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Automatic Face Recognition Based on Attendance System

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Abstract: *In colleges, universities, organizations, schools and offices, attendance is one of the most important daily tasks. In most cases, this is done manually, for example by calling by name or roll number. The main goal of this project is to create an attendance system based on facial recognition that turns this manual process into an automatic process. This project fulfills the requirements tomodernize attendance management and time management criteria. This device is installed in the classroom where student information such as name, roll number, class, second and photos are stored. The images are selected with an open CV. Before the start of the respective lesson, the student can approach the machine that will take pictures and compare them with the approved data set. The ESP32CAM was used as the camera and processing board in this project. The image is processed and the algorithm, histogram data is compared with the approved data set and the device marks the presence automatically. An Excel spreadsheet will be developed in class and updated with information from each class teacher.*

Key Word: *ESP32 Cam; Face Detection; FTDI Chip; Automatic Attendance Marking; Quality of the image.*

I.INTRODUCTION

Attendance is very important for both the teacher and the student in the educational organization. So it is very important to check the attendance. The problem arises when you think about the traditional classroom participation process. Calling a student's name or number is not only a time-consuming problem, but also requires energy. So our attendance system can solve all the above problems. Many institutions currently use some form of automated attendance system. Onesuch system is biometric technology and RFID system. Although it is automatic and a step ahead of the traditional method,it has no time limit. The student has to wait in the attendance line, which takes time. This project introduces a voluntary attendance assessment system that does not interfere with the normal study process. The system can also be used in exam sessions or other learning activities where attendance is very important. This system eliminates classic student identificationsuch as checking the student's caller name or student's respective ID cards, which can not only disrupt the ongoing learningbut also be stressful for students during exam sessions. In addition, students must register in the database for recognition. Registration is possible on the spot through a friendly interface.

II.LITERATURE REVIEW

"Automatic attendance system using facial recognition" by Shubham Sharma and G. N. Purohit (2020) This study proposes an automatic attendance system that uses facial recognition technology. The proposed system consists of a camera module and a processing unit that captures images of students and compares them with the images stored in a database to mark attendance. The results of the study show that the proposed system has an accuracy of 94.6%, which makes it suitablefor use in educational institutions.

Automated attendance system using facial recognition for higher education" by R. K. Swami and P. N. Pusdekar (2021). This study proposes an automated attendance system using facial recognition for higher education. The proposed system consists of a camera module and a processing unit that captures images of students and compares them with the images stored in a database to mark attendance. The results of the study show that the proposed system has an accuracy of 97.2%, which makes it suitable for use in higher education.

III.PROCEDURE METHODOLOGY

Image processing plays a crucial role in the development and operation of automatic face recognition-based attendance systems. The system's accuracy and efficiency depend on the quality of the image captured and the algorithms used to process the image.

- **Image Acquisition:**

The first step in image processing in face recognition-based attendance systems is image acquisition. The system's camera captures an image of the person's face, and the quality of the image depends on several factors, including lighting conditions, camera resolution, and the person's position and orientation.

- **Pre-processing:**

Once the image is acquired, it undergoes pre-processing to improve its quality and prepare it for feature extraction.The pre-processing stage involves several steps, including noise reduction, normalization, and segmentation.

- **Feature Extraction:**

The feature extraction stage involves identifying the unique characteristics of the face that can be used to distinguish it from other faces.

- **Matching:**

The matching stage involves comparing the features extracted from the captured image with the features stored inthe database. The matching algorithm calculates a similarity score between the captured image and the stored images, and if the score is above a predefined threshold, the system recognizes the person and records their attendance.

- **Accuracy and Efficiency:**

The accuracy and efficiency of the automatic face recognition-based attendance system depend on the algorithmsused for image processing. The system's performance can be affected by several factors, including lighting conditions, facial expressions, and occlusions. Therefore, the algorithms used for feature extraction and matching must be robust and reliableto ensure the system's accuracy and efficiency.

