# Face recognition using image processing with raspberry pi

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## ABSTRACT

Face Recognition is concerned with finding whether or not there are any faces in a given image and, if Present, returns the image location and content of each face. Security and surveillance are the two important aspects of human being. In this paper we propose face detection and recognition system that will capable of processing images very fast while acquiring very high true positive face detection rate. Most face detection algorithms are designed in the software domain band have a high detection rate, but they often require several seconds to detect faces in a single image, a processing speed that is insufficient for real-time applications. This Paper describes a simple and easy hardware implementation of face detection system using Raspberry Pi, which itself is a minicomputer of a credit card and is of a very low price. The system is programmed using Python Programming language. Both real time face detection and face detection from specific images, i.e. Object Recognition, is carried out and the proposed system is to provide a high security system using face recognition on Raspberry Pi board and send an alert to the authorized    person    email,    this    will    increase    the    security    of    our    Project.
**Keywords:** Face Recognition, Haar cascade Algorithm, Local Binary Patterns Histograms (LBPH) Algorithm, Raspberry Pi.

## INTRODUCTION

In associations, enterprises and many organizations are taking the whole participation utilizations RFID techniques, registers, Moodle based understudy ID recognizable proof and unique finger impression modules. In Registers, the whole participation will be figured and reports will be assembled toward the end.

It requires greater investment for computation. RFID innovation disentangles customized remote utilizing advanced inactive and dynamic with distinguishing pieces of proof suitable per users. In brief span, worth's of dispersion and usage for a RFID card based passage bunch framework can be fairly costly. An RFID based passage bunch framework has the capability of genuinely abusing human's sec unity or protection. RFID procedures at last impacts programming that permits each individual to be broke down by essential

information base. This kind of condition will be under assault of programmers. In the event that the RFID per user and recipient are not legitimately coordinated then less read rate can happens. Biometric time and neamess framework is one of the most precise prerequisite in biometric innovation.

Unique finger impression acknowledgment based participation administration framework is a running field today, yet acknowledgement of singular unique finger impression from an arrangement of selected fingerprints is a period taking procedure. Most unique finger impression based participation frameworks store the fingerprints of a client in the unique mark module database. The unique mark framework does not uncover any information about the first unique mark of the client. This suspicion has now been appeared to be false, numerous calculations have been expressed that can reestablish unique mark pictures from

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particulars layouts. These biometric frameworks, RFID frameworks and Moodle based understudy ID recognizable proof frameworks are close to home recognizable proof frameworks utilized for participation administration frameworks and numerous

## RASPBERRY PI

The Raspberry Pi 3 model B is a little Mastercard measured PC that attachments into screen, console or touch show. The Raspberry Pi 3 model B display is utilized as a part of this venture also, it gives six times the handling velocity of other past models. The Raspberry Pi demonstrate has Broadcom BCM2837 processor, BCM2837 is high fueled Quadcore ARM cortex – A53,64 bit based quad center processor and keeps running at recurrence of 1.2GHz with

security, protection what's more, exactness are basically ascertaining parameters yet these frameworks are damaging security and off base. In this way, it is imperative to outline a framework with exceedingly secured and exact.

memory ability to 1Gbyte. It has 40 stick GPIO Header for interfacing the outside gadgets to speak with processor. The correspondence media's resemble 12C, CAN, SPI and in this extend GSM is utilized by direct association with TRX and RXI sticks in GPIO it has quad USB ports, 10/100 Base T Ethernet attachment, DSI Display connector, Micro SD card space, 5v Micro USB, HDMI port, CSI camera connector what's more, 4-shaft 3.5mm jack all of these are appeared I below figure.
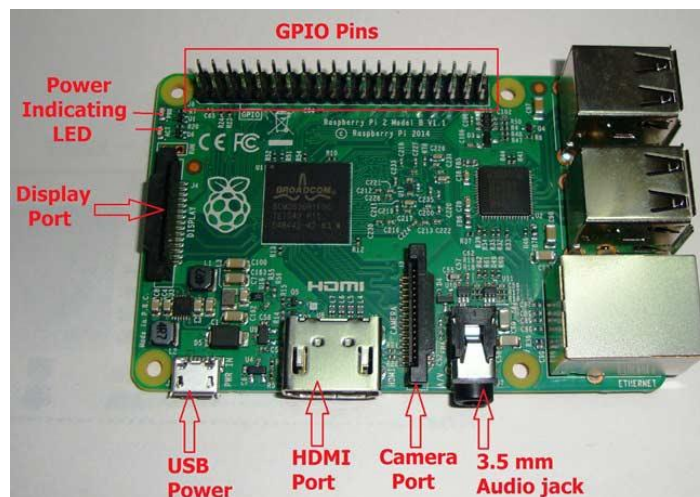


