SMART ATTENDENCE SYSTEM

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Abstract: This is a real time system to detect face in a structured environment. The proposed attendance system using face recognition and class monitoring system will have a camera present inside the classroom where the students are seated. The camera will capture the images of students from the video frame. A face recognition system which automatically identifies and verifies the identity of person from data set. Once the face is identifying the controller send the information to the mail box. In this system we are using Raspberry pi and OpenCV library which is installed in pi for face detection and recognition.

Index terms: Raspberry pi 3b, webcam, GSM, OpenCV, Python

I. INTRODUCTION

In present scenario attendance system is manual. It wastes a considerable amount of time both for teachers and students. The waiting time of the students is increased as well as too much time is wasted, if attendance is taken manually. There are still chances for proxies in the class when attendance is taken manually. Manual attendance always a have a cost of human error. Face is the essential recognizable proof for any human. So, automating the attendance process will increase the productivity of the class. This module can be utilized for different applications where face acknowledgment can be utilized for validation.

In [1] the authors have proposed an Automatic Attendance System based On Face Recognition. Which is based on face detection and recognition, automatically detects the student when he/she enters the class room and mark the attendance by recognizing him. This technique is to be use in order to handle the treats like spoofing. The problem with this approach is that it captures only one student image at a time when he enters the classroom thus it is time consuming and may distract the attention of the student.

In [2] the authors have proposed Automatic Control of Students Attendance in Classroom Using RFID. In this system in which students carry a RFID tag type ID card and they need to place that on the card reader to record his attendance. In which RS232 is used to connect the system with computer and stored the recorded attendance from the database. This system may give rise to the problem of corrupt approach. An unlicensed student may make use of RFID card and enter into the organization.

In [3] authors have compiled a system which is based on real time face recognition Which is more reliable, high security and fast response. Also needs to improve in dissimilar lighting conditions.

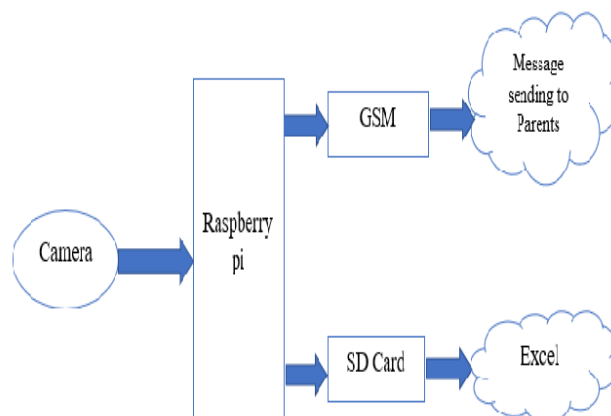## II. IMPLEMENTATION

Block Diagram:

Fig 1: System Architecture

The power supply is given to the raspberry pi which is the heart of the system. The camera is been connected to the raspberry pi camera slot. Camera act of capturing the images of the students who are present in the class. Raspberry pi takes those images as input images and compares the input images which are stored in the data base. Then it tracks the attendances of each and every student which is present in the class. The further process will take place in such a way that the result will be display on a Excel sheet, which carry every student information such as he/she Name, Roll no, attendances etc. If the student is student it takes mark present or absent.

1. **Raspberry pi 3b:**

Fig 2: Raspberry pi 3b module

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries. The original model 5 became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals (such as keyboards and mice) and cases. However, some accessories have been included in several official and unofficial bundles.

- 64bit ARMv7 Quad Core Processor at 1.2GHz
- CSI camera port for connecting the
- Micro SD port for loading your operating
- Upgraded switched Micro USB power
- BCM43143 WiFi on board

powered Single Board Computer running

Raspberry Pi camera
system and storing data
source

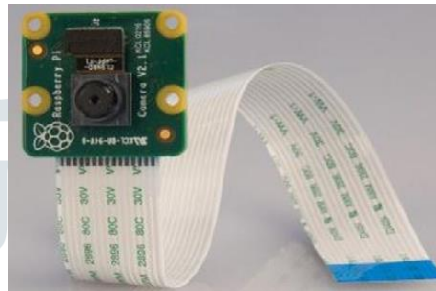2. **Raspberry PI Strip Camera:**

Fig 3: Raspberry pi Strip Camera

This 5mp camera module is capable of 1080p video and still images and connects directly to your Raspberry Pi connect the included ribbon cable to the CSI (Camera Serial Interface) port on your Raspberry Pi, boot up the latest version of Raspbian.

- Sony IMX 219 PQ CMOS image sensor in a fixed-focus module.
- Resolution is 8-megapixel and picture resolution is 3280 x 2464
- Max image transfer rate 1080p: 30fps (encode and decode) 720p: 60fps
- Lens size =1/4"
- Dimensions =23.86 x 25 x 9mm
- Weight=3g

3. **GSM Module:**

Fig 4: GSM/GPRS module

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate.

