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Smart Education: The Impact of IoT on Learning Environments

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Abstract

The Smart Education System leverages IoT and cloud computing technologies to efficiently monitor and manage various aspects of the educational framework. To facilitate this, systems must provide access to nodes and gateways by implementing an architecture that supports the latest wireless and wired technologies, ensuring a reasonable communication range while also reducing energy consumption. As more educational devices become interconnected, campus officials will increasingly benefit from the continuous flow of data and information, enabling them to transform their interactions with students, faculty, administrators, and service providers from transactional to iterative. By being compact, person-centered environments, smart campuses can more effectively align and integrate with the broader smart environment strategy. This allows educational institutions to function at peak efficiency, promote sustainability, and enhance the daily experiences of their members. The purpose of the study is to illustrate how IoT is being utilized to develop the smart education system. A limitation of the study is that it mainly focuses on the application aspects of the topic, without addressing the physical components. This paper provides an overview of IoT applications and potential solutions for the education sector. It is organized into three main sections: an overview of IoT applications, IoT in education, and the benefits of IoT-enhanced education.

Keyword: Intelligent Education, IoT, Smart Education, Cloud Computing, Smart Campus, Senor, Actuator, teaching-learning, Security System, Alerts, IOT Applications.

INTRODUCTION

The educational landscape has been altered by technology. Education has changed the way we live, from the innovative learning methods of open institutions to the usage of tablets in the classroom. These advancements, though, pale in comparison to the massive transformation that the Internet of Things is bringing about in the field of education (IoT).

The Internet of Things (IoT), which connects people, processes, devices, and data, increases the amount and quality of the information we can gather, enabling players in the educational sector to transform data into meaningful information in a way that has never been possible before.[1]

The advent of mobile technology has allowed educational institutions to keep track of all available resources for education. IoT is essential to learning, teaching, and even evaluation. The IoT is quickly becoming essential in all facets of the educational institution, from KG to PG. The application of IoT will aid in providing participants with resources overall in a creative way. Every facet of student learning might be impacted by the IoT. [2] This information gives interested parties a current picture of the students, staff, and resources. Decision-making, automated execution, and security features are all aided by it

Fig. 1 IoT based Smart Environment

IOT APPLICATION

Numerous IoT applications may be used in our daily lives. Among the programmes that are typically installed are: [3]

- The multimedia industry for simple manipulations.
- The deployment of security, component management, and home automation.
- This is really useful in following the logistic service.
- This will enable the scheduling to be done efficiently.
- The Internet of Things (IoT) is crucial for tracking transportation units.
- The health sector benefits greatly from this.
- An e-health system that includes remote surgery and the monitoring of heart rate and blood pressure.
- Monitoring of the environment, including the quality of the air, water, soil, and animals.
- Asset management for both urban and rural infrastructure.
- Smart traffic management, vehicle-to-vehicle communication, etc.
- Industrial initiatives in the agricultural, surveillance, and food industries, etc.

Fig 2. IoT Application

Due to the ability for communication between smart objects and things, there has been a quick expansion [4] in the field of several IoT applications. As a result, it leads the development of several IoT application fields, leading to the creation of the smart environment, smart people, and smart mobility.

SMART EDUCATION INDUSTRY APPLICATIONS

IoT might make education more accessible, capable, and respected across all geographies. There are countless opportunities to incorporate IoT-enabled technologies into the educational setting. These provide a solid foundation for developing a thorough grasp of its use in education.[5] Further, using technology to enhance instruction is preferable to hiring more teachers. To demonstrate their teaching abilities, some teachers and pupils require technology assistance. This is something that IoT Solutions for Education is aware of, and it offers solutions that raise educational standards everywhere.

The information base utilised to apply educational standards and procedures is improved by IoT as well. Accuracy issues and a general lack of data are concerns in educational research. IoT is a vast, high-quality, real-world dataset with a design education focus.[6] Thus, IoT assists each student in learning adaptability by providing access to their demands. Each student can evaluate his or her own experience and contribute to the development of teachings. Many things are done passively. Students just utilise the technology, and the performance metrics informs the design. This provides highly effective instruction, lowering the costs of education planning and adaptation.

1. Smart Classroom

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2. Smartboard/ Projector

Now that technology has advanced, pupils prefer smart boards to blackboards. A smartboard, an interactive board that presents a picture of the subject. Allow interaction between professors and students. Simply enter or cycle through the class. It appears to be more enjoyable and interesting at this stage. It is customary to wonder whether

a smartboard can ever replace a chalkboard.[5] Yes, the answer is yes. Blackboard and textbook words and massages are too short to convey the text's meaning in minutes.In this case, the use of IoT in education has made learning and information sharing more convenient, fascinating, and participatory.

3. Attention - Attendance

The educational institution separates the rules. Some argue that the exam should be taken by a specified percentage of pupils. Managers may obtain reliable attendance data via IoT.[3] The data contains no human mistake. Students may easily compute attendance and regularity, punctuality, and personality reports using the IoT-based attendance system. Saving time may have a significant impact on lab staff satisfaction. In addition, IoT has recognised the necessity to digitally record attendance in order to increase student attendance in the classroom.[6]

4. Significant Safety

The lab has a short circuit, and the IoT sensor detects it instantaneously and provides an instant alarm to reverse the condition. If someone becomes trapped in the elevator, an "auto" real-time warning will be dispatched.[6] The major influence of globalisation may be seen in numerous forms of the globe in our note of service. With severe weather, the likelihood of an earthquake is rapidly shifting and increasing prevalent.