## GPIO PINS
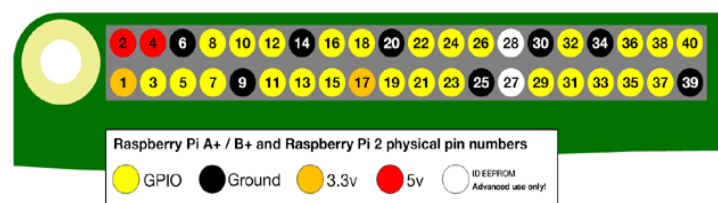


As shown as above figure, there are 40 output pins for the PI. But when you look at the following figure, you can see not all 40 pin out can be programmed to our use. These are only 26 GPIO pins which can be programmed. These pins go from GPIO2 to GPIO27.

These 26 GPIO pins can be programmed as per need. Some of these pins also perform some special functions. With Special GPIO put aside, we have 17 GPIO remaining (Light green Cirl).

Each of these 17 GPIO pins can deliver a maximum of 15mA Current. And the sum of currents from all GPIO cannot exceed 50mA.

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So we can draw a maximum of 3mA in average from each of these GPIO pins. So one should not tamper with these things unless you know what you are doing.



## QHM495LM USB WEB CAMERA



It has Built-in Microphone with noise reduction. Camera was interpolated to 25 Mega pixels. It has 10 level zoom on live Motion Picture and Special Visual effects. It Capture true motion picture. It is Night vision, 6 bright light switch and potentiometer. It is inbuilt with sensitive microphone. It has background changeable of live motion picture.

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## METHADOLOGY

### Lcd Character 2 X 16 Module



LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16 x 2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reason being: LCDs are economical, easily programmable, have no limitations of displaying special and even custom characters (unlike in seven segments), animations and so on.

A 16 x 2 LCD means it can display 16 characters per line and there are 2 such lines.

In this LCD each character is displayed in 5 x 7 pixel matrix. This LCD has two registers, namely, Command and Disk.

The command register stores the command instructions given to the LCD. A Command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

## PIN DETAILS OF 2 X 16 MODULE

| PIN No | Name | Function |
|--------|------|----------|
| 1 | VSS | Ground voltage |
| 2 | VCC | +5V |
| 3 | VEE | Contrast voltage |
| 4 | RS | Register Select<br>0 = Instruction Register<br>1 = Data Register |
| 5 | R/W | Read/ Write, to choose write or read mode<br>0 = write mode<br>1 = read mode |
| 6 | E | Enable<br>0 = start to latch data to LCD character<br>1= disable |
| 7 | DB0 | Data bit 0 (LSB) |
| 8 | DB1 | Data bit 1 |
| 9 | DB2 | Data bit 2 |
| 10 | DB3 | Data bit 3 |
| 11 | DB4 | Data bit 4 |
| 12 | DB5 | Data bit 5 |
| 13 | DB6 | Data bit 6 |
| 14 | DB7 | Data bit 7 (MSB) |
| 15 | BPL | Back Plane Light +5V or lower (Optional) |
| 16 | GND | Ground voltage (Optional) |

