

F.A.M.S. (Facial Attendance Management System)

¹Aditya Waingankar, ²Madhura Garge, ³Dhananjay Chaudhari, ⁴Saloni Kabadi, ⁵Anjali Devi Patil

^{1,2,3,4}Student, Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India

⁵Professor, Dept. of AI & ML, Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India

Abstract - This paper presents a system which consists of a door that unlocks with the help of face recognition and face detection with an attendance manager. The system has two sides of working for better clarification of attendance issue in institutes or workspaces, the two sides of system consist of: outside the door esp32 camera is programmed with face detection and face recognition that helps in unlocking the door and then we have the inside camera which refers to the pre-registered data of person to log the attendance in presence of authority.

In this system, a camera captures an image of a person's face and compares it to the registered image in the system's database. If there is a match, the person is identified, and their attendance is recorded. The system can be integrated with a door access control system, allowing the person to enter or exit a room or building based on their identification. To unlock a door using face recognition technology, the system is connected to an electronic solenoid lock that can be activated on meeting certain conditions. When a person's face is recognized, the system sends a signal to the electronic lock to unlock the door. This technology provides a convenient and secure way of managing access to restricted areas, reducing the risk of unauthorized access and ensuring accurate attendance records.

Keywords: face recognition, face detection, attendance manager, esp32 camera, solenoid lock.

I. INTRODUCTION

Door Unlocking with face recognition and attendance management is a system that uses facial recognition technology to authenticate the identity of individuals before granting them access to a particular area. The system works by capturing an image of an individual's face using a camera, which is then compared to a database of pre-registered images to identify the person.

In addition to unlocking doors, the system can also be used as an attendance management tool. When an individual is identified, their attendance is recorded automatically, eliminating the need for manual entry. Also, the attendance will be recorded with date and time while going in and out. This feature can be particularly useful for large organizations

where keeping track of attendance can be time-consuming and error prone.

Overall, Door Unlocking with face recognition and attendance management offers a high level of security and convenience, making it an ideal solution for companies and organizations looking to streamline their access control and attendance management processes. Also, this system can be used for educational institutes as maintaining the record of attendance is a very hectic work.

1.1 Project Aims and Objectives

The project aims and objectives that will be achieved after completion of this project are discussed in this subchapter. The project aims to develop a system for door unlocking with face recognition and attendance management. The system will use facial recognition technology to identify individuals and grant access to the designated areas. The system will also keep track of attendance records for everyone, which can be accessed by authorized personnel.

The objectives of the project are:

- Design and develop a robust facial recognition system that can accurately identify individuals in real-time.
- Develop a secure and reliable door unlocking mechanism that can be triggered by the facial recognition system.
- Implement an attendance management system that records attendance records for each individual using the facial recognition system.
- Provide an easy-to-use interface for authorized personnel to access attendance records and manage the system.
- Test the system under various conditions and scenarios to ensure its reliability and accuracy.
- Document the entire development process, including the system architecture, algorithms used, and testing procedures, for future reference.
- Ensure compliance with privacy regulations and data protection laws.
- Provide technical support and maintenance for the system after deployment to ensure its continued functionality.

1.2 System Objectives

Convenience: Another objective is to provide a convenient and easy way for authorized personnel to access the building or designated area. With face recognition technology, there is no need for key cards, passwords or other traditional methods of authentication.

Attendance management: The system can also be used to manage attendance by tracking the time and attendance of employees. This can be useful for calculating employee salaries, monitoring absenteeism, and tracking overall attendance patterns.

Data management: The system can store and manage data related to employee attendance and access to the building. This data can be used for generating reports, tracking patterns, and making informed decisions.

Cost savings: The system can also help reduce costs associated with traditional access control methods, such as key cards or badges, which can be lost or stolen. With face recognition technology, there is no need to replace lost or stolen cards, reducing associated costs.

1.3 Background of Project

Door unlocking with face recognition and attendance management is a technology that combines facial recognition with access control systems and attendance management software. This technology allows authorized personnel to gain access to restricted areas by scanning their face using a camera that captures an image of their face and compares it to a pre-stored database of authorized users. The system can be configured to grant access to specific individuals or groups of people at specific times or days. The system can also keep track of attendance records and generate reports based on the data collected.

This technology is highly feasible in workplaces, educational institutions, and other organizations to improve security and streamline attendance management. It eliminates the need for traditional methods of access control, such as keys or swipe cards, which can be lost, stolen or shared. It also reduces the administrative burden of attendance management by automating the process.

II. HARDWARE COMPONENTS

2.1 Components for processing the system

i) ESP32 Camera

The ESP32 camera is a small-sized camera module that is designed to work with the ESP32 development board. It is

based on the OV2640 image sensor, which is capable of capturing images with a maximum resolution of 1600x1200 pixels.

