Intelligent people and Vehicle counting System for Secretariat

A PROJECT REPORT

Submitted by

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1.INTRODUCTION

1.1 Project Overview

Security has always been the priority of any state. Taking such security into account a system is to be developed where we constantly monitor the people entering and leaving the place and even the vehicles which are entering that particular location. This data will be useful in case of emergencies. Camera detects the entry and exit of a person, captures all the faces and count the number of people in the secretariat. It also captures all the cars and counts the number of cars entering and leaving the area. The captured data is sent to a mobile application via cloud. The mobile application facilitates the constant monitoring and patrolling of the arena.

1.2 PURPOSE

The tracking of people that enter or pass through a determined space is undoubtedly, an important tool for statistical and marketing research purposes, likewise for an increased security control (eg. emergency evacuation). Like any other organization, it's management is required to make periodical reports, which success is strongly attached to the number of visitors that the building receives. This leeds to the need developing a people counting system to easily and reliably, assist valuable data.

2. IDEATION & PROPOSED SOLUTION

In this milestone you are expected to get started with the Ideation process.

2.1 Problem Statement Definition :

Customer Problem Statement Template:
Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love. A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

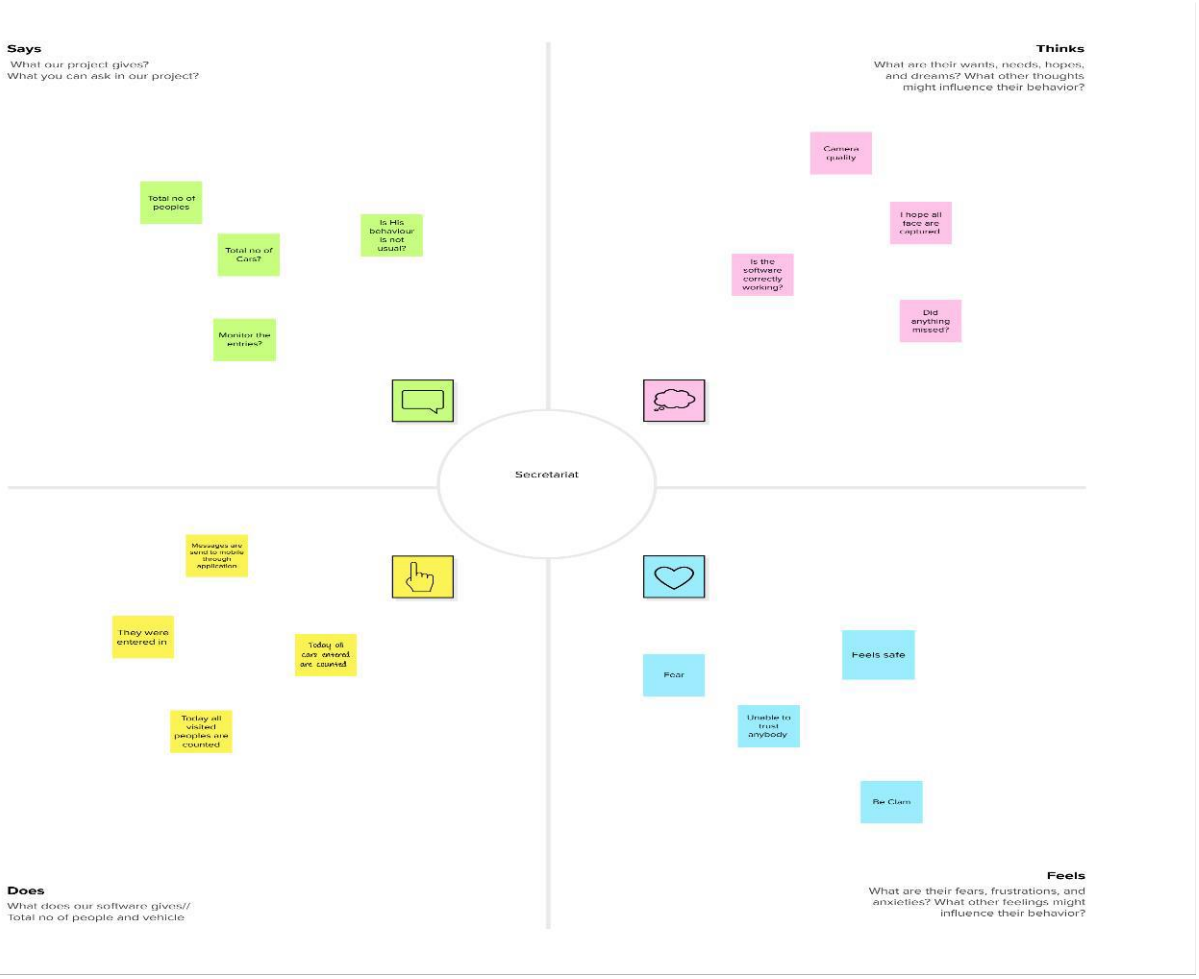
Our Project Visitor link :
https://miro.com/welcomeonboard/ZEVvRHV4UTVBTG9oa0hWb1paeDUyM0lwOEdWWDlaSmdPdUZIa0ZON2V1bUs5cGl1V3NaZVAwWkNTY0VHeU1xc3wzNDU4NzY0NTUzMDM1Njg1
ODg3fDI=?share_link_id=145087794133

2.2 Empathy Map Canvas:

• An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behavior and attitudes.

