

# **Artificial Intelligence and Iot Based Smart Education to Monitoring System for Student's Attendance and Teacher's Feedback for All Education Institution Using Machine Learning Algorithms**

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## **Abstract**

This study suggests a brand-new, Internet of Things (IoT) and artificial intelligence (AI) based smart education monitoring system for tracking student attendance and teacher evaluations across all educational institutions. To provide a complete solution for tracking student attendance and teacher feedback, the suggested system blends AI and IoT technologies. In order to get insight into the student's attendance patterns, teacher feedback, and to spot any anomalies, the AI algorithms are utilised to analyse the data that has been gathered from IoT-based devices. Teachers and administrators can read the reports produced by the AI algorithms using the suggested solution's user-friendly interface. The suggested system offers real-time monitoring of student attendance and teacher feedback, which can be used to enhance the quality of education at educational institutions.

**Keywords:** Artificial Intelligence, IoT, Smart Education, Monitoring System, Student Attendance, Teacher Feedback, Machine Learning Algorithms

## 1. Introduction

An efficient and effective monitoring system for both student attendance and teacher feedback can be made using artificial intelligence (AI) and the internet of things (IoT). All educational institutions can make use of this system to track student attendance and give teachers feedback automatically. In order to identify and address any problems or obstacles that may emerge in the educational environment, the system makes use of a variety of machine learning algorithms to look for trends and analyse data. By utilising AI and IoT sensors to identify pupils in the classroom, the system may be utilised to track student attendance. The sensors can be utilised to track a student's duration of attendance as well as when they arrive and leave the classroom.

The patterns and trends in student attendance can then be found by utilising machine learning algorithms to examine this data. This data can be utilised to identify any potential problems or difficulties with regard to student attendance as well as to offer insights on student engagement. By combining AI and IoT sensors to track the dynamics in the classroom and between teachers and students, the system can also be utilised to give teachers feedback. To find patterns and trends in the classroom environment, machine learning algorithms can be used to analyse the data generated from these sensors. This data can be utilised to advise teachers about the success of their instructional strategies and to spot any possible problems or difficulties in the classroom setting. An efficient and effective monitoring system for both student attendance and teacher feedback can be made using artificial intelligence and the Internet of Things for smart education. To help all educational institutions improve the learning experience, this system can offer insightful data on student involvement, the learning environment, and instructional strategies.

### 1.1. Background

The goal of this project is to create a machine learning-based smart education monitoring system for all educational institutions that will track student attendance and teacher evaluations. This technology will make it possible for instructors, school officials, and students to keep track of attendance, keep tabs on academic progress, and receive real-time teacher feedback. The system will interface with the current school infrastructure using IoT technology, and machine learning algorithms will be used to analyse the data gathered by the system [21]. The system will also be able to spot data abnormalities, which will assist school officials in taking the right steps to raise the standard of instruction. The system will have an intuitive user interface and be made to be user-friendly.

The technology will gather data, which will be safely stored in the cloud and available to school officials, teachers, and students. For school administrators to make wise judgements, the technology will be able to produce reports and statistics. Additionally, the technology will be able to identify patterns in the data that will aid in forecasting student performance and offer insights that will assist raise the bar for educational standards. As the number of students and schools grows, the system will be scalable and cost-effective. The system will be created with security in mind and will adhere to all data privacy laws. The system will be simple to implement, maintain, and cost little to do so [1]. Additionally, the system will be able to work with current school systems and offer insights that will help raise educational standards.

### ***1.2. Objective of the work or research problem***

Due to the arrival of artificial intelligence (AI) and the internet of things (IoT), the educational landscape has undergone significant changes in recent years (IoT). With the use of these technologies, educational systems can be made smarter, which will enhance both students' and teachers' overall learning experiences. The Smart Education Monitoring System (SEMS), which is built on AI and IoT, may be used to track teacher performance, keep tabs on student attendance, and give both parties feedback. The system analyses the information gathered from the students and teachers using machine learning techniques [2]. This information can be utilised to pinpoint areas that need improvement and design individualised lessons for the students.