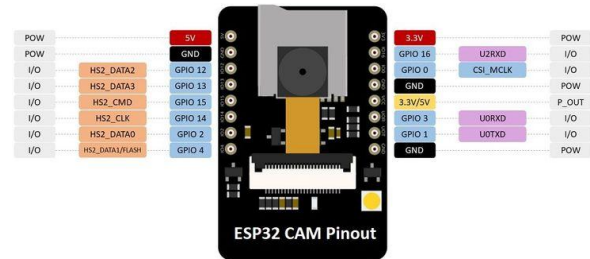


Figure 1: ESP32 Camera

The camera module also features a built-in micro SD card slot, which can be used to store the captured images or videos.

ii) Arduino Mega + Wi-Fi 2560



Figure 2: Arduino Mega + Wi-Fi 2560

The Arduino Mega + Wi-Fi 2560 is a combination of the Arduino Mega 2560 board and a Wi-Fi module. The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 microcontroller, which has 54 digital input/output pins, 16 analog inputs, and 4 UART (hardware serial communication) ports.

iii) Solenoid lock

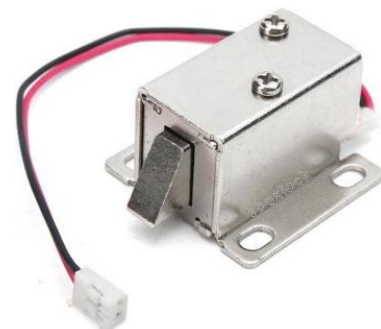


Figure 3: Solenoid Lock

A solenoid lock is an electronic lock that is controlled by a solenoid, which is an electromechanical device that converts electrical energy into mechanical energy. The solenoid consists of a coil of wire that, when energized, creates a magnetic field that pulls a plunger or rod towards it.

iv) Single Channel Relay

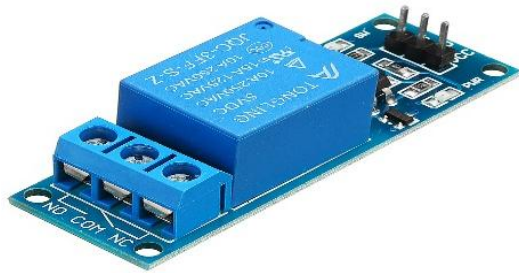


Figure 4: Single channel Relay module

A relay is an electrically operated switch. It consists of a set of input terminals for single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

III. METHODOLOGY

3.1 Data Registering and processing

- i. The Esp32 camera is programmed with the face recognition and signal sending commands such that when a registered face is detected the board sends the high or low command to the solenoid lock.
- ii. The Arduino Mega WIFI is of great use in uploading programs to the esp32 camera board through its communication pins and provides a steady power supply of 5v to the esp32 camera. The Arduino also helps in keeping other components of the system working like buzzer, i2c liquid crystal lcd and a speaker with Sd card module with serial port.
- iii. The Solenoid lock works with a 12v power supply, it is connected directly to the one channel relay 5v module, which increases the data processing speed and unlocks/locks the door on accurate commands provided by the esp32 camera.

3.2 Attendance system

- i. The attendance system is the second side /second part of the project; here the individual enters inside the area after unlocking the door using face recognition and logs attendance on the second camera.
- ii. The second camera is connected directly to the admins database or device which is programmed using python.

- iii. The working of attendance is such that the admin gets access to all entries of the individuals with their total timespan of attendance in the area.
- iv. This system solves the problem of less timespan spent in lectures or workspaces.
- v. The total summation of attendance time span is calculated such that if the given time limit by the admin doesn't match with the individual's attendance span, it will not be entered in the final datasheet and will be marked absent.

IV. RESULT

The results of our experiments demonstrate the effectiveness and practicality of the Facial Attendance Management System based on the hardware system built using esp32 camera board and arduino mega wifi.

The system was tested in several conditions to tackle the daily life problems like low light conditions; the following results were observed;

4.1 Accuracy

The hardware system was able to detect the face correctly for unlocking the door using the images captured previously for better and accurate working.

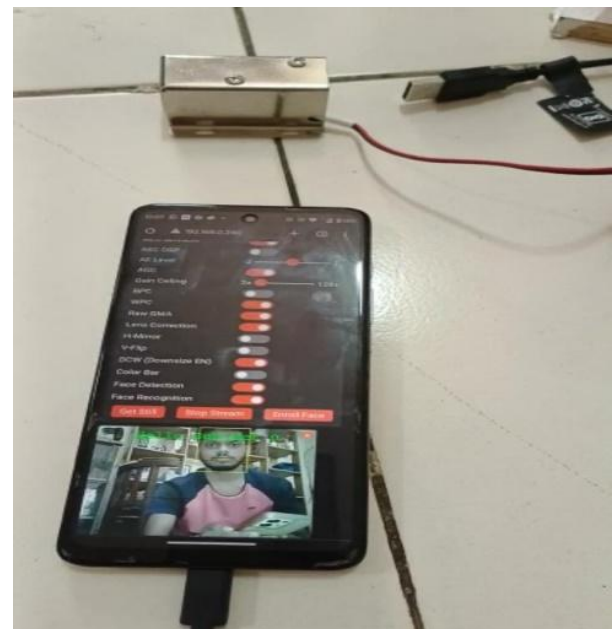


Figure 5: ESP32 browser

The software system was able to detect the face with high accuracy for adding and managing the attendance in the datasheet.