5. For divyangjan

It was challenging for youngsters with impairments to learn and think on new things just a few years ago. Because of the latest technical design, they can learn and execute new tasks similar to any other competent pupil.[6] Hearing loss affects some parts of the population. Conversations may be transcribed into sign language using a connected glove and computer system. The motivation to translate spoken thoughts into written terms is remarkable.[7] The future of youngsters who are disabled is bright as IoT devices enable positive educational support for children with impairments.

6. Mobile & Tablet Apps

Millennial students must limit their usage of technology. Unfortunately, these modern pupils' lives appear to centre around smartphones, tablets, and other display technologies.[7] IoT experts have moved their emphasis to educational topics in games and social media devices. The IoT of Education sensor gathers data and automatically recommends educational topics of interest to pupils on the opposite side of the screen.[4] The usage of cell-phones and tablets improves pupils' grades nearly immediately.

THE ROLES OF IOT IN EDUCATION

The IoT is a very clever component of today's colleges and classrooms since it improves schools and lowers prices for real services and systems.[8] An enigmatic university has the benefit of quickly providing a higher degree of information at the individual basis. The IoT will soon be integrated into more educational institutions. Many schools utilise this to instruct their kids for higher comprehension, while others may use it to preserve data, resources, and other comparable purposes. Teachers, scholars, and administrators who work in educational institutions to create realistic and sensible goods.[7]

1. Interactive Learning

Learning nowadays involves more than just the mixture of graphics and words. Many books have been integrated to web-based sites, along with extra videos, resources, animations, ratings, and other information to help students study.[9] It gives kids a broader perspective on new subjects, including improved comprehension and interactions with professors and peers.

2. Security

Because numerous student organisations attend courses, it is difficult to keep track of each student's whereabouts and activities. Furthermore, institutional students are more vulnerable than other working demographics, and their need for smart protection may significantly improve the security of IoT colleges, institutions, and other learning centres. Students may be tracked and reported on at any moment using approaches such as 3D location.[9] These technologies may also have a sad button for activating alarms as necessary. Significant advancements in computer vision technology have recently allowed for faster signature monitoring.

3. Educational application

Educational applications of IoT advantages are viewed as a strong creative tool, and teaching and learning approaches are evolving. Teachers and students may use video to design and take notes within 3D graphic textbooks. Because of the enormous number of instructional games offered, this software might be called a game changer.[10] These games include a variety of characteristics that provide intriguing teaching and learning opportunities.

4. Increase efficiency

Most schools spend a significant amount of money on activities that do not serve the primary goal of their existence. Students, for example, must be present many times every day. This data must also be sent to the head office for specified purposes. IoT has the potential to abolish this wasteful system. This data is gathered and delivered to a centralized data server via IoT end devices, eliminating the requirement for data interference.[11] This revolutionary breakthrough in IoT has the potential to minimise the time-consuming job of instructors and pupils.

IMPORTANT FACTORS FOR EFFECTIVE IMPLEMENTATION OF IOT IN EDUCATION

As previously said, IoT can have a fundamental impact on the act of learning. These six fundamental components will be critical to the successful use of IoT.[12]

1. Storage

Many enterprises utilise the hybrid cloud as their operational infrastructure for hosting Iot systems. The combination of tech-savvy students at educational institutions and the spread of tablets and mobile devices has opened up new options for improving the efficacy of the business infrastructure, digital technology, research, and learning eco-system.[10] In ubiquitous computing, the cloud provides information infrastructure providers with seamless access and services. Educational institutions are becoming more reliant on cloud infrastructures that provide private cloud computing services, while instructional apps are gradually migrating to public clouds.[13]

2. Instructional Technologies

Learning Management Systems (LMS) like as Moodle and Blackboard are rapidly being utilised to generate significant amounts of structured/unstructured data, such as audio/video material.[9] As a result, there is an increasing need for school rooms to be outfitted with modern technological tools such as lecture recording systems and video sharing, which allow students to access educational content on demand at any time.[10]

3. Quality and Ethics

The quality of online and on-campus education, as well as rising educational prices, have been hotly debated in recent years.[13] The Internet of Things provides new options for delivering digital training courses. However, this frequently makes maintaining the quality of teaching and evaluating students' work challenging. IoT educational applications enable students, professors, and educators to improve academic quality and solve ethical challenges inside the education system.

4. Security

With children involved, the protection of the partners and the security of the information acquired is crucial. Guardians and educational institutions expect not only a promise from the service provider, but also the successful implementation of protection and safety activities. Similarly, issues such as personal and collective information responsibility must be addressed before IoT can be fully realised in the education sector.[12]

5. Integrity

It is also critical to ensure the credibility of the information being acquired. The appropriate technology should be employed for this.[11] A crucial step in this approach will be the use of a public platform that all parties involved may use without incurring additional costs.

6. Educational policy

IoT in training is a fundamental shift in the way education is delivered and learning occurs. Strategy decisions must be made and implemented by trained professionals for any transformative change to be effective.[13] Because IoT is being implemented in educational institutions, training plans must enable the use of innovation in classrooms and other learning contexts.

CONCLUSION

IoT is extremely important in the sphere of education since it improves the learning process smarter and simpler for pupils. Furthermore, it might rearrange a person's geographical location by providing further change in the subject of study. As a result of appropriately deploying IoT technology, the learning will be enhanced, as will the learning environment. The purpose is to evaluate the possible benefits using IoT in education, as well as how it utilises the sector while overcoming difficulties and mitigating risks. Our next study should focus on IoT application in higher education.

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