

**A  
Project Report  
On  
"Crowd Counting in Mall"**

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**Submitted at**



**Department of Computer Science & Engineering**  
**Devang Patel Institute of Advance Technology and Research**  
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## CERTIFICATE

This is to certify that the report entitled “**Crowd Counting in Mall**” is a bonafide work carried out by **Parth Vasoya (18DCS134)** under the guidance and supervision of **Prof. Shraddha Vyas** for the subject **CS349 Software Group Project-IV** of 6<sup>th</sup> Semester of Bachelor of Technology in **Department of Computer Science and Engineering, DEPSTAR** at Faculty of Technology & Engineering – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate, has duly been completed, and fulfills the requirement of the ordinance relating to the BTech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

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## ACKNOWLEDGEMENT

The developer of a machine learning project namely “Crowd Counting in Mall”, with immense pleasure and commitment would like to present the Project. The development of this project has given us wide opportunity to think, implement and interact with various aspects of management skills as the new emerging technologies.

Every work that we complete successfully stands on the constant encouragement, good will and support of people around. We hereby avail this opportunity to express my gratitude to number of people who extended their valuable time, full support and cooperation in developing the project.

We express deep sense of gratitude towards our project guide Professor Shraddha Vyas for the support during the whole session of study and development. It is because of them, that we were prompted to do hard work, adopting new technologies.

*Thanks,*

*Parth Vasoya*

## **ABSTRACT**

In today's world, crowd counting using Convolutional neural network is an effective solution to handle record of daily visited people in mall. Crowd counting in mall is a process of counting mall using different scenarios like target detection, density based, CNN based etc. In our crowd counting system will be able to find and detect the human fast and precisely. Numerous techniques are available for this type of counting systems but we have preferred to go with machine learning with python OpenCv which helps us in creating frames of the video into images as well. This makes user to see the total number of people present in the mall at any time of instance and also user have features like displaying alerts if people are more than a specific number, automatic starting of the system at specific time, also closing the system after some duration and saving data to excel sheet whenever system closes.

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## Chapter 1: Project Definition

### 1.1 Definition

- This project is based on developing a system which is helpful in maintaining records of daily visited people in a mall.
- Count people if entrance and exit can be covered by single camera.
- Count people if entrance and exit can be covered by different cameras.
- Admins can easily count total number of people present in a mall at any time of instance. Also gets alerts if s/he has done settings.

### 1.2 Objective

- After development of this project, security guard has not to remember how many are in or out (which will help in situations like COVID-19).
- Basically this system will also help admins to maintain daily record easily as automatically data will be saved once system is closed, this will help to take advertisements' fees on the basis of daily records.

### 1.3 Scope

- In today's world, everything is going online which has resulted in emergence of new technologies.
- Time will be reduced greatly and better management of records will be possible.

### 1.4 Tools and Technologies

- Python
- OpenCV
- Flask
- MobileNetSSD
- HTML
- CSS
- JavaScript
- BootStrap
- Heroku



## Chapter 2: Project Description

### 2.1 Description

- This project contains a counting system developed using python which helps to maintain records of daily visited people in mall correctly.
- The UI has been developed using bootstrap, HTML and other web development tools and we have used flask to connect it with the backend files.
- The total number of visited people will be added in the excel sheet once the system ended.

#### Why to use OpenCV?

- OpenCV is a huge open-source library for computer vision, machine learning, and image processing.
- OpenCV supports a wide variety of programming languages like Python, C++, Java, etc.
- It can process images and videos to identify objects, faces, or even the handwriting of a human.
- When it is integrated with various libraries, such as Numpy which is a highly optimized library for numerical operations, then the number of weapons increases in your Arsenal i.e whatever operations one can do in Numpy can be combined with OpenCV.