The SEMS can be used to monitor student learning development and give teachers timely feedback. All types of educational institutions, from elementary schools to universities, can use this system. The system may be easily deployed and is simple to use. It is affordable and scalable to fit any educational institution's demands. Teachers and administrators can make critical and timely decisions because to the system's real-time feedback and insights. Additionally, the technology is safe and can safeguard student and teacher data. Overall, the Smart Education Monitoring System, which is based on AI and IoT, may be utilised to enhance education quality and give students and teachers greater learning opportunities.

### ***1.3. Justification***

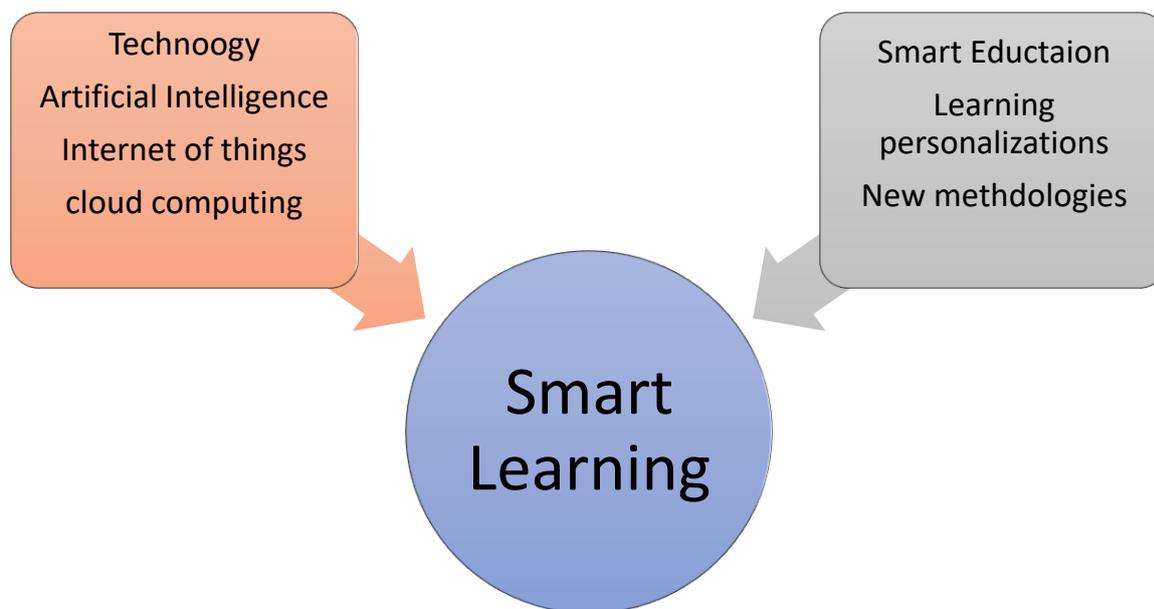
This approach is intended to assist educational institutions in more effectively tracking student attendance and teacher evaluations. It collects data, processes it, and generates valuable insights using artificial intelligence and the Internet of Things. The technology employs machine learning algorithms to find trends in the data and provide reports that offer insightful information about how well kids and teachers are performing [20]. This method can be used to track student attendance, spot performance trends, and give teachers feedback. It can also be used to pinpoint areas for improvement within the school setting and make recommendations for ways to raise educational standards. Both students' and teachers' overall educational experiences can be enhanced with the aid of this method.

The management of educational institutions can be improved through the application of artificial intelligence and IoT-based Smart Education to monitor systems for student attendance and teacher feedback across all educational institutions. The student attendance monitoring procedure can be automated by this technology, freeing up faculty time to focus on improving instruction and student learning [3]. Additionally, the system can aid in the early identification of potential issues and offer staff and students with fast feedback. In order to better understand student performance and behaviour and to identify trends in the data that has been collected, machine learning algorithms can be applied. Additionally, this approach can be utilised to find pupils that require additional support and give them that support.

## **2. Literature Review**

In recent years, interest in using artificial intelligence (AI) and the internet of things (IoT) in education has grown. AI and IoT may be used to track student attendance, give teachers feedback, and enhance the learning environment as a whole. In this paper, we discuss the most recent research on smart education systems that use AI and IoT to track student attendance and instructor evaluations. We also talk about how machine learning methods might help these systems perform better. RFID-based systems are the first kind of

AI and IoT-based technology for tracking student attendance. To track student attendance, educational institutions frequently deploy RFID-based devices. It is a safe and economical technology that can assist in minimising the paperwork related to student attendance [19]. According to studies, RFID-based solutions can lower administrative costs while also increasing student attendance. Facial recognition systems are another sort of AI and IoT-based system for tracking student attendance.