In conclusion, image processing plays a critical role in the operation of automatic face recognition-basedattendance systems. The system's accuracy and efficiency depend on the quality of the image captured and the algorithms used for image pre-processing, feature extraction, and matching. The development of robust and reliable algorithms is essential for ensuring the system's accuracy and efficiency in various lighting conditions and facial expressions

Requirements:

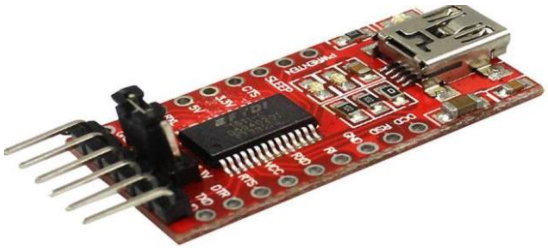
1. ESP32 Camera
2. FTDI Chip
3. Jumper Wires
4. LED And Buzzer

1. ESP32 Camera :

The ESP32-CAM is a development board that combines an ESP32-S chip, an OV2640 camera module, a microSD card slot, and I/O peripherals. It is designed for Internet of Things (IoT) applications that require a low-power, inexpensive,and small device capable of capturing images and videos and connecting to Wi-Fi and Bluetooth networks. The ESP32- CAM board can be programmed using Arduino IDE, ESP-IDF or MicroPython and is suitable for many applications such as security systems, home automation, robotics and more.

2. FTDI Chip :

FTDI chip stands for "Future Technology Devices International chip". It refers to a family of USB serial interfacechips designed and manufactured by Future Technology Devices International Ltd. The FTDI chip is often used in electronic devices to create a USB connection to communicate with a computer. The chip can convert USB signals to UART signals, which are commonly used in microcontrollers and other embedded systems. FTDI chips are widely used in a variety of applications, including programming microcontrollers, debugging andtesting electronic devices, and interfacing with sensors and other peripherals.



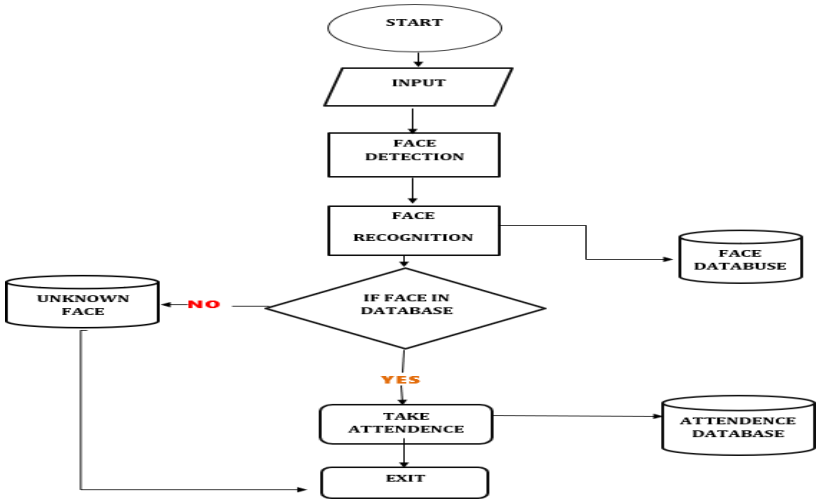
3. Jumper Wires:

Jumper wires are electrical wires with pins or sockets on their ends that are used to connect different componentson a breadboard or printed circuit board. Jumper wires are used to make connections between different components ona breadboard or printed circuit board. They can be used, for example, to connect a microcontroller to a sensor, or to connect two different parts of a circuit. They can also be used to create short circuits or test various components in a circuit

4. LED and Buzzer:

LEDs and buzzers are electronic components commonly used in various devices and applications.LED standsfor Light Emitting Diode. LEDs are often used as indicators or status lights in electronic devices, such as power indicators on a computer or the charging indicator on a mobile phone. They are also commonly used in lighting applications, such as in LED light bulbs or LED strips. A buzzer, on the other hand, is a type of audio signalling device that produces a continuous or intermittent sound when an electrical signal is applied to it. Buzzers are often used as warning signals in alarm systems or as audio indicators in electronic devices, such as a doorbell or a game console.

