

# IOT Based Smart Attendance System Using Face Recognition

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**Abstract:** - The attendance of students is a topic in our paper. Face recognition is used to track student attendance. The Raspberry Pi is used for face detection and recognition. If the camera is attached to the Raspberry Pi's USB port, only photographs of students who are present in the class will be captured for face detection. When the taken photographs are compared to the recorded photos, we will be able to distinguish the faces of each student, and attendance will be assigned to that subject class. This procedure is followed for each class, and students are assigned attendance as a result. This is an automated technology that assists the instructor in taking class attendance without causing any disruption or wasting time. The concept can be applied to a variety of scenarios, one of which is facial recognition, which saves time and effectively identifies and eliminates the possibility of proxy attendance. The main goal of this project is to create an automatic attendance system using a Raspberry Pi and OpenCV/Python modules, as well as a recognizer algorithm. The proposed method can be used in any field where an attendance system is used and is important. Furthermore, because the project objectives and design criteria were all met, it's best to describe this project as an engineering solution for tracking and managing attendance at all universities and institutions.

**Key Words**— Attendance, face identification, Recognizer, OpenCV, Raspberry pi.

## I. INTRODUCTION

This is designed to record student attendance without the need for human intervention, making it particularly beneficial for institutions and schools to keep track of attendance. This approach saves time for people because they may check their attendance and academic performance from anywhere by registering on the student registration page developed in this paper. We are still employing the same old methods of classroom management in this day of technology and automation. Attendance is the most crucial factor in the classroom, as it is closely related to students' academic performance. Recently, some students have been preoccupied with bettering themselves during lectures only when there is strict classroom supervision (Research Gate, 2018). The more effective the attendance system, the higher the level of involvement and learning in class. Previously, we used tactics such as roll numbering, calling, and signing against a specific roll number. These approaches are time demanding and have a high probability of proxy. We came up with the notion of automating this procedure using current technology in order to achieve a well-kept and disciplined classroom. This project's goals will be met with the help of a facial recognition system, as well as appropriate hardware and software. Image processing has led to the development of facial recognition systems. Image processing is concerned with the extraction of necessary data from a digital image, and it plays a unique role in technological growth. Our main focus will be on obtaining digital

photographs and then processing them with programmes and algorithms to extract usable data.

As the visual data is sent into the image processing system, it is processed to make it usable for human interpretation. That information from image processing will play a significant role and assist in a variety of fields where it can be used. Image processing has a wide range of applications and can be used in almost any situation where imaging data may be linked to pre-determined algorithms. It was a sophisticated image processing application that also served as the foundation for our research. Our facial anatomy was a classic example of a multidimensional complexity that required extensive computational analysis to recognise.

## II. LITERATURE SURVEY

There has been a lot of research done so far on the many techniques for implementing an effective attendance monitoring system. The sorts of input methods used, the sorts of data processing used, and the controllers utilised to construct the systems all differ. In this section, we'll look at the numerous options available, as well as the benefits and drawbacks of each system. "Attendance System Using NFC Technology with Embedded Camera on Mobile Device" is the first system (Bhise, Khichi, Korde, Lokare, 2015). Near field communication (NFC) is a sort of short-range wireless communication that occurs between two active and passive devices. Both devices are essentially inductor coils that respond to electromagnetic induction. The active gadget generates an electromagnetic field with a specified radius and strength. Which was utilised to construct a timekeeping system. Students can be given NFC tags that are uniquely

programmed with their unique identifying numbers in a school context, for example. The professors carry the NFC readers to the classes, and students must swipe their NFC tags near the reader, say the instructors' phone. This information is subsequently sent to the school database, which is used to track the student's attendance. This approach, however, is open to impersonation, in which one individual can sign in as another. Time management systems, which are utilised at many universities, institutions, and schools, are another comparable system that uses biometrics (fingerprint recognition, RFID, and so on) to identify end users. These systems, on the other hand, raise new privacy concerns. These systems can potentially be damaged physically by their users. As a result, they will incur increased maintenance costs. We suggest an idea that eliminates physical access to the automated system for anyone.

### III. METHODOLOGY

We will build a viable solution to our problem based on the literature survey, since we have fully investigated many areas that are directly related to our project. In this section, we will present a method that will provide an overview of our project's approach and how it should be carried out. Because the prior effort was insufficient, we decided to build this project in the most viable and efficient manner possible. The Viola Jones method is the suggested face detection module for this project. A neural network architecture with LBPH is also proposed for facial recognition modules in this project. The following figure shows the project system circuit design.

