

# EARLY DETECTION OF PEDESTRIAN CROSSING FOR SAFEDRIVING

## Abstract:

Sudden pedestrian crossing is the major reason for many accidents on the roads. To reduce these type of accidents we propose an advanced driver assistance system using Raspberry Pi. We focus on detecting pedestrians crossing the road and provide assistance drivers. Integration of face detection and human detection takes place on the Raspberry Pi. Open CV was used for the detection and programmed in Python. The Pi camera was used to capture images and image processing takes place, it gives the buzzer intimation to the driver for attention and also slows down the speed of vehicle. The application has two major requirements to detect crossing pedestrians as early as possible just as they enter the view of the car-mounted camera and to maintain alarm system to alert the driver. Arranging this type of devices in vehicles can reduce collisions between pedestrians and vehicles.

**Key words** - Open CV, Raspberry Pi, Python, Pi camera

## I. INTRODUCTION:

Modern vehicles are equipped with autonomous features such as pre-collision system or adaptive cruise control to help people perform driving in a safer and more convenient way. Now-a-days pedestrian crossing is the major reason for many accidents on the roads. To reduce these type of

accidents we assist an drive assistance system using Raspberry-Pi. In the existing system, ultrasonic and PIR sensors were used which gives false triggers due to strong winds.

In proposed system, Raspberry Pi and Pi-

camera were used. Whenever the Pi-camera captures the images, image processing for face and human detection takes place on the Raspberry Pi. When face detection and pedestrian (human detection) are detected it gives buzzer intimation to the driver and by using relay it reduces the speed of the motor. For face detection Haar-cascaded classifiers algorithm and for human detection HOG descriptor algorithm were used.

## II.LITERATURE SURVEY:

In previous methods arduino and sensors (PIR and Ultrasonic) were used. PIR sensor stands for passive infrared sensor. It measures infrared light that is radiated from the object. It will detect infrared radiation emitted by or reflected from objects. They do not detect or measure "heat". An Ultrasonic sensor is a device that measures the distance between two objects by using sound waves. It will produce a sound wave at specific frequency and measure the distance by listening to the signal that is reflected back. It is important to understand that some objects might not be detected by ultrasonic sensors. By using these sensors we get false triggers whenever the strong winds occur.

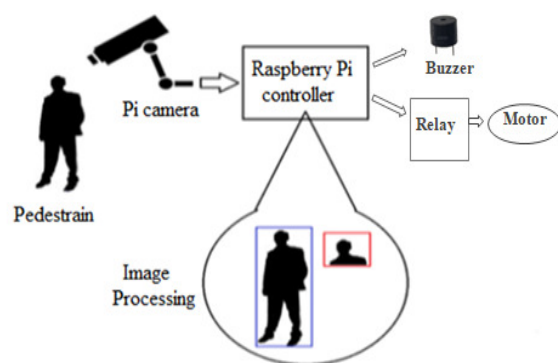
In another method, the Pedestrian push button traffic control or the Ped call button that exist in most crossing areas are used to change traffic light transitions by the pedestrians in order to have their turn to cross.

Another device that is found in some areas is the Closed-circuit television cameras. They are also used to monitor areas or things that could help security personnel's investigate acts harmful to human and infrastructure. Hence cameras are now used for pedestrian detection to detect the presence of people. This type is used in the streets to know if the pedestrian wants to cross the street, which is similar with a Ped call system. This makes a camera on pedestrian lane have additional functionality to help the pedestrians consider their turn to cross. This method was used at traffic signals only. So, to avoid these problems we go for proposed method. This method can be used anywhere not only at traffic signals.

## III.PROPOSED METHOD:

In this system Pi-camera, Raspberry Pi 3 (model b), buzzer, relay, motor were used. The Pi-camera was connected to the Raspberry Pi, where the input images captured by camera are processed for face and pedestrian detection. When face and pedestrian are detected the buzzer intimation was given to the driver. By using relay the speed of motor is reduced.

The integration of face and human detection takes place on Raspberry Pi. Open CV was used for the detection and it was programmed in python.