• It is a useful tool to helps teams better understand their users.

• Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



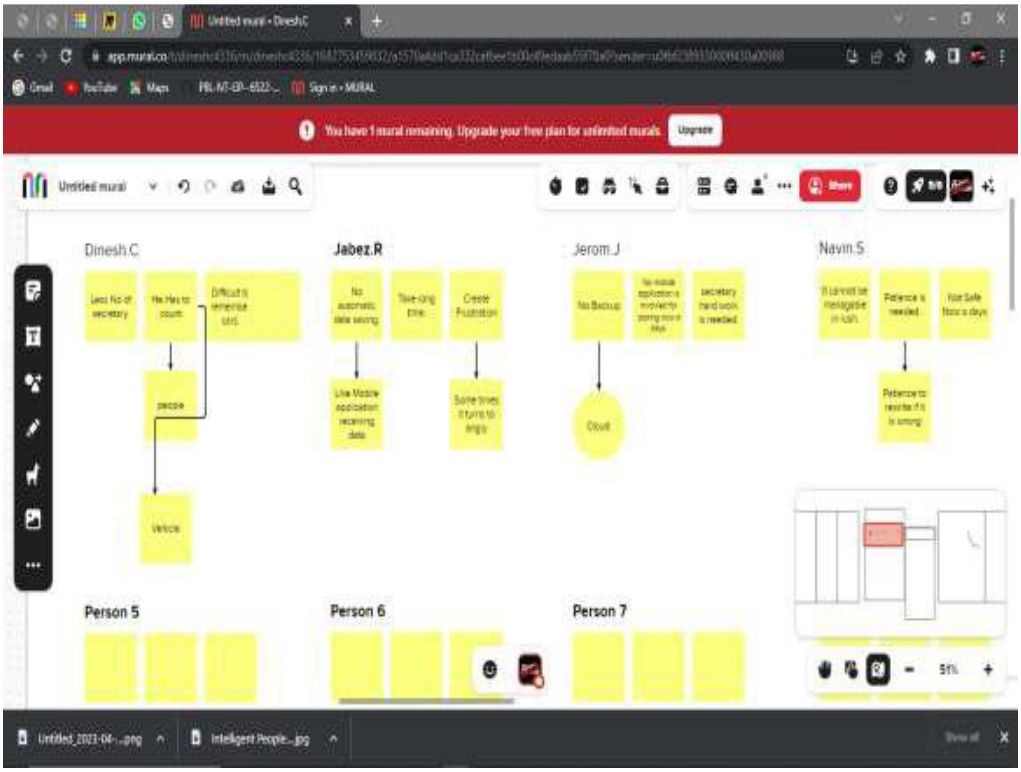
Reference Mural link :
https://app.mural.co/t/dineshc4336/m/dineshc4336/1682609120457/5aef8a07406fdce2b71168058e589d17cf578f74?sender=u0fbf238933000ff430a00988

2.3 Ideation & Brainstorming

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing

volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions. Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Our Projects Brainstorming link :
https://app.mural.co/t/dineshc4336/m/dineshc4336/1682753459832/a1570a4dd1ca332cafbee1b00c49edaab55f78a0?sender=u0fbf238933000ff430a00988



2.4 PROPOSED SOLUTION:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To capture people and vehicle which are entering and leaving. Then count the number of people and vehicle who have entered and leaved.
2.	Idea / Solution description	Camera detects the entry and exit of a person, captures all the faces and counts the number of people in the secretariat. It also captures all the cars and counts the number of cars entering and leaving the area.
3.	Novelty / Uniqueness	The captured data is sent to a mobile application via cloud. No of people and vehicle are send to mobile.
4.	Social Impact / Customer Satisfaction	By considering our project the security of people increased a step ahead. By sending the message keeps owner to monitoring the place.
5.	Business Model (Revenue Model)	The project can be revenue by fixing it to home, institution, office, and other busy places for security purpose.
6.	Scalability of the Solution	The capturing device can be modified according to need and placed in any direction and any Size of storage by connecting it to internet that lead to record and send message. Easy to fix and re-fix if needed.