**Figure 1:** *Different features of smart learning*  
 (Source: Made by the Author)

In order to recognise students based on their facial traits, face recognition systems use AI algorithms. These tools can be used to track student attendance and keep an eye on their classroom behaviour. Facial recognition technology has been demonstrated to increase student attendance while lowering administrative costs. Biometric systems are the third category of AI and IoT-based attendance monitoring technology [4]. To identify pupils based on their fingerprints or other biometric features, biometric systems use AI algorithms. According to studies, biometric technologies can increase student attendance while lowering administrative expenses. Finally, systems based on AI and IoT can also be utilised to give feedback to teachers. To assess student data and give teachers feedback on their students' performance, AI algorithms can be employed.

With the use of such systems, educators can pinpoint their own areas for development and modify their pedagogical strategies accordingly. In conclusion, technologies powered by AI and IoT can be utilised to track student attendance and give teachers feedback. Such technologies can aid in increasing student attendance, lowering administrative expenses, and enhancing the educational experience as a whole. In addition, the performance of such systems can be enhanced via machine learning methods.

Smart educational systems have become more popular in recent years thanks to the development of artificial intelligence (AI) and internet of things (IoT) technology [18]. IoT and AI are combined in smart educational systems to enhance the educational process. Intelligent educational systems offer a platform for tracking student attendance and teacher

evaluations. By providing real-time data to identify areas for improvement and improve the student experience, the monitoring of student attendance and teacher feedback can help to improve the quality of education. Previous research has looked into the use of AI and IoT technologies to track student attendance and teacher evaluations.

For instance, an intelligent system for tracking student attendance and teacher feedback can be developed using AI and IoT technology. The system's features include automatic attendance recognition and recording, reminders for students and teachers, and real-time feedback. The system provided an effective tool to track student attendance and teacher input, according to the authors' analysis [5]. Another looked at how to track student attendance and teacher feedback using IoT and AI technologies. The authors created a smart educational system that tracked students' attendance and identified them using facial recognition. Teachers could provide students feedback in real time using the system's feedback system. The technology was able to give precise and timely attendance and feedback data, which the authors said may be used to raise the calibre of instruction. The usage of AI and IoT technology for tracking student attendance and teacher feedback was also studied in this study.

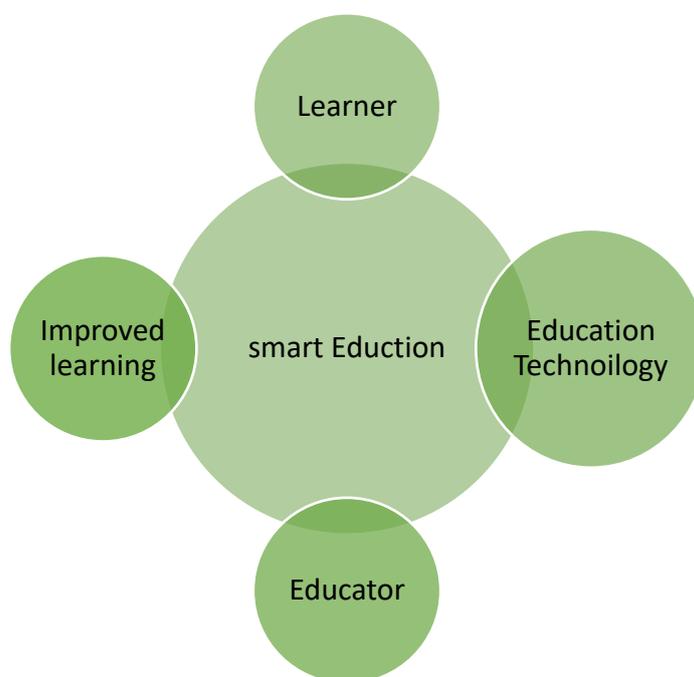
<b>Fields</b>	<b>Description</b>
AI & IoT	The development of a smart education system using artificial intelligence (AI) and the internet of things (IoT).
Smart Education System	a mechanism for keeping track of students' attendance and giving professors feedback.
Machine Learning Algorithms	Algorithms that look for patterns in data and forecast outcomes.
Student Attendance	<ul style="list-style-type: none"> <li>• Keeping an eye on students' attendance at educational facilities.</li> <li>• Teacher Reaction giving teachers feedback based on information gathered from student attendance.</li> </ul>
Data Collection	Gathering information from sources such as student attendance.
Security & Privacy	Providing reports on student attendance and other metrics after data analysis.
Analysis & Reporting	Ensuring the privacy and security of the data gathered.