#### Connection using Flask Framework

- Flask is a web framework.
- This means flask provides you with tools, libraries and technologies that allow you to build a web application.
- This web application can be some web pages, a blog, a wiki or go as big as a web-based calendar application or a commercial website.
- Flask is part of the categories of the micro-framework. Micro-framework are normally framework with little to no dependencies to external libraries

**What is MobileNetSSD?**

- SSD (Single Shot MultiBox Detector) is a popular algorithm in object detection while Mobilenet is a convolution neural network used to produce high-level features.
- MobileNet is a CNN architecture model for Image Classification and Mobile Vision.
- There are other models as well but what makes MobileNet special that it very less computation power to run or apply transfer learning to. This makes it a perfect fit for Mobile devices, embedded systems and computers without GPU or low computational efficiency with compromising significantly with the accuracy of the results.
- It is also best suited for web browsers as browsers have limitation over computation, graphic processing and storage.

**What is Tkinter?**

- Tkinter is the standard GUI library for Python. Python when combined with Tkinter provides a fast and easy way to create GUI applications.
- Tkinter provides a powerful object-oriented interface to the Tk GUI toolkit.
- Creating a GUI application using Tkinter is an easy task.

**What is Heroku?**

- Heroku is a cloud platform that lets companies build, deliver, monitor and scale apps — we're the fastest way to go from idea to URL, bypassing all those infrastructure headaches.
- Heroku provides Free hosting up to 500 MB.
- It proved SSH certificate therefore we protect our website to any malware and attacks.

## **Chapter 3: Software and Hardware Requirements**

### **3.1 Software and hardware requirements for making the Project:**

- Operating System:
  - Microsoft Windows 7, 64-bit +
- Hardware:
  - Intel® Core i5 4th generation (or an equivalent AMD processor)
  - 4 GB Ram
- Software
  - Python IDLE
  - Anaconda
  - Any Web Browser

### **3.2 Software requirements for running the App:**

- Any Web Browser
- Anaconda Environment with install required all libraries

### **3.3 Hardware requirements for running the App:**

- The absolute minimum requirements for our project were a 1 GB of RAM.
- 45 MB of storage is required minimum.