3.REQUIREMENT ANALYSIS

3.1 Functional Requirements:

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	• Registration through Gmail. • Registration through SMS.
FR-2	User Confirmation	• Confirmation via Email. • Confirmation via OTP .
FR-3	Users Authentication	• Conforming by username and password. Tested.
FR-4	Users Interface	• Clear cut Interface. • Easy understanding.
FR-5	Cost	• Cost efficient. • Low budget simulators.
Fr-6	Data Processing	• High Performance. • Low system specifications.

3.2 Non – Functional Requirements:

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	• Easy to understand by User interface. • People with less knowledge can easily access. • Easily modified.
NFR-2	**Security**	• Permission is required to login. • Password maintained for unique users. • Authentication is required to login first.
NFR-3	**Reliability**	• Reliability is high until update is carried out. • Reliability decreases by bugs without update.
NFR-4	**Performance**	• Performance is high due to low system requirement. • The loading time of page is quick. • Compatibility is high.
NFR-5	**Availability**	• The page experience problem is displayed. • Page loading does not long time. • One of module does not affect other modules.
NFR-6	**Scalability**	• Scalability is high by allowing multiple users at a time. • Data storage is more by using cloud storage also. • Risks can be handled easily.

4.PROJECT DESIGN

4.1 Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

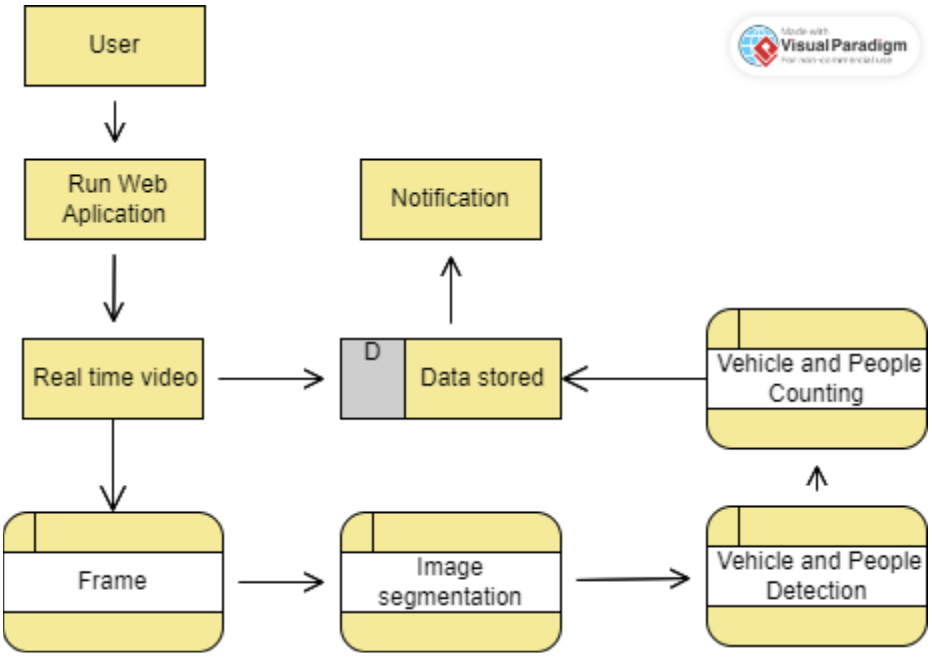


Fig : Data flow diagram

4.2 Solution & Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information.

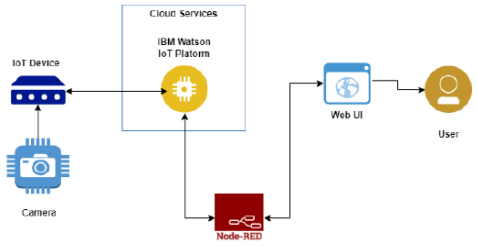


Fig : Technical Architecture

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4.3 User Stories:

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Team Member
Customer	Registration	USN-1	As a user, I can able register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Dinesh. C
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	Medium	Dinesh. C
	Login	USN-3	As a user, I can login with username and password if exists	I can register if not exists	High	Jabez. R
	Authentication	USN-4	As a user, I need authentication	No one can login without registration or wrong password.	High	Jabez. R
	Change password	USN-5	As a user, I can change password if needed.	By using Email notification.	Medium	Jerom Deva Prasath..J
	Dashboard	USN-6	Dashboard must contain username and some details.	After log in	Low	Jerom Deva Prasath..J
Administrator	Monitor	USR-7	As a Admin and user I can monitor the video.	By handheld device also	Medium	Navin Jayhar. S
Admin/customer	Data	USN-8	As a user I need