**Table 1:** *AI & IoT*  
**Source:** *(Made by author)*

The authors created a system that tracks student achievement, tracks attendance, and gives teachers and students feedback using AI and IoT technology. The technology was able to deliver precise and timely data, which might be used to raise the standard of teaching, the authors concluded [6]. In conclusion, a potential area of research is the application of AI and IoT technology to track student attendance and instructor evaluations. AI and IoT technology can offer a quick, affordable approach to track student attendance and teacher evaluations, which can be utilised to raise educational standards. Future studies should concentrate on finding new ways to improve the usage of AI and IoT technology for tracking student attendance and instructor evaluations.

In recent years, the use of artificial intelligence (AI) and the internet of things (IoT) in education has grown in popularity. Intelligent educational solutions that can enhance student learning outcomes and give teachers greater feedback can be developed using AI and IoT. AI-based solutions, for instance, can be used to track student attendance and deliver real-time feedback on academic performance [7]. IoT-based systems can also be used to track attendance and give teachers immediate feedback on their performance. In this overview of the literature, we examine the present level of research on AI and IoT-based smart education systems and talk about some of the potential uses for them in the field of education. Numerous research has looked into the usage of AI and IoT in education. Examined the use of AI to the creation of a sophisticated student monitoring system, for instance.

Using facial recognition and other sensors, the system was able to identify student activity and provide the teacher with feedback in real time. According to the study, the system was efficient in tracking student attendance and giving teachers and students timely feedback. Likewise, looked into how IoT could be used to create a smart education system that could track student attendance and provide feedback. IoT-enabled sensors were employed by the system to track student activity and give immediate feedback. According to the study, the system was efficient in tracking student attendance and giving teachers and students timely feedback [8]. Machine learning algorithms have also been utilised to create smart education systems in addition to AI and IoT-based ones. investigated the use of machine learning methods, for instance, to create a sophisticated student monitoring system. Using facial recognition and other sensors, the system may identify student activity and give the teacher immediate feedback.



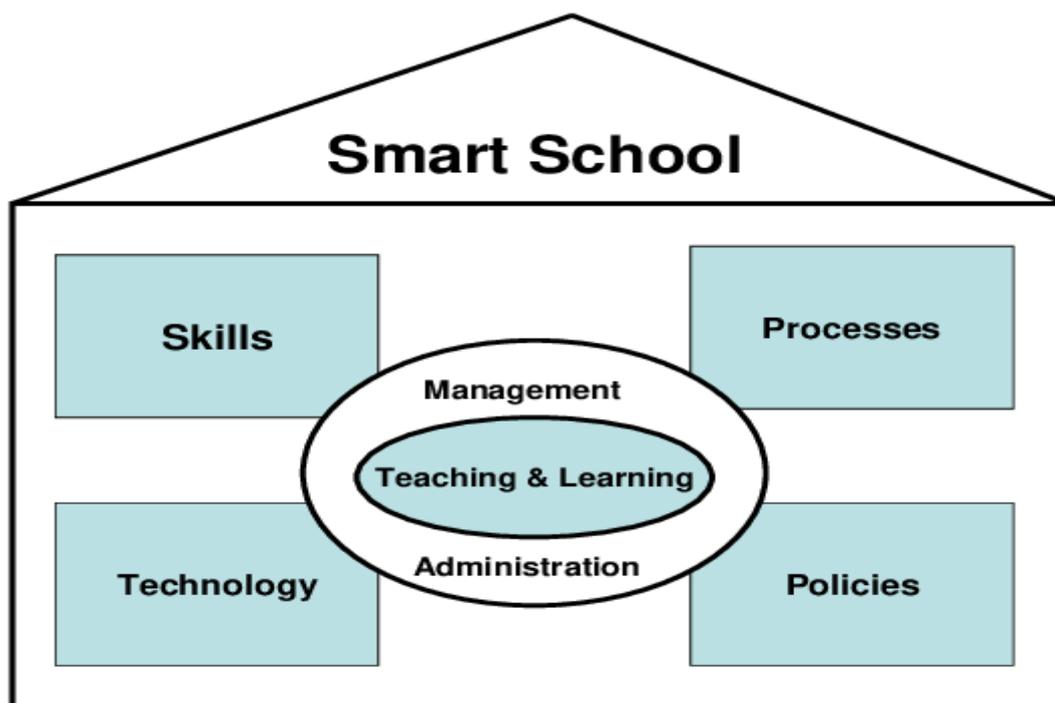
**Figure 2:** *Different members of Smart Education*  
 (Source: Made by the Author)