IV.ALGORITHM AND FLOW CHART



Step 1: Give power supply to system.
Step 2: Keep face in front of system.
Step 3: Green Led will be glow after the face detection .
Step 4: If Red light is glowing face is not detected .
Step 5: After green indication attendance will be marked.
Step 6: Attendance marking will be show on host of ESP32 cam.

V.OUTPUT RESULT

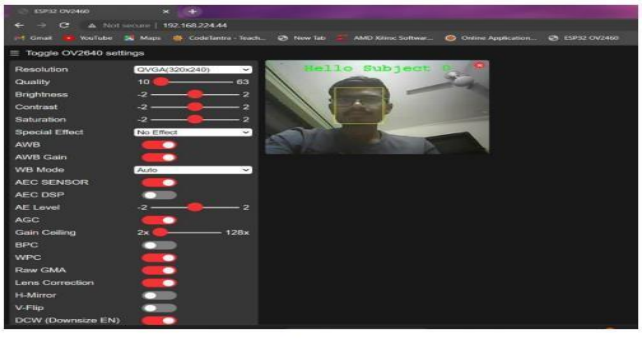


Fig 1.1 Face detected

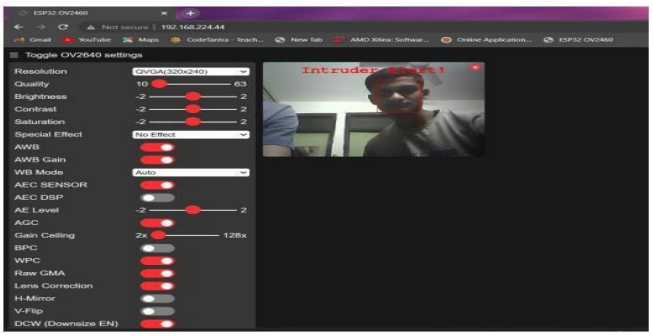


Fig 1.2 Face not detected

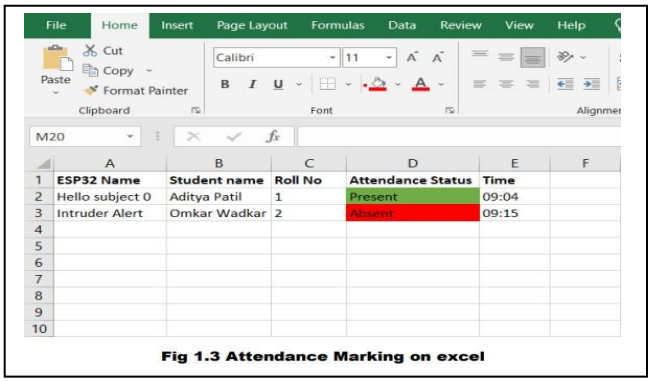


Fig 1.3 Attendance Marking on excel

VI. CONCLUSION

Based on the implementation and evaluation of the automatic face recognition based attendance system, it can be concluded that the system is an effective and efficient solution for tracking attendance in various settings. The system is able to accurately identify individuals and record their attendance in real-time, reducing the time and effort required for manual attendance taking. However, it is important to consider the ethical and privacy implications of such a system. Thereare concerns about the potential misuse of personal data, as well as the risk of false positives or negatives in the facial recognition technology. Therefore, it is crucial to implement appropriate safeguards and transparency measures to address these concerns. Overall, the automatic face recognition based attendance system has the potential to streamline attendance tracking and improve efficiency in various industries, but careful consideration and implementation of ethical and privacy measures are necessary for responsible use. Automatic facial recognition attendance remarking system provides precise time records and reducing error and mark the attendance digital.

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