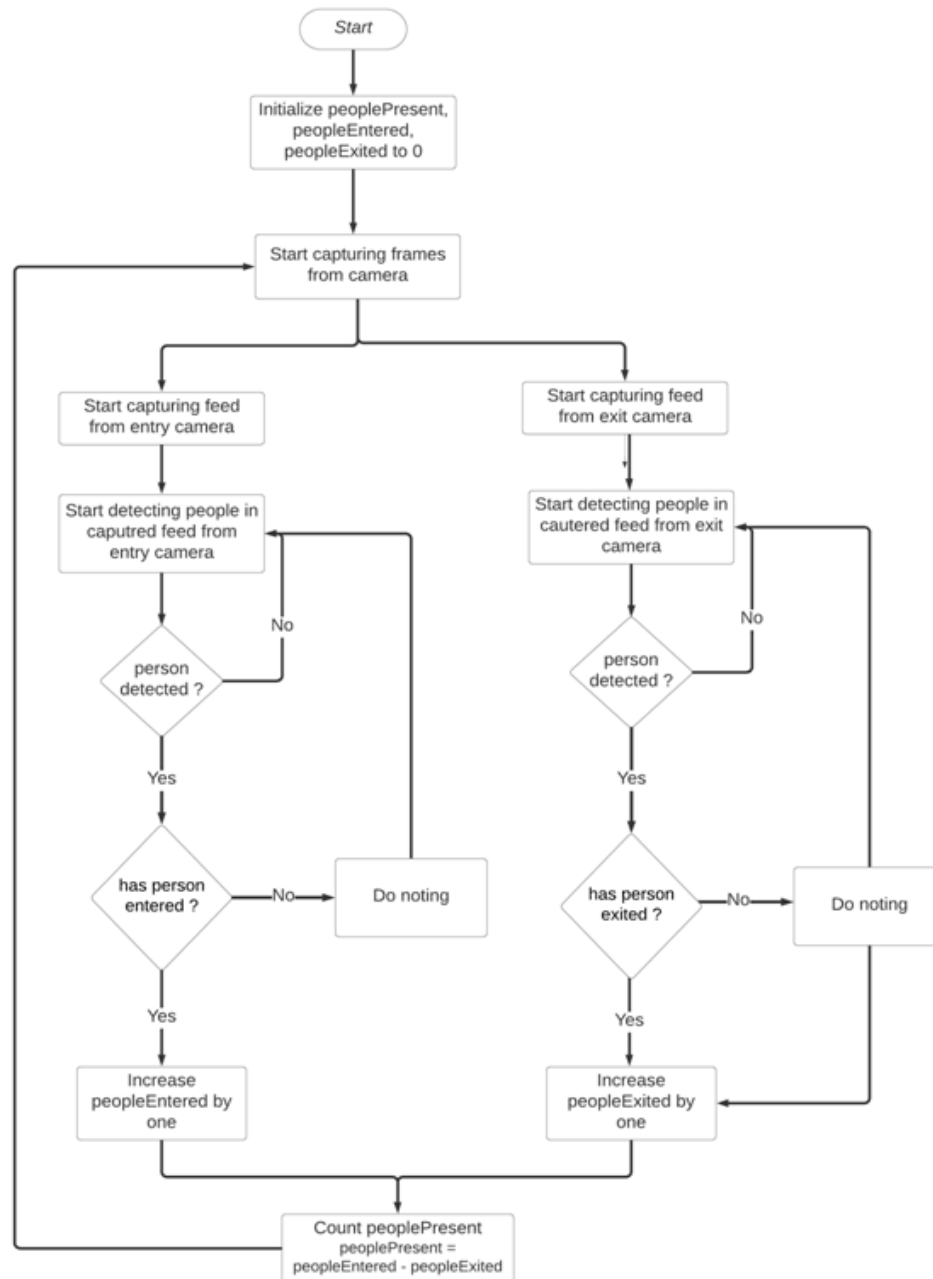
## Chapter 4: Major Functionality

### 4.1 Functionality for Admin

- The admin will have all the access to the record sheet that is being generated.
- If the admin finds anything to be suspicious and not accurate then the admin can immediately make the changes accordingly in the sheet as well.
- The admin will have the right to manage the system as if the admin wants to set alert when total present people in the mall at any instance of time will exceed maximum number of people, can set automatic starting of the system and also set closing of the system after couple of hours from starting.

## Chapter 5: Flow Chart

### 5.1 Flow Diagram



[Figure 5 - Flowchart of Project]

