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# ATTENDANCE USING FACE DETECTION AND RASPBERRY

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**Abstract** : Attendance for the students is an important task in class. When done manually it generally wastes a lot of productive time of the class. This proposed solution for the current problem is through automation of attendance system using face recognition. Face is the primary identification for any human. This project describes the method of detecting and recognizing the face in real-time using Raspberry Pi. This project describes an efficient algorithm using open-source image processing framework known as OpenCV. Our approach has five modules Face Detection, Face Preprocessing, Face Training, Face Recognition and Attendance Database. The face database is collected to recognize the faces of the students. The system is initially trained with the student`s faces which is collectively known as student database. Raspberry Pi usage helps in minimizing the cost of the product and the usability as it can be connected to any device to take the attendance. This project uses modified algorithm of Haar feature for face detection and uses Local binary pattern histograms for face recognition.

Keywords: Face detection, Face identity, Attendance.

## I. INTRODUCTION

The present-day attendance system is manual. It wastes a considerable amount of time both for teachers and students. The waiting time of the students is increased if attendance is taken manually. There are still chances for proxies in the class when attendance is taken manually. Manual attendance always 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. To make it available for every platform we have chosen the Raspberry pi 3 for face recognition. A Webcam is associated with the Raspberry Pi module. Face identification separates faces from non-faces and those countenances that can be perceived. This module can be utilized for different applications where face acknowledgment can be utilized for validation. In this proposed system we take the attendance using face recognition which recognizes the face of each student during the class hours

## II.LITERATURE SURVEY

**Deshmukh, S. V& Kshirsagar, U. A,"Face Detection and Face Recognition Using Raspberry Pi," 2017 [1]**

Nowadays the number of thefts and identity fraud has become a serious issue. In order to avoid these thefts and identity fraud, a face recognition system must be established. The scope of this project is to develop a security access control application based on face recognition. The haar-like features is used for face detection and HOG +SVM algorithm is used for face recognition. In order to achieve a higher accuracy and effectiveness we use OpenCV libraries and python computer language. Training and identification is done in embedded device known as Raspberry Pi.

**Daryanavard, H., & Harifi,A,"Implementing Face Detection System on UAV Using Raspberry Pi Platform" ,2018 [2]**

Unmanned Aerial Vehicles are air vehicle without pilot which usually appears in the form of quadcopter, hexacopter or aircraft. Implementing face detection and recognition system on Unmanned Aerial Vehicles can identify people on the ground. Lightweight portable system is needed to be applied on UAV. In this paper a Raspberry Pi implementation of face detection has been proposed. Haar cascade classifier algorithm is used via OpenCV tool. The implementation is evaluated using the specific UAV facial image dataset. Experimental results shows 98%, 93%, 86% and 80% True Positive for 1.5, 3, 4 and 5 meters height of camera from the ground, respectively.

**Wazwaz, A. A., Herbawi, A. O., Teeti, M. J & Hmeed, S. Y, "Raspberry Pi and computer based face detection and recognition system", 2018 [3]**

This paper aims to deploy a network that consists a group of computers connected with a microcomputer with a camera. The system takes images of people, analyze, detect and recognize human faces using image processing algorithms. The system can serve as a security system in public places like Malls, Universities, and airports. It can detect and recognize a human face in different situations and scenarios. This system implements "Boosted Cascade of simple Features algorithm" to detect human faces. "Local Binary Pattern algorithm" to recognize these faces. Raspberry Pi is the main component connected to a camera for image capturing. All needed programs were written in python. Tests and performance analysis were done to verify the efficiency of this system.

## III.BACKGROUND THEORY

Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it.They are just like our convolutional kernel. Each feature is a single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black rectangle. Now all possible sizes and locations of each kernel is used to calculate plenty of features. For each feature calculation, we need to find sum of pixels under white and black rectangles. To solve this, they introduced the integral images. It simplifies calculation of sum of pixels, how large may be the number of pixels, to an operation involving just four pixels. The histogram of oriented gradients (HOG) is a feature descriptor used in computer and image processing for the purpose of recognition The technique counts occurrences of gradient orientation in localized portions of an image. This method is similar to that of edge orientation histograms, scale-invariant feature transform descriptors, and shape contexts, but differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalization for improved accuracy. More formally, a support vector machine constructs a hyper plane or set of hyper planes in a high- or infinite-dimensional space, which can be used for classification, regression, or other tasks. Intuitively, a good separation is achieved by the hyper plane that has the largest distance to the nearest training-data point of any class (so-called functional margin), since in general the larger the margin the lower the generalization error of the classifier.