#### I. PROPOSED SYSTEM CIRCUIT DIAGRAM

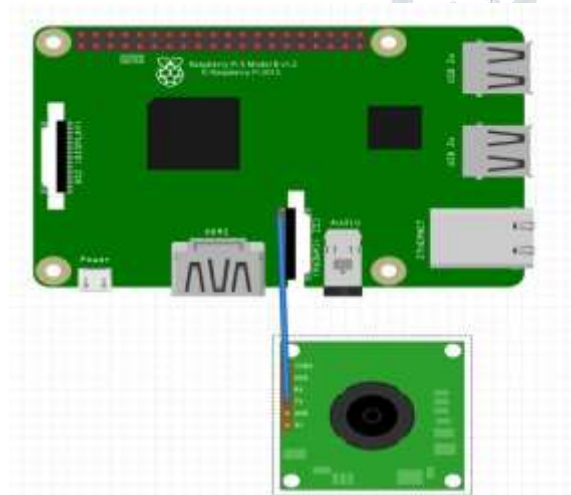


Figure 1: The Raspberry pi System setup

### II. PROPOSED SYSTEM FLOWCHART

The following figure shows the project system flow- chart:

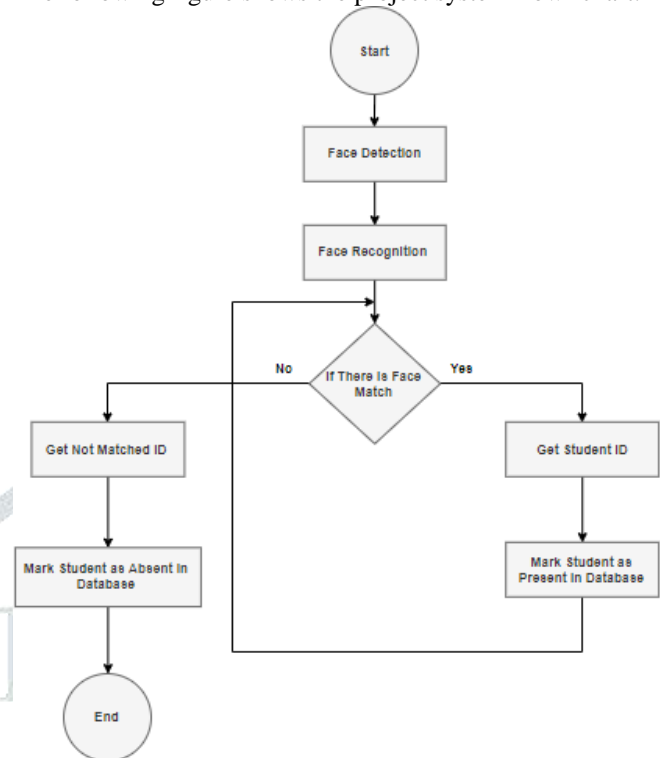


Figure 2: Flow chart of attendance taking

### IV. HARDWARE REQUIREMENT

The Raspberry Pi set up needs:

The hardware used in this project consists of only 7 components which are:

- Raspberry Pi 3
- Raspberry Pi 5MP Camera Board Module
- Power Supply Cable
- 16 Gb Micro SD Card SanDisk
- Screen
- Mouse & Keyboard
- HDMICable

### IV. SOFTWARE REQUIREMENT

**OpenCV-Python software:**

OpenCV is a programme that works with computer languages such as Java, Python, and C++. It may be used on a variety of platforms, including iOS, Android, OS X, Linux, and Windows. Interfaces for CUDA and OpenCL-based GPU workloads are also being developed in real time. OpenCV-Python is a Python library for dealing with vision problems on computers. 2018 (OpenCV)

**Visual studio code software:**

Microsoft® Windows® Visual studio code is a code manager produced by Microsoft and Linux. Essentially, this strategy aids in the troubleshooting of Windows by

incorporating Git control and GitHub, language structure, perceptive code finishing, scraps, and code restructuring. Which I used to run python code in my project.

#### Google drive:

Google Drive is a cloud-based storage service that lets you save files online and access them from any computer, smartphone, or tablet. You may securely upload and edit files online using drive on your PC or mobile device.

### I. IMPLEMENTATION

• To begin, connect the Raspberry Pi to the necessary components as shown in the diagram:



Figure 3: The Raspberry project system set-up.

• The flowchart of a human face detection and identification system utilising the Raspberry Pi 3 is shown in the diagram below.