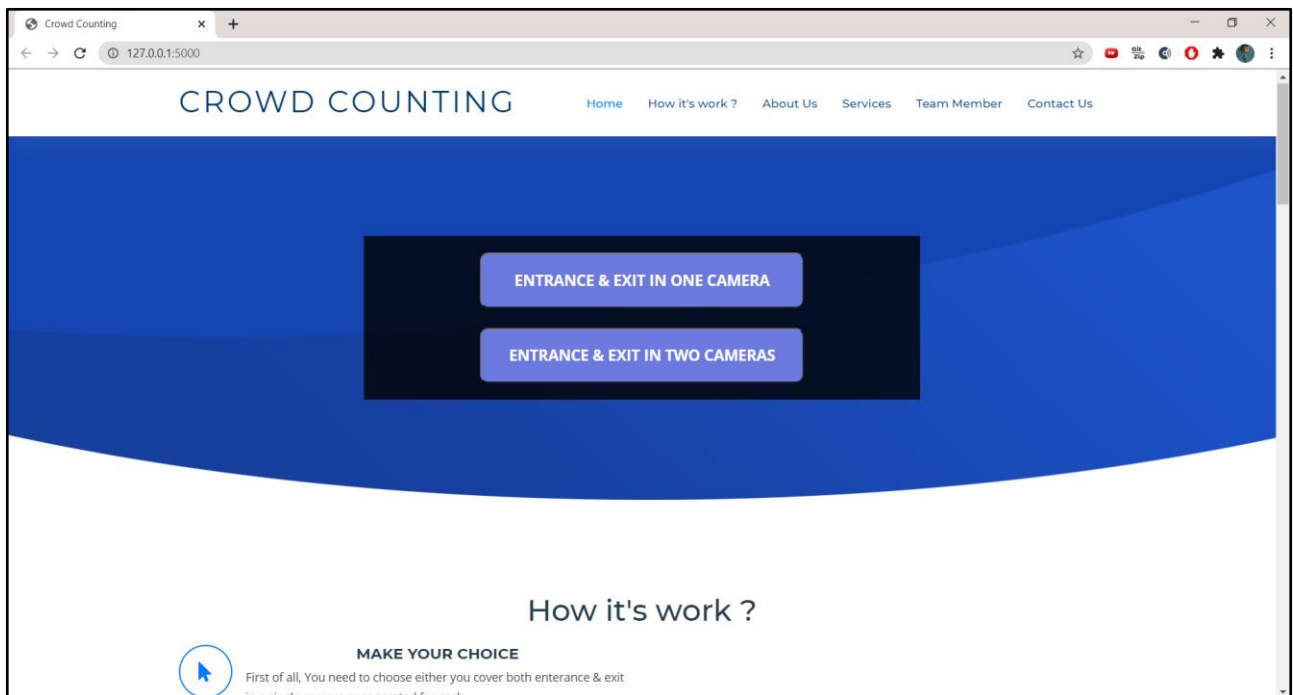
## Chapter 6: Screenshots

### 6.1 Screenshots of Project – Localhost

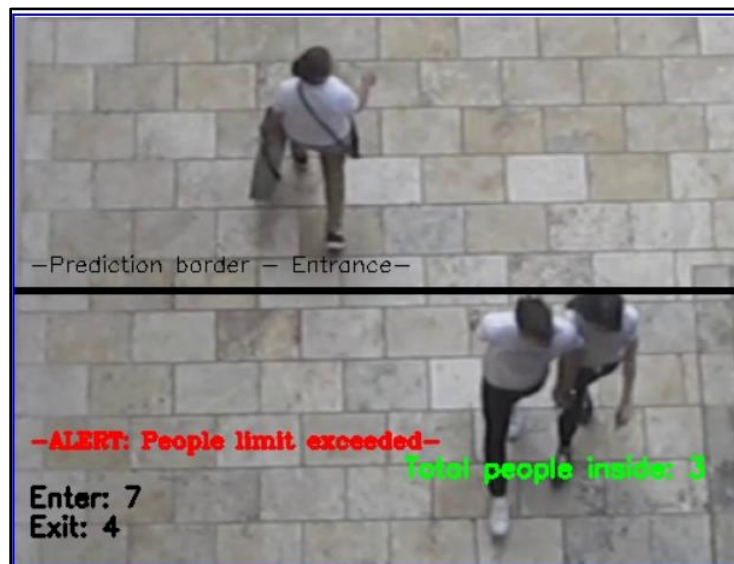
```
F:\SGP\CCC12>activate tfpose

(tfpose) F:\SGP\CCC12>python main.py
Starting Python Flask Server For Crowd Counting system...
* Serving Flask app "main" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: off
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

[Figure 6.1 - Activate Conda Environment and run main.py file]



[Figure 6.2 - Website Interface]



[Figure 6.3 - One Camera – Entrance + Exit]



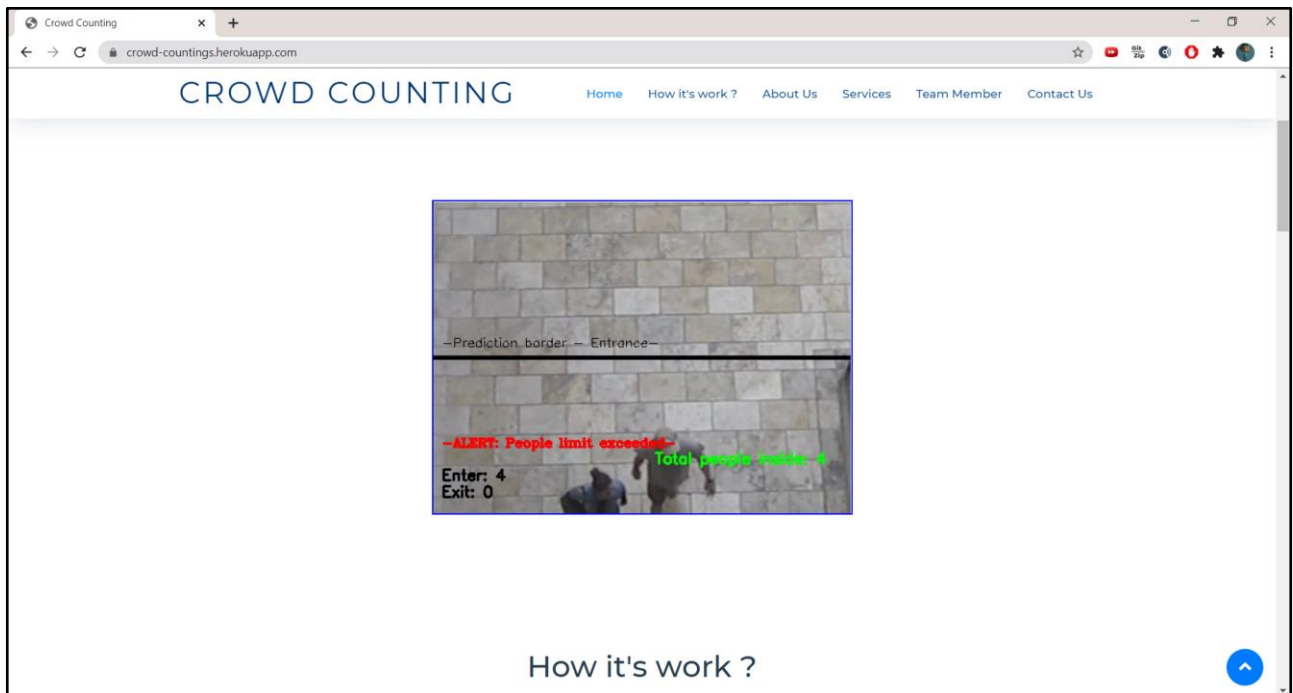
[Figure 6.4 - Two Separate cameras – Entrance & Exit]

	A	B	C	D	E	F	G	H
1	Date	Time	Total Visited					
2	26-02-2021	18:06	7					
3	26-02-2021	18:08	7					
4	26-02-2021	18:13	0					
5	26-02-2021	18:14	20					
6	26-02-2021	18:16	12					
7	26-02-2021	18:17	12					
8	26-02-2021	18:17	12					
9	26-02-2021	18:18	21					
10	26-02-2021	18:20	2					
11	26-02-2021	18:20	2					