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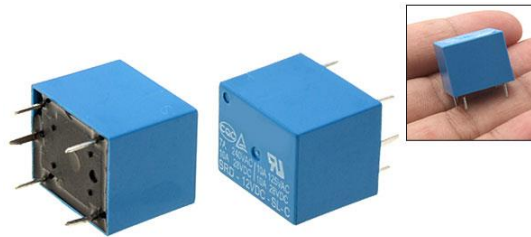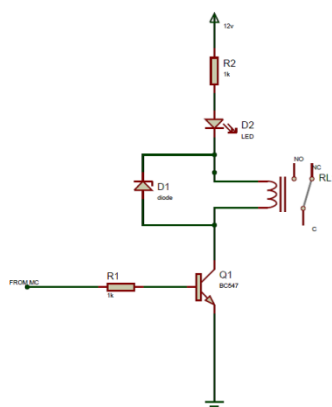
# RELAY



Relays are very versatile- but they're not magic. All they do is make and break sets of mechanical contacts. With careful observation- and a little logical thought- you can work out exactly happening inside the case.

Start by finding two pins connected to relay coil. You can do this with Multi meter. The coil pins will be the only pair be somewhere that exhibit a resistance. Its likely to be somewhere between about 50 ohms to 100 ohms. Low voltage DC relay coils obeys Ohm's Law.
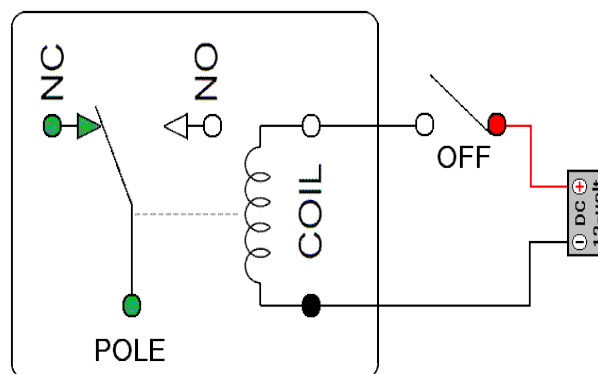


# TRANSISTOR USING RELAY CIRCUIT



Now that we're using a transistor to drive the relay ,we can use considerably less power to

get the relay driven. Because a transistor is an amplifier, we just have to make sure that the

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base lead gets enough current to cause a larger current to flow from the emitter of the transistor will conduct from emitter to collector and power relay.

With no voltage or input current to the transistors base lead, the transistors emitter-to-collector channel is open, hence blocking current flow through the relay's coil. However, if sufficient voltage and input current are applied to the base lead, the transistors emitter-to-collector channel will be closed, allowing current to flow through the relay's coil.

## LBPH (LOCAL BINARY PATTERN HISTOGRAM)

Neighborhood of Binary Pattern (LBP) highlights has performed extremely well in different applications, including surface characterization and division, picture recovery and surface review. The first LBP administrator marks the pixels of a picture by thresholding the 3-by-3 neighborhood of every pixel with the focus pixel esteem and considering the outcomes as a parallel number. Following figure demonstrates a case of LBP estimation.
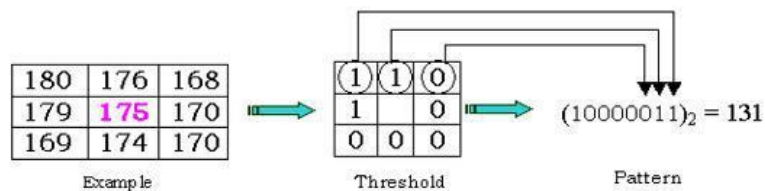


Fig. Case of LBP estimation

The 256 container histogram of the names figured over a picture can be utilized as a surface descriptor. Each container of histogram (LBP code) can be viewed as a smaller scale texton. Nearby primitives which are classified by these canisters incorporate diverse sorts of bended edges, sports, level territories, and so on.