## IV.PROPOSED METHOD

In our proposed system the student attendance is marked by face recognition. For face detection and face recognition the raspberry pi is used. If the camera is connected to Raspberry pi USB port, then only images will capture of the students who are available in the class for face detection. The captured images recognize with stored images then in that image we will recognize the faces of every student and according to that attendance will be given to that subject class. This process is carried out for every class and students are given attendance accordingly. Faculty attendance is monitored with this project. A module is a software component or part of a program that contain one or more routines. One or more independently developed modules make up a program.

## V.BLOCK DIAGRAM

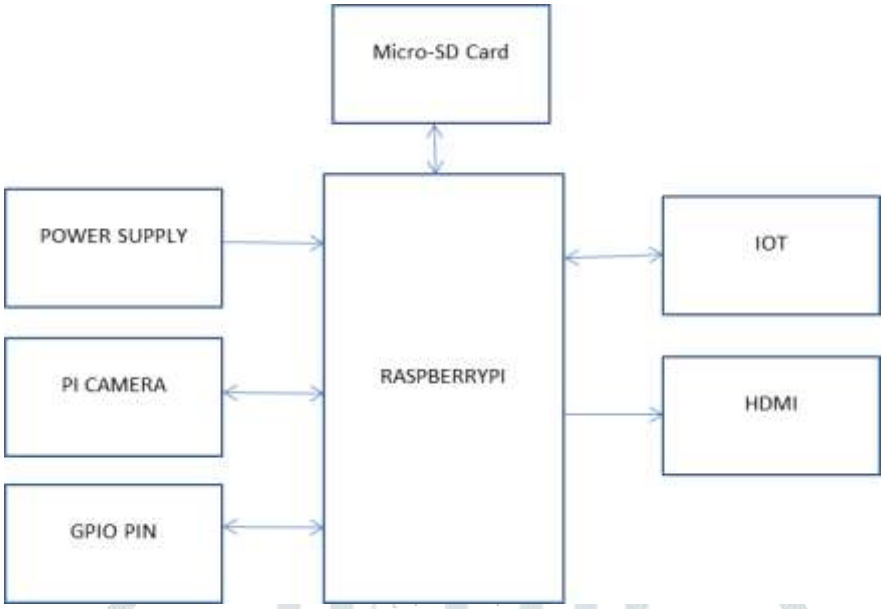


**Fig 1.Block diagram of proposed method**

## MODULES DESCRIPTION

A module is a software component or part of a program that contain one or more routines. One or more independently developed modules make up a program. The project "Attendance Using Face Detection and Raspberry-Pi" consists of two main modules they are

- Hardware
- Software

### RASPBERRY PI

Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (models B and B+) to 512 MB. The system has Secure Digital (SD) (models A and B) or MicroSD (models A+ and B+) sockets for boot media and persistent storage

### RAM

On the older beta model B boards, 128 MB was allocated by default to the GPU, leaving 128 MB for the CPU. On the first 256 MB release model B (and model A), three different splits were possible. The default split was 192 MB (RAM for CPU), which should be sufficient for standalone 1080p video decoding, or for simple 3D, but probably not for both together. 224 MB was for Linux only, with just a 1080p framebuffer, and was likely to fail for any video or 3D. 128 MB was for heavy 3D, possibly also with video decoding (e.g. XBMC). Comparatively the Nokia 701 uses 128 MB for the Broadcom VideoCore IV

### PI CAMERA

This 5-megapixel sensor with OV5647 camera module is capable of 1080p video and still images that connect directly to your Raspberry Pi. This is the plug-and-play-compatible latest version of the Raspbian operating system, making it perfect for time-lapse photography, recording video, motion detection and security applications. Connect the included ribbon cable to the CSI (Camera Serial Interface) port on your Raspberry Pi, and you are good to go.