12	26-02-2021	18:21	3					
13	26-02-2021	18:23	23					
14	26-02-2021	18:23	0					
15	26-02-2021	18:24	0					
16	26-02-2021	18:24	0					
17	26-02-2021	18:25	15					
18	26-02-2021	18:26	15					
19	26-02-2021	18:27	20					
20	05-03-2021	17:38	10					
21	05-03-2021	17:38	0					
22	05-03-2021	17:41	0					
23	05-03-2021	17:45	7					
24	05-03-2021	17:51	7					
25	05-03-2021	17:56	7					
26	05-03-2021	17:58	3					

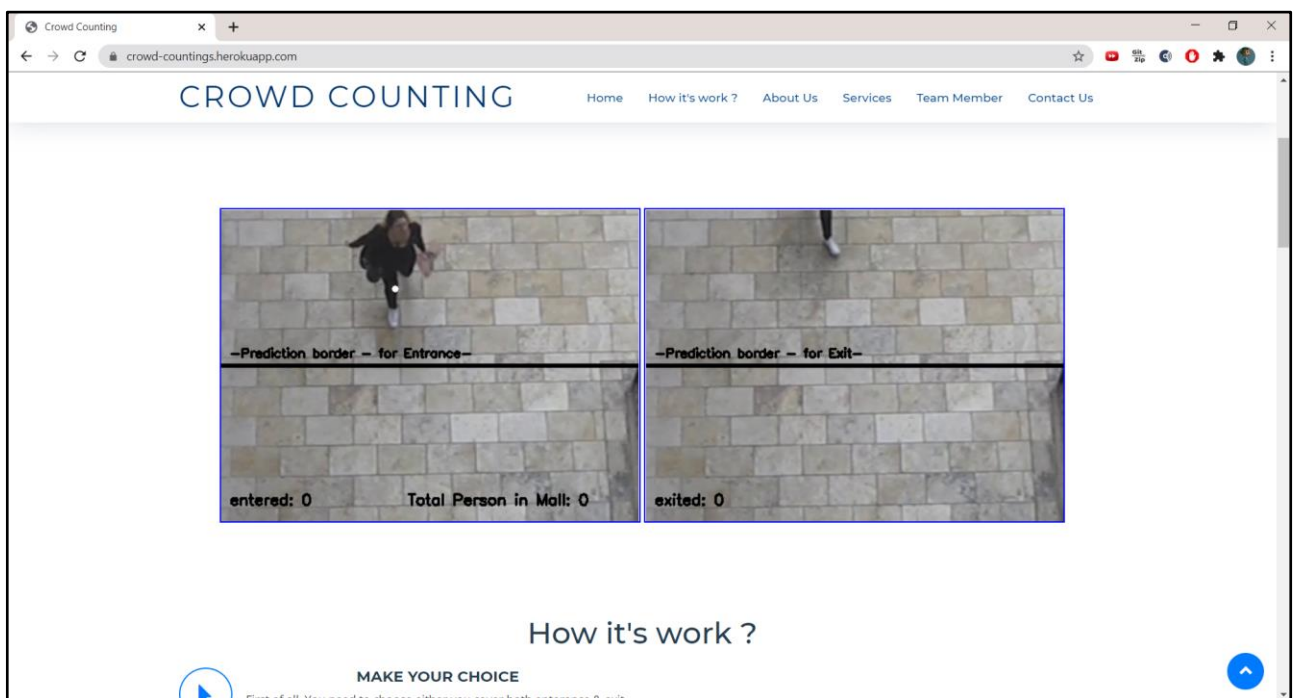
[Figure 6.5 - Record of Visited People – Excel Sheet]



## 6.2 Screenshots of Project – Heroku



[Figure 6.6 - One Camera – Entrance + Exit -Heroku]



[Figure 6.7 - Two seprate camera – Entrance + Exit - Heroku]

## **Chapter 7: Limitations of project & Future Enhancement**

### **7.1 Limitations**

- The limitation of our project is that if more and more people will be present in each frame then it will take little extra time for detection.
- It can't detect human if size of human is too small.

### **7.2 Future Enhancement**

- More accuracy along with speed
- More attractive UI
- Can detect human even the size is small
- Predicting advertisement price base on the daily visited data
- Add other module like violence detection,etc.

## Chapter 8: Outcome

### 8.1 Our Application outcome

- “Crowd Counting” helps to take records of daily visited individual automatically by detecting human instead of manually counting by anyone or guessing.
- It provides admin to view records any time and update it if he/she wants.
- Less time will be consumed in counting and less paper is used with this approach of our system.
- It can count people also if entrance and exit are at different location in mall

### 8.2 Expected outcome

- We expect that small size of people (depends on camera placed) can easily detect and marked as visited.
- Admin can manage all the data easily at one place and no time gets wasted on counting in the mall.

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