## HAAR CLASSIFIERS

The core basis for HAAR classifier object detection is the HAAR-like features. These features, rather than using the intensity values of a pixel, use the change in contrast values between adjacent rectangular groups of pixels. The contrast variances between the pixel groups are used to determine relative light and dark areas. Two or three adjacent groups with a relative contrast variance form a HAAR-like feature. HAAR-like features, as shown in following figure are used to detect an image. HAAR features can easily be scaled by increasing or decreasing the size of the pixel group being examined. This allows features to be used to detect objects of various sizes.
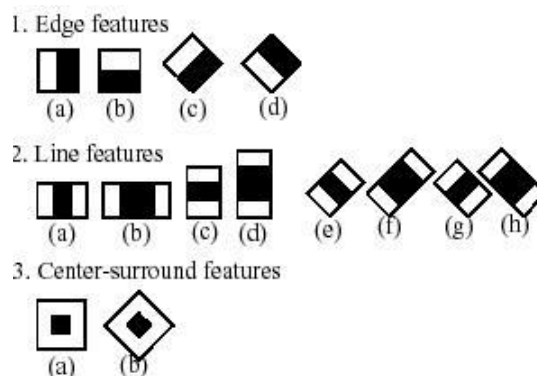


Fig. HAAR Classifiers

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## EXPERIMENTAL RESULT

Raspberry Pi has enough power for HD video and image manipulation, and can be connected to the Arduino board. Connected to Raspberry Pi, Arduino can be used as a control unit while Raspberry Pi processes video images.

Raspberry Pi features include Bluetooth and Wi-Fi wireless technologies and this is the shortcut to display images directly on the Android device.



Fig 1. Images Stored in data base of Raspberry Pi
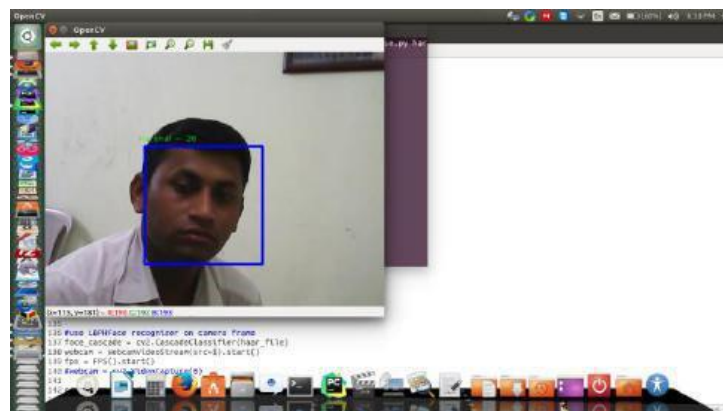


Fig 2. Implementation of the system
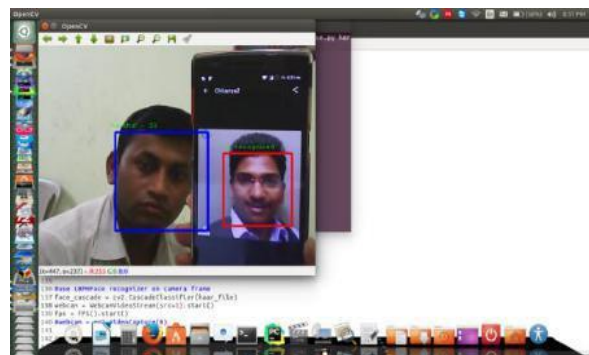


Fig 3. Recognition Image



Fig 4. Not Recognition Image

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## APPLICATION

1. Home Security Purpose
2. Home Automation
3. 3.Use for Attendance

## FUTURE SCOPE

Using Raspberry Pi the current project can be modified by an infrared camera interfacing it can be used in smart Surveillance Monitoring security System which any type of public security is using Living body detection or spying, Also it can be used in Attendance system of the class, Also some profound applications can be implemented using interfacing of Raspberry Pi and Arduino UNO board like sensor application of smartcard swapping, finger detection, alcohol detection, agriculture, humidity sensing, and many more.

## CONCLUSION

A face detection system using Raspberry Pi was developed. The system was programmed using Python Programming language. Both real time face detection and face detection from specific images, i.e. object recognition, was carried out. The proposed system was tested across various standard face database such as At & T, Caltech, Indian face database, JAFFE etc with and without noise and blurring effects. The efficiency of the system was analyzed in terms of face detection Rate. The analysis revealed that the present system shows excellent performance efficiency and can be used for face detection even from poor quality images.

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