

# “Crowd Size Estimation Using Raspberry Pi”

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## ABSTRACT

Crowd size estimation is an awkward situation. Especially when the crowd is spread over a significant geographical area. In this time when COVID-19 is expanding speedily, it is imperative to maintain social distance and avoid large public convocation at one place to fragment the chain of corona infection but maintaining this is not easy. Many people knowingly and unknowingly, gather and roam the street. Keeping an eye fixed on these activities is not a simple job. The authority needs sufficient technology to continue track of these activities. Our project crowd size estimation can help to detect the number of people in the crowd. This system uses a raspberry pi with an RPI camera for capturing the frame. After this frame will be compared with OpenCV's pre-trained model for people detection. The people counting will be displayed on the Thingspeak channel which can be monitored from anywhere in the world. So, we have decided to make a crowd size estimation using raspberry pi that will keep a watchful eye on all illegal activities and detect any crowd on the road or in any area.

### Keyword:

Hardware Component: Raspberry Pi, Pi camera Hd HDMI o VGA connector. Software Tools: Opencv, Thingspeak

## I. INTRODUCTION:

In our country historical places, religious places, gardens, railway stations, etc are crowded mostly tourist places are very crowded. It is difficult to count people in this crowd. Crowd counting or crowd estimating is a methodology used to count or estimate the number of people in a crowd estimating crowd numbers, evaluating crowd density, and understanding safety limits for event capacity is an essential requirements for crowd safety and many people knowingly and unknowingly gather on any place keeping an eye on all these activities is not an easy job. In our

current situation, COVID-19 crowd detection cameras can help in isolating the people.

In this paper, we process the people counting system where the Raspberry pi along PI camera will be mounted on the ceiling at the entrance of the religious place, railway station, gardens, etc. This will help to detect the number of people entering a particular place and also track the place. This model works with real-time images captured from the area under observation using the raspberry pi camera module. This study focuses on capturing the image in which it is placed and then detects the people and then detects the people in the image. The most direct technique to count each person in the crowd is the method using crowd size estimation. We can take the image using a PI camera and count the people in the crowd using OPENCV'S software. With this technique, it is possible to easily count the crowds in any place. The obvious improvement of this technique is that it solves the problem of overlapping so that a high-density crowd can be estimated by this method.

## II. LITERATURE REVIEW:

It is mainly used in real life for automated public monitoring such as surveillance and traffic control also the feature is applied to interior image detection and detailing work videos of crowd scenes problems in computer vision. In this COVID-19 situation if the crowd is not directed properly it influences the safety of people in crowded areas like malls, and auditoriums. These days controlling the crowd properly is very salient.

Sometimes, the human eye cannot remark all the cameras at the same time. Therefore an automated technique must be used for long-duration Histogram Oriented Object Descriptor. In this proposed work we are using a HOG detector and image processing for object detection. The technique counts the phenomenon of gradient orientation in the localized portion of the image. The HOG descriptor focuses on the structure of an

object. It is better than any border description as it uses magnitude as well as the angle of the gradient to compute the features. Some other researchers have done their work on being present of person-based part analysis some researchers have performed crowd detection using a density.

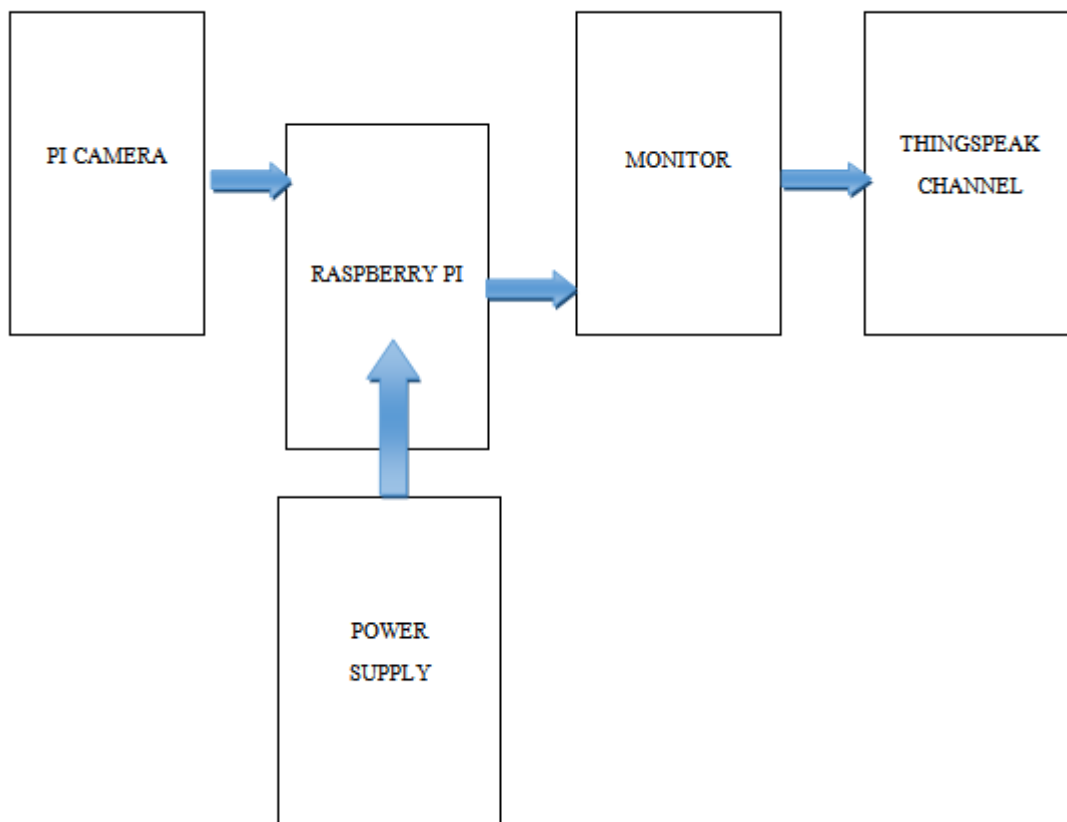
### III. METHODOLOGY:

we proposed the work of this paper present in this section crowd rowdy is mainly mentioned in the population count of a certain place. The Over suspect work is to develop a detection of crowd counting using raspberry pi. People counting is a problematic task so We are

working on crowd size estimation using raspberry pi. In that, we calculate the number of people in a crowded area.

In our proposed system, firstly capturing the image using a g pi camera module. This capturing the frames and this frame will be a procedure with HOG (Histogram Oriented ObjectDescriptor ) descriptor to detect the object in that captured frame. Afterward, these captured frames will be compared with OpenCV, this model for human being detection. The people counting will be shown on the Thingspeak channel which can be observed.

### IV. BLOCK DIAGRAM OF PROPOSED SYSTEM:



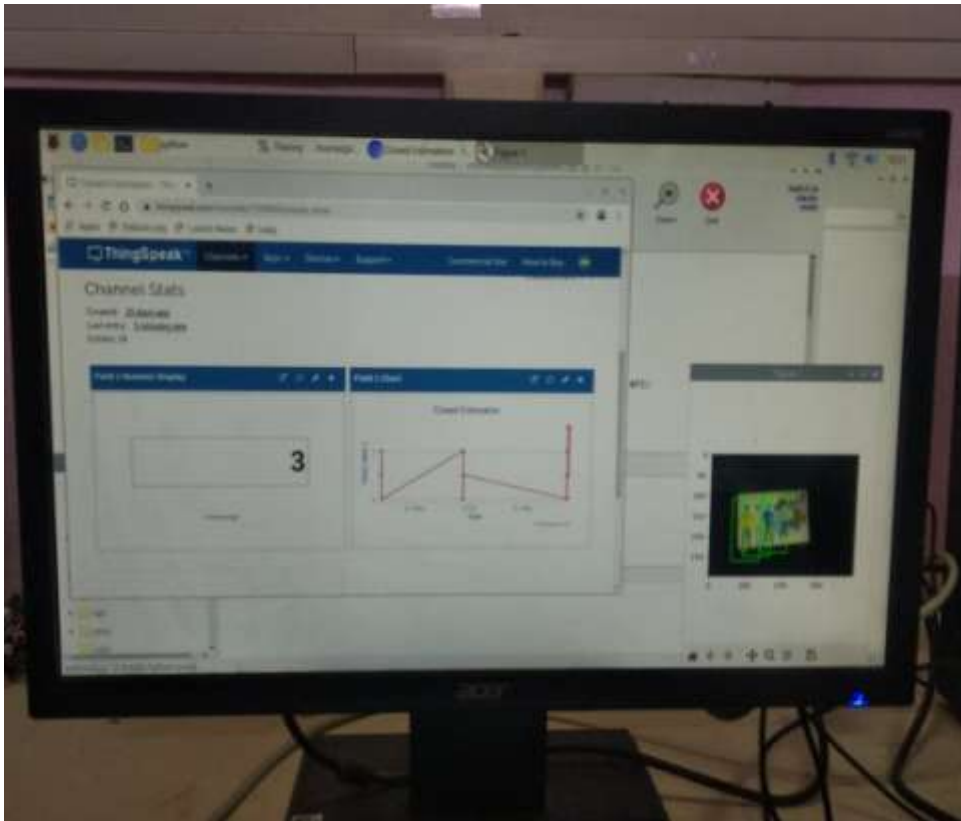
#### Working Principle:

The working of this project is, first of all, the components required for the project we are used to raspberry pi and pi camera. In that pi camera module is used for continuously capturing the frames and then the timeframes are processed with HOG (Histogram Oriented Object Descriptor) to detect the objects in the image.

Afterward, these frames will be compared with OpenCV's model for people detection.

The people counting will be shown on the Thingspeak channel which can be monitored from anywhere in the world. We can show the output of this project on the Thingspeak channel as a graph as well as a numeric count.

## V. RESULT:



## VI. FUTURE SCOPE :

This will be able to detect the crowd in public places for avoiding covid19.

- In further we will be able to maintain the Stamped across the country.
- It can be used in Army to detect enemy movements even in dark by some modification in the visuals of the camera.
- It can be further modified into robot surveying for the auction of booms and other things which can be watched from far distances.

## VII. CONCLUSION:

- In this project we have to detect or counted the number of people in the crowd.
- it is easy the use this project which is crowd size estimation using Raspberry Pi.

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