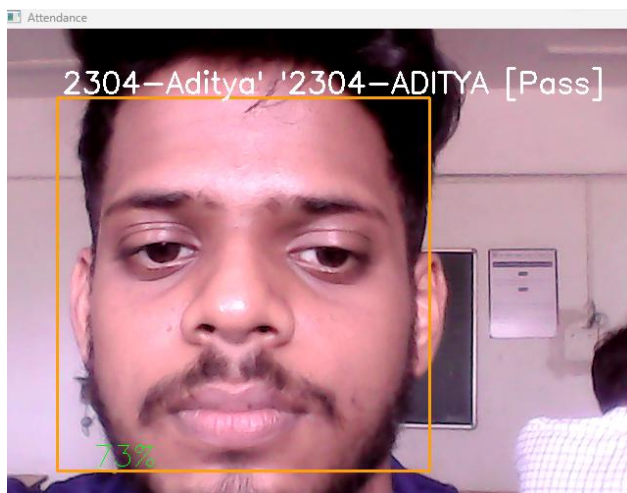


Figure 6: Attendance Tracking

4.2 Efficiency

The hardware and software system work efficiently in both normal and dark conditions.

V. CONCLUSION

Facial recognition door unlocking and attendance management is a promising technology that has the potential to revolutionize access management and participation in many areas such as workplaces, schools, and other institutions. Using facial recognition algorithms, the technology can quickly identify authorized users and give them access to secure areas. At the same time, it can track participants and provide management with important information to monitor and improve efficiency.

While technology has many benefits, it also raises concerns about privacy, security and abuse. It is important to ensure that data collected through facial recognition is secure and protected from unauthorized access or use.

There should also be transparency about how technology is used, and people should have the right to disable facial recognition if they want to.

Overall, facial recognition for door unlocking and attendance management can improve efficiency, safety and productivity in many areas, but there may be ethical and legal considerations and measures used to reduce risk.

VI. FUTURE SCOPE

This technology is anticipated to become widely used throughout the world as a result of improvements in facial recognition technology and rising demand for contactless access control solutions. In the areas of education, the workplace, healthcare, and transportation, we intend to expand

the system. Face recognition attendance systems, for instance, can assist educational institutions in streamlining attendance administration and ensuring correct attendance tracking.

ACKNOWLEDGEMENT

The authors would like to extend their sincere gratitude to everyone who helped my study project be completed successfully. Before anything else, we want to express our deepest gratitude to the technical team for all of their help and support during the project. They overcame a number of technical obstacles and produced the expected results thanks to their knowledge and commitment.

We are also grateful to our professors, research guide, supervisor, and mentor, who provided us with valuable direction and input during the research process. Their sage advice and insightful critiques helped us refine our ideas and raised the bar on our work.

Furthermore, we would like to thank our institute and our beloved HOD madam for providing us with the resources and facilities we needed to complete this project. Their assistance and inspiration were crucial in the accomplishment of our research.

Last but not least, we would like to express our gratitude to the project team for their cooperation, dedication, and hard work. Their assistance was essential in attaining the project's goals and finishing on schedule.

Finally, we would want to express our sincere gratitude to everyone who has supported us on this trip. We could not have accomplished it without their help and contributions, which are priceless.

REFERENCES

- [1] Facial Recognition Attendance Management System Using Door Unlock," by K. V. Chetan and K. Ashwini. International Journal of Scientific Research in Computer Science and Engineering, Vol. 7, No. 2, 2019.
- [2] "A Study on Facial Recognition-based Attendance Management System," by N. K. Jha and P. S. Bhalerao. International Journal of Engineering Research and General Science, Vol. 5, Issue 6, 2017.
- [3] "Design and Implementation of an Automated Attendance Management System using Facial Recognition," by M. S. M. Sazzad, et al. International Journal of Advanced Computer Science and Applications, Vol. 9, No. 1, 2018.
- [4] "Facial Recognition Based Attendance Management System Using Raspberry Pi," by A. Y. Chawan and M. R. Bhongade. International Journal of Advanced

Research in Computer Engineering and Technology, Vol. 7, No. 3, 2018.

- [5] "Development of a Facial Recognition-based Attendance Management System," by M. A. Khan, et al. Journal of Applied Science and Engineering, Vol. 21, No. 4, 2018.

AUTHORS BIOGRAPHY



Aditya Waingankar,

Pursuing second year in B.E CSE (AI&ML) at Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India.



Saloni Kabadi,

Pursuing second year in B.E CSE (AI&ML) at Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India.



Dhananjay Chaudhari,

Pursuing second year in B.E CSE (AI&ML) at Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India.



Madhura Garge,

Pursuing second year in B.E CSE (AI&ML) at Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India.

Citation of this Article:

Aditya Waingankar, Madhura Garge, Dhananjay Chaudhari, Saloni Kabadi, Anjali Devi Patil, "F.A.M.S. (Facial Attendance Management System)" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 7, Issue 4, pp 163-167, April 2023. Article DOI <https://doi.org/10.47001/IRJIET/2023.704026>