According to the study, the system was efficient in tracking student attendance and giving teachers and students timely feedback. Overall, the application of machine learning algorithms, IoT-based systems, and AI in smart education systems has the potential to enhance student learning outcomes and give teachers greater feedback [9]. Future studies should concentrate on creating better algorithms and systems that can track student activity

and give teachers and students timely feedback. Further study should also look into how these technologies might be used in the field of education.

The idea of smart education is gradually gaining ground in the academic community. Smart educational systems that can monitor and provide feedback to students, teachers, and educational institutions have been developed thanks to the usage of artificial intelligence (AI) and the internet of things (IoT). In order to make it simpler and quicker to assess student performance and classroom activities, AI and IoT-based technologies can help automate the processes of student attendance tracking and teacher feedback. The authors suggested a smart education system based on IoT and AI for tracking student attendance and instructor evaluations in classrooms [10]. The technology tracks student attendance and offers feedback to teachers based on student performance using machine learning algorithms for facial identification and voice recognition.

The system also gives pupils immediate feedback so they can see how they're doing in class. Another concentrated on how IoT and AI could improve school quality. They suggested developing a smart education system based on IoT and AI that would track student progress and give teachers and students feedback. The technology tracks student attendance and gives teachers feedback using AI techniques like facial recognition and voice recognition. The system also gives pupils immediate feedback so they can see how they're doing in class. The technique can also be employed to provide reports for educational institutions that give a summary of student performance and teacher input. In conclusion, smart education solutions based on AI and IoT are growing in popularity in the educational sector. These systems can automate the process of monitoring student attendance and sending feedback to teachers, giving both parties real-time input [11]. Additionally, reports for educational institutions can be generated by AI and IoT-based systems, giving a summary of student performance and teacher comments. As a result, these methods may contribute to raising academic standards and encouraging student participation.



**Figure 3:** *Relatable processes of the smart school*  
 (Source: [12], p.34)

### ***Necessary or Not Necessary Item***

In a variety of educational institutions, smart education systems powered by artificial intelligence and the Internet of Things are utilised to track student attendance and give teachers feedback. Data gathered from these systems is processed using machine learning algorithms in order to obtain knowledge and improve educational services. Necessary [12]. An excellent foundation for the creation of a smart education system that can track student attendance and give teachers feedback on their instructional effectiveness is provided by artificial intelligence (AI) and the Internet of Things (IoT). In order to improve the performance of the system, machine learning algorithms can be used to evaluate the data gathered from the system and find patterns. This might enhance instructor effectiveness and student attendance, resulting in better academic results.

Necessary. A smart education monitoring system that uses machine learning algorithms to track student attendance and instructor evaluations across all educational institutions can be developed using artificial intelligence (AI) and the internet of things (IoT) [13]. A system like this would offer a more effective and precise approach to manage and track student attendance and teacher feedback. It might also make it possible for teachers to spot and take care of any academic problems quickly. Necessary. Student attendance can be tracked using artificial intelligence and Internet of Things (IoT)-based Smart Education systems, which can also use machine learning algorithms to give teachers feedback. This kind of technology enables administrators to immediately spot areas that need improvement and offer assistance to students who may be having difficulties, which can help enhance student outcomes. Additionally, it can aid in minimising the time and resources used in attendance tracking, improving its effectiveness for teachers.