- Quad-Band 850/ 900/ 1800/ 1900 MHz
- Dual-Band 900/ 1900 MHz
- GPRS multi-slot class 10/8GPRS mobile station class B
- Low power consumption=1.5mA
- Operation temperature= -40°C to +85 °C
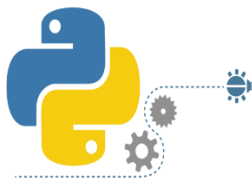
4. Python:

Fig 5: Python

Python is an interpreted high-level programming language for general-purpose programming. It provides constructs that enable clear programming on both small and large scales. Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object-oriented, essential, functional and procedural, and has a large and extensive standard library.

5. Open CV:

Fig 6: Open CV

OpenCV (Open Source Computer Vision) is a library of programming functions which is mainly aimed for real-time computer vision. The library is cross-platform. It is free for use under the open-source BSD license. It has C++, Python and Java Interface and supports windows, Linux, Mac OS, iOS and Android.

III. PROPOSED SYSTEM FLOWCHART:

The image is been captured by camera through a video streaming, while the image is resizing up to certain point using Face detection. Then the image segmented is get compared with latest data sets as well as faces are recognized. The Admin records the data that the particular student is absent or present and then generates the data. The is displayed in Excel sheet
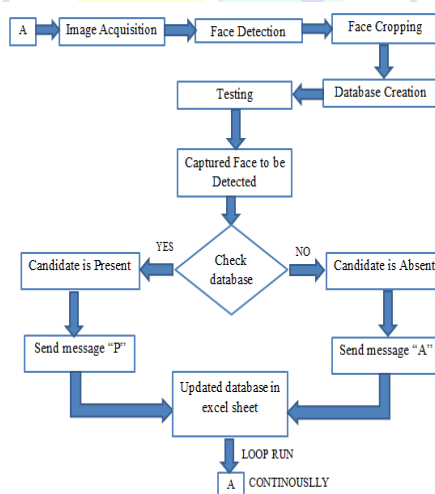

Fig 7: Flowchart

IV. PROPOSED SYSTEM ALGORITHM:

1. Take Raspberry pi OS on to the SD card and repoint the card into the SD slot.
2. Install all the open CV liberies (numpy, pillow , cv2, cognitive face) into the raspberry pi.
3. Fix the entire hardware setup camera connected to the raspberry pi and capture the image.
4. Enroll the images using face detection program
5. Resize the faces of the persons.
6. Store the images in the SD card.
7. Train the images for face recognition using haar algorithm.[3]
8. Run the face recognition program.
9. Track the attendance of the students.
10. Make attendance report in Excel.
11. Send student report to parents.

V. FACE DETECTION AND CROPPING:

A particular image is taken then image after the background is been subtracted which is used for the image detection. For face detection of face the image of face are marked with the help of rectangular or circle. The face detected from an image which is not background subtracted is compared to the face detected after background subtraction is accurate. Then the face which is detected is been cropped. Finally, all the detected face of particular students are detected and cropped from the image. Each cropped image is compared with the images of database. Then the face is trained using haar cascade algorithm. A Haar Cascade is basically a classifier which is used to detect the object for which it has been trained for, from the source. [3]
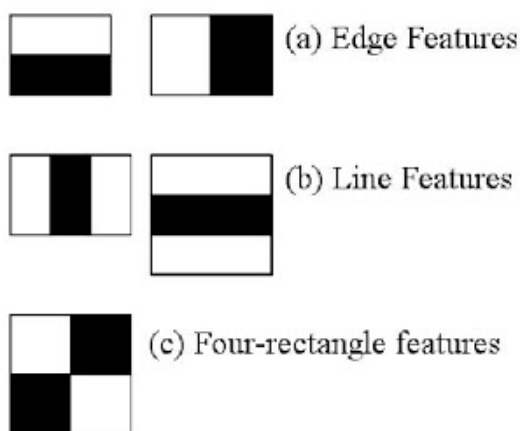

Fig 8: Haar Algorithm

Fig 9: Facial detection and cropping

VI. FACIAL RECOGNITION SYSTEM:

Facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected features from given image with faces within a database. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shapes.

Fig 9: Face Recognition

CONCLUSION:

Smart Attendance System has been invented for the purpose of reducing the errors that occur in the manual attendance system. The aim is to smart and make a system useful to the organization such as an institute and industries as well as send daily report to the teacher in the excel sheet. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This method is secure, reliable, accurate and available for use. This system saves the time and easy to use.

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