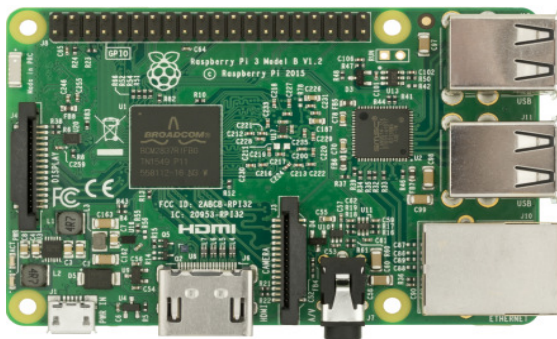


**Fig.1:** Block diagram of the system

### A.RASPBERRY PI:

The Raspberry Pi is a small credit-card sized computer board developed in the United Kingdom. It is similar to a PC which can be used for many things that our desktop PC does. It also plays high-definition video. Raspbian is the operating system of Raspberry Pi. Python is the official programming language of the Raspberry Pi IDE (Integrated Development Environment). Raspberry Pi on-board memory ranges from 256MB to 1GB RAM. In Raspberry Pi Broadcom processor (BCM237) and Quadcore ARM cortex-A53, 64 Bit are present. Processor speed ranges from 700MHZ to 1.2GHZ for the Raspberry

Pi 3 model-B. The board has one to four USB ports. The Raspbian operating system is dumped into the SD card and inserted into the Raspberry Pi. For video output, HDMI port is used, and 15-pin Camera Interface is available, with a standard 3.5mm audio and video jack, and it has Wi-Fi 802.11n, Ethernet port and Bluetooth. The Raspberry Pi consists of GPIO (General purpose input/output) pins on the top edge of the board. These pins are physical interface between the Pi and outside world. Of the 40 pins, 26 are GPIO pins and others are power or ground pins and two EEPROM pins which are used for external purpose.



**Fig.2:** Raspberry pi-3model B

### **B. PI-CAMERA:**

Pi Camera Module is a custom designed add-on for Raspberry Pi. Since it is used for Raspberry Pi, it is called as Pi-camera. It is attached to Raspberry Pi with short ribbon cable (15 pins). The cable is capable of extremely high data rates, and it exclusively carries pixel data.

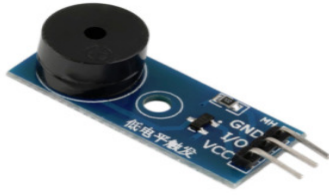


**Fig.3:** Pi – Camera

The board itself is tiny it weighs just over 3g. CSI (camera serial interface) port was used for interfacing Pi-camera to Raspberry Pi. The Pi-camera was connected to the BCM2835 processor through the CSI bus, a higher bandwidth link which carries pixel data from the camera. The camera itself has a native resolution of 5 mega pixel.

### **C. BUZZER:**

It is an electrical device that makes a buzzing noise and is used for intimation. It consists of three pins, power, ground and VCC. Inside a piezo element which consists of central ceramic disc surrounded by a metal. When current is applied to the buzzer, it causes the ceramic disc to contract or expand. Then this causes the surrounding disc to vibrate and makes the sound. By changing frequency of the buzzer, the speed and the vibrations changes, which changes the pitch of the resulting sound.



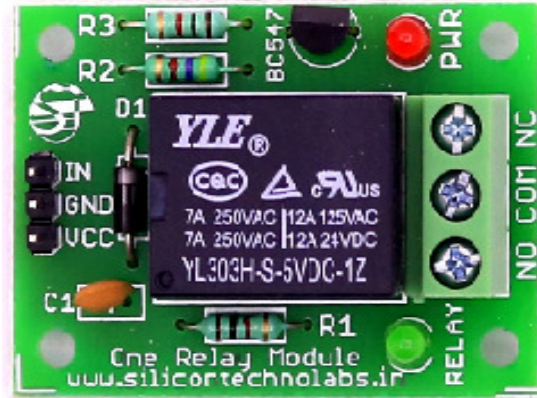
**Fig.4:** Buzzer

**SPECIFICATIONS:**

Rated voltage	: 1.5V to 12V DC
Operating voltage	: 1.2V to 16V DC
Rated current	: <40mA
Sound output	: >85Db
Resonant frequency	: 2400Hz
Weight	: 2g
Diameter	: 10mm

**D.RELAY:**

Relays are simple switches which are operated both electrically and mechanically. It operates on 5V used to control one 240V power appliance directly from a low voltage circuits. Relay can handle a maximum of 7A/240V AC and 7A/24V DC. It is used for a low-power signal that can be used to control a circuit. There are two LEDs in relay green and red. Green represents the control circuit which acts like a coil and red is used for load circuit which acts as a switch. Current flowing through the coils causes a magnetic field. This magnetic field causes the closing of the circuit and the current would flow. When current flow stops, switch opens and thus circuit prevents the current flow. It has 3pins COM (common), NC (Normally Close), NO (Normally Open). One end of load is connected to COM and other end is connected to NO or NC.



