilize neuro sensors to assess learners' cognitive brain activity, and send haptic sensations to a student's wearable to gently

remind them to get back on target. While the majority of schools have yet to implement an IoT program, a learning environment like this is not far off

IV. CONCLUSION

In the field of teaching, the usage of technologies, especially IoT, has led the world for fresh and innovative ideas to better the life of either pupils and teachers. IoT-based education systems, such as smart classrooms, smart laboratories, and whole smart campuses, are being researched. There have also been studies on the use of IoT-based smart learning apps, and there is still much more to learn about The Internet of Things (IoT) is being used in schooling. Considering the numerous advantages of IoT in schooling, it may be necessary to sacrifice privacy and security. New methods may be developed in the future to address all of these problems. Education technologies has been developed to enhance the standard of educational throughout the globe by providing it more intelligible and available to everybody. Many institutions are introducing IoT at their own pace since it is a pricey expenditure. It is advantageous to engage in this market due to the advantages of IoT and its wide range of applications. Due to IoT-enabled gadgets delivering parts of expanded learning on venues that are pleasant, simple to use, and secure for teachers and learners, several instructional venues have recently developed.

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