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**Features:**

- Compatible with Raspberry Pi 4 Model B/3B+/3B/2B/Zero Wireless

- 5 Megapixel OV5647 Camera
- Static Images Resolution: 2592×1944
- Supported Video Resolution: 1080p/30 fps, 720p/ 60fps and 640 x480p 60/90 video recording
- Aperture (F): 1.8

| S.NO | COMPONENT | SPECIFICATION |
|---|---|---|
| 1 | Processor | Broadcom BCM2837B0, Cortex-A53 64-bit SoC @ 1.4GHz |
| 2 | Memory | 1GB LPDDR2 SDRAM |
| 3 | Connectivity | 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE, Gigabit Ethernet over USB 2.0,4 × USB 2.0 ports |
| 4 | Access | Extended 40-pin GPIO header |
| 5 | Video & sound | 1 × full size HDMI, MIPI DSI display port, MIPI CSI camera port |
| 6 | Multimedia | H.264, MPEG-4 decode (1080p30); H.264 encode , (1080p30); OpenGL ES 1.1, 2.0 graphics |
| 7 | SD card support | Micro SD format for loading operating system and data storage |
| 8 | Input power | 5V/2.5A DC via micro-USB connector, 5V DC via GPIO header, Power over Ethernet (PoE)–enabled (requires separate PoE HAT) |
| 9 | Environment | Operating temperature, 0–50°C |

## VI.RESULTS AND DISCUSSION

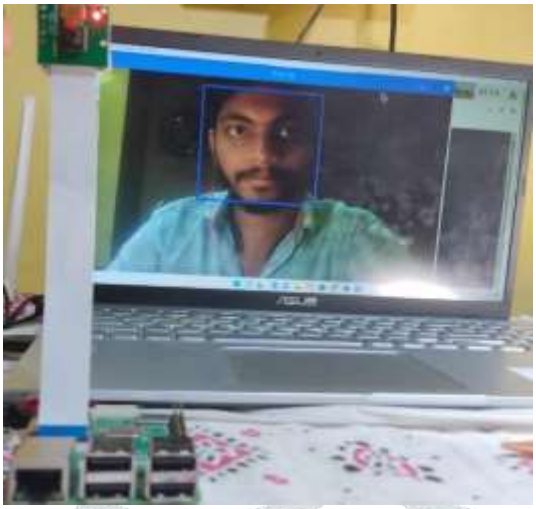

**Fig 2.Face Recognition Started**

In this step, the pi camera connected to raspberry pi is turned on and start capturing the images and it stores the captured image in the database with entered id number.

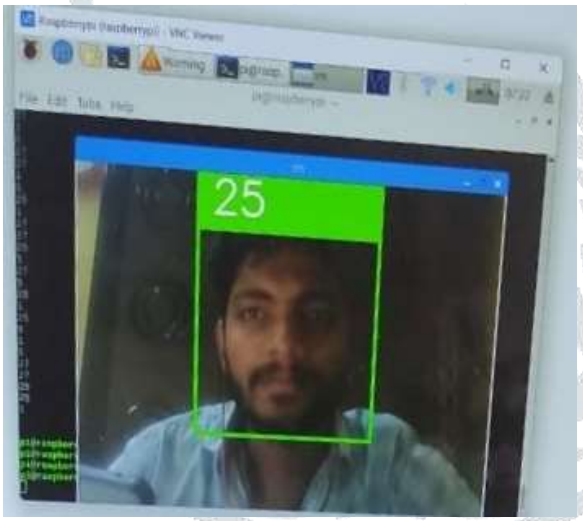


**Fig 3.Face Identity recognized**

In this step, when the face detects in the camera, it compares the face with existing images which was already stored in the database. It detects, analyze and recognize the face and displays the student's id number.

## VII.CONCLUSION

Basically this system work for improving attendance system in every domain like schools, colleges, organizations, institutions and companies. Capturing live images from camera and applying different techniques of face detection and face recognition which will reduce manual or traditional work. In our solution, by creating interface we generate the dataset. We trained the images using Haar Cascade. After completing training it will successfully detect and recognize faces and non faces. When stored images and compared images matched then attendance sheet get updated automatically with time and date. As it stored the entering time of every student it becomes easy for faculty member to keep track on time of student.In future work, the cost of actual implementation is also considerably less compared to other designs and the system can be further improvised by Industrial automation.

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