



# Pirfect Presence?



## **An Arduino-Based Multimodal Attendance System Using PIR Sensors, RFID and OpenCV**

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# Introduction

Have you ever wondered how to create a truly **uncheatable attendance system** that balances efficiency with security? Traditional methods often fall short, with manual processes being time-consuming and prone to human error, while biometric systems are susceptible to spoofing.

This project introduces a **novel Arduino-based attendance system** that tackles both challenges head-on. By **integrating RFID tags, PIR sensors, and face recognition**, it offers a **multi-layered approach to foolproof verification**.

# Objectives

- ❑ Develop a multi-layered attendance system using RFID, PIR sensors, and face recognition that significantly reduces the possibility of cheating compared to existing methods.
- ❑ Design a time-efficient and user-friendly attendance system that authorizes attendance recording and minimizes manual intervention.
- ❑ Implement a cost-effective and scalable attendance system suitable for deployment in various educational settings.

# Scope

- **Verification System:**
  - **RFID tag integration:** Reading and processing RFID tags for student identification.
  - **PIR sensor integration:** Detecting entry and exit through designated points.
  - **Face recognition implementation:** Adding an extra layer of verification using facial features.
  - **Algorithm development:** Designing algorithms to combine data from all sensors and determine legitimate attendance.
- **Data Recording and Management:**
  - Automatic data storage of attendance records with timestamps.
  - System for accessing and managing attendance data by authorized personnel.
  - Potential integration with existing school data systems (optional).
  - **Testing and Validation:** Thoroughly testing to ensure accuracy and reliability.

# Literature Review

S.No.	Author(s)	Title	Technology/Methodology
01.	Agus Bejo, Ricky Winata, Sri Suning Kusumawardani	<b>Prototyping of Class-Attendance System Using Mifare 1K Smart Card and Raspberry Pi 3</b>	NFCs, Raspberry Pi 3 and Radio Frequency Communication under short distances
02.	Trio Adiono, Didi Setiawan, Maurizfa, Jason William, Nana Sutisna	<b>Cloud Based User Interface Design for Smart Student Attendance System</b>	IoT, Fingerprint Sensor, User Interface and Data Analysis
03.	Paval Zlatarov	<b>Design and Development of a Smartphone-Enabled Smart Card-Based Attendance Tracking Module for Personalized Education</b>	Smart-phone enabled smart cards and smart card readers

# Results/Discussions

This project successfully developed a multi-layered Arduino-based attendance system utilizing RFID, PIR sensors, and face recognition, significantly reducing cheating opportunities. Compared to traditional methods (manual or biometric), our system achieved a **reduction in a number of attempted cheating methods**. The integration of PIR sensors with RFID ensured **prevention of some proxy**, while face recognition provided a **satisfactory backup and response**. This multi-layered approach addressed the limitations of both manual and biometric systems, offering improved accuracy and security. Although the project faced with limitations like **coding the efficiently algorithm or setting up the sensors**, the results demonstrate the potential of this system to **have a positive effect of the workings of the educational system**.

# Novelty

This project transcends existing attendance systems by proposing a **multi-layered approach** that effectively tackles the limitations of both manual and biometric methods. While traditional methods often suffer from proxy tagging or time-consuming manual intervention, our system utilizes **PIR sensors and RFID integration** to eliminate proxy tagging and ensure **only authorized entries are recorded**. Additionally, the **incorporation of face recognition** provides an extra layer of security, addressing potential discrepancies or concerns with RFID tags. This innovative combination results in a **highly secure and efficient system**, significantly reducing cheating attempts compared to conventional solutions. This project paves the way for **further advancements in foolproof attendance systems**, offering valuable insights for educational institutions seeking **reliable and secure attendance management**.



# References

- **Literature review:**

- Zlatarov, P. & Ivanova, G. (2023). "Design and Development of a Smartphone-Enabled Smart Card-Based Attendance Tracking Module for Personalized Education." (Keywords: Smart cards, education, RFID, personalized education)
- Adiono, T., Setiawan, D., Maurizfa, J. W., & Sutisna, N. (2021). "Cloud Based User Interface Design for Smart Student Attendance System." (Keywords: Cloud computing, fingerprint recognition, smart attendance system)
- Bejo, A., Winata, R., & Kusumawardani, S. S. (2018). "Prototyping of Class-Attendance System Using Mifare 1K Smart Card and Raspberry Pi 3." (Keywords: Smart cards, Raspberry Pi, attendance)

- **Online resources:**

- (YouTube video: "RFID Based Attendance System Using Arduino")
- (YouTube video: "Smart Attendance System using RFID and Face Recognition")
- (Website: "RFID based attendance system using Arduino")
- (Website: "Project Hub - RFID Based Smart Attendance System")
- (Website: "RFID-based Attendance System using Arduino")
- (Website: "How2Electronics - RFID RC522 Attendance System using Arduino")
- (Slideshare: "RFID Based Attendance System using Arduino")



# Thank You!



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