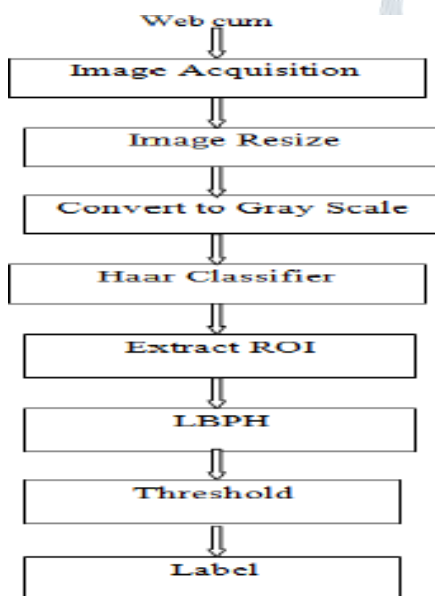


Figure 4: Flow chart of attendance taking

**Step 1:** The first step is to set up the Raspberry PI.

**Step 2:** Navigate to the Attendance Monitoring System's Graphical User Interface. After the professor has selected the

appropriate day and schedule ID for the current class session, the attendance taking session can begin.

**Step 3:** Launch python script after receiving the lecturer's button click action in the main window, a python script will be launched from a bash file.

**Step 4:** The initial step is to load the trained data (.yml) file that was saved during the face database building procedure into the python script.

**Step 5:** Obtain Faces The device will next begin to acquire student portraits, which will be subjected to the same pre-processing and face detection procedures as before.

**Step 6:** Valid portraits will next be matched against the recognizer's loaded gallery in order to identify the captured faces.

**Step 7:** Make a note of who is in attendance. Following the identification of the relevant student through the capturing procedure, a record of current attendance will be added to a database-managed attendance table.

**Step 8:** The students attendance is recorded in an excel sheet.

**Step 9:** This excel sheet is then uploaded on google drive.

### V. RESULTS

After testing the face detection algorithm on a number of volunteers, the results are accurate to within about 98.5 percent. We got the following results after completing all of the implementation steps.

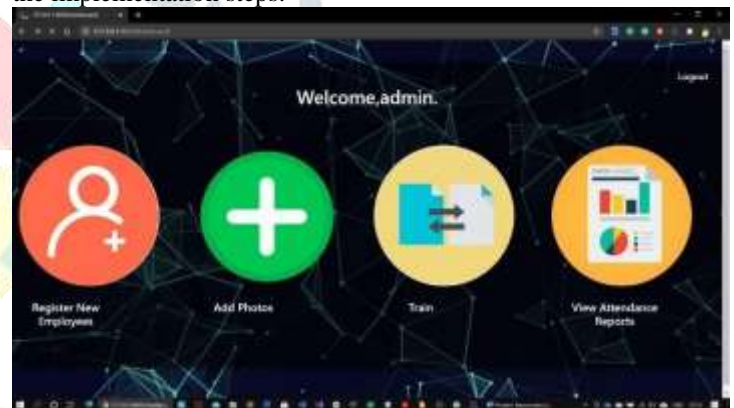


Figure 5: Login Page Of the System

### Face detection of enrolled student

The following are the findings of the implementation test, which showed that one student was detected and enrolled as present during the attendance taking procedure.

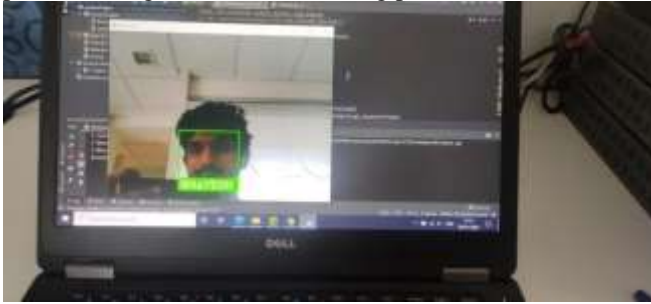


Figure 6: To record a student's attendance, it first records an image in the shape of a rectangular box.

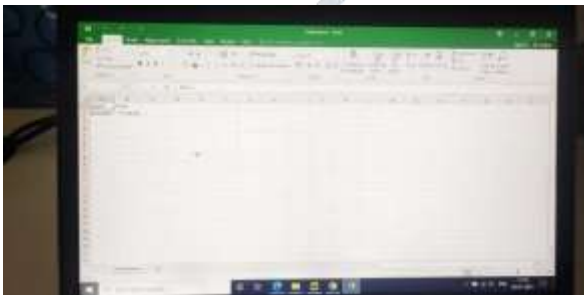


Figure 7: An excel sheet of attendance record is generated.



Figure 8: The generated excel sheet is uploaded on google drive.

### VI. CONCLUSION

We choose the Automated Attendance Monitoring System project after considering the demands of society's day-to-day needs and wants. As technology advances, we are more likely to think outside the box and come up with a game-changing concept. Education is the most important thing that everyone should obtain because it is the foundation for a better lifestyle and will undoubtedly raise the living community's standard. Our educational system is lacking in student involvement in schools, colleges, and universities. Rather than attending lectures and studying, they prefer to stay away from class and keep themselves occupied with these devices. Low attendance means that pupils do not gain the knowledge that they are expected to obtain, knowledge

that is extremely valuable to them and can lead to a brighter future.

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