**Fig.5:** 1 channel 5V relay

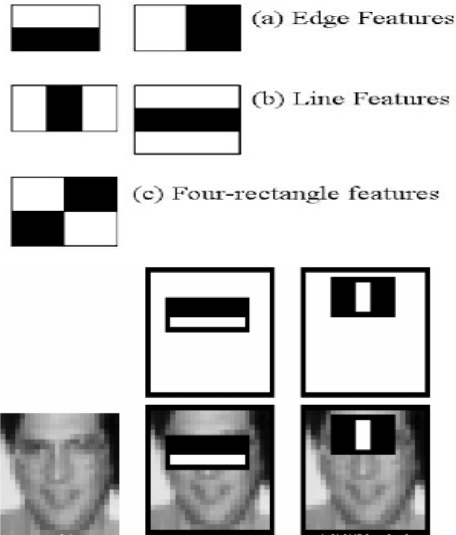
**D.SOFTWARE USED:**

- HAAR FEATURES AND HOG ALGORITHM

**1. Haar Cascaded Classifiers**

Haar features are used for face detection. Haar wavelets are used to describe Haar features, which are functions that consist of positive impulse, followed by negative impulse. In image processing, a Haar feature is the difference between the sums of all pixels in two or more regions. These haar features are proposed by VSiola and Jones that are shown in Figure. Sum of intensities of the pixels in the light region minus the sum of intensities in the dark region gives the value of Haar feature. Around 180,000 features are generated for 24x24 image by using all possible sizes. The haar features shown in figure.





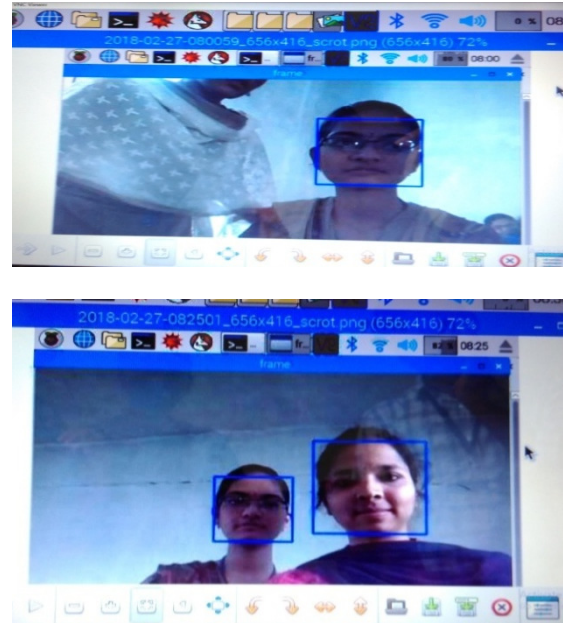
**Fig.6:** Haar features algorithm

**2. HOG Algorithm:**

HOG algorithm was used for object detection. On a dense grid HOG features are extracted from all points. Grids of HOG features are used as the primitive features because they significantly outperform existing feature sets for human detection. HOG (Histogram of Oriented Gradients) i.e., distribution of directions of gradients in x and y derivatives. In an image gradients are useful because the magnitude gradient is large around edges and corners and we know that edges and corners pack in a lot more information about object shape than flat region.

**IV. EXPERIMENTAL RESULTS:**

Real-time face detection and pedestrian detection was detected using Raspberry Pi. It was implemented using python language and open CV tool.



**Fig 7:** Real-time face detection



**Fig 8:** Real-time pedestrian detection

**V. CONCLUSION AND FUTURE SCOPE:**

The objectives of this study were successfully achieved. The integration of the face and pedestrian detection was successfully done and implemented the system to reduce the speed of motor. The face and pedestrian detection were found using python language and open CV tool. Arranging this kind of systems provide assistance to the drivers, keeping them alert, thus reducing collisions. It was implemented

only in lighting conditions. In future it can be implemented in dark conditions also.