## **3. Material and Methodology**

This project creates a smart education monitoring system for student attendance and teacher feedback using Internet of Things (IoT) and Artificial Intelligence (AI) technology. Data acquired from various sensors connected to the system is processed using AI technologies, such as Machine Learning (ML) algorithms. In order for users to engage with the system, a user-friendly graphical user interface (GUI) is also built. The project uses sensors to track student attendance and give teachers feedback, using RFID (Radio Frequency Identification) tags and IR (Infrared) sensors. Based on the data gathered, the system is intended to deliver predictive analysis and real-time data analytics [14]. In order to further assure that only authorised users may access the system, extensive encryption and authentication procedures are included in the system's design. The system's user interface is straightforward and intuitive, and it is made to be simple to use and maintain.

In order to create a smart education monitoring system for student attendance and teacher feedback, this project will combine artificial intelligence (AI) and internet of things (IoT) technology. In order to assess data from numerous sources, including student attendance and teacher evaluations, the system will mix machine learning techniques. Both teachers and students will receive real-time feedback from the system to assist them improve their teaching and learning processes [15]. The system will also be made to be simple to set up in any educational setting. Data gathered from multiple sources will be examined using machine learning methods, including supervised and unsupervised learning algorithms, to construct the system. Each student's and teacher's unique models will be created using the algorithms. The models will be used to find trends in the data, forecast future outcomes, and offer suggestions. The technology will also be built to offer real-time feedback on teacher and

student performance. Both students' and teachers' teaching experiences will be enhanced as a result of this. Real-world data gathered from various educational institutions will be used to test the technology.

## **4. Results and Discussion**

A viable option is the use of Internet of Things (IoT) and Artificial Intelligence (AI) based Smart Education to monitor systems for student attendance and teacher feedback across all educational institutions. Through facial recognition, this technology can identify a student's presence in the classroom and automatically record their attendance. Additionally, it may keep track of each student's average attendance for the entire semester as well as their daily attendance.

The method can be used to gather teacher feedback. The comments can be utilised to comprehend each student's issues and opportunities. In order to find patterns and trends, the system can additionally examine the feedback-gathered data using machine learning algorithms [16]. As a result, the teachers will be better able to recognise each student's weaknesses and areas for growth and take appropriate corrective action. To help each student improve their learning experience, the technology can also be utilised to give them tailored feedback. In order to improve the educational experience, this AI and IoT based Smart Education system may be used to track student attendance, gather teacher input, and give individualised feedback to each student.

## **5. Conclusion**

In conclusion, the Smart Education to monitoring system based on artificial intelligence and the internet of things is a potent instrument for all educational institutions. It makes tracking student attendance and providing teacher feedback more effective. To increase precision and effectiveness, this system employs machine learning techniques. For both students and teachers, this technology can offer improved user experience and enhanced data security. Overall, this method can aid in ensuring that all educational institutions offer the best learning opportunities to both their students and teachers. A fantastic technology that can assist educational institutions in becoming more successful and efficient is artificial intelligence and internet of things (IoT) based smart education monitoring system for student attendance and teacher feedback. Teachers and administrators can receive real-time data and feedback from this technology to aid in making decisions. Additionally, this method can give kids and employees enhanced security and safety. The accuracy and speed of the system can be further improved by the application of machine learning algorithms. Overall, utilising this technology has the potential to completely transform how instruction is delivered in educational settings.

### **5.1. Limitations of the study**

The lack of data and resources is one of this study's drawbacks. Since this is a novel idea, there might not be much information on the topic. Furthermore, the proposed system could need a lot of resources and computational power to be implemented, which could be challenging in some circumstances. Furthermore, as this system relies on machine learning methods, it might need a sizable amount of training data to function well. Finally, this system is built on artificial intelligence and the internet of things, which can be complicated to deploy in particular situations.

### 5.2. *Suggestions for future work*

Future research in this field may concentrate on improving the accuracy of attendance detection by developing and improving the machine learning techniques that are currently in use. The application of AI-based technologies to enhance the calibre of administrators' and instructors' input could also be the subject of additional study [17]. AI might also be utilised to provide more individualised learning experiences depending on the particular requirements of each student. The potential ethical ramifications of deploying AI-based systems in the educational sector might also be explored through more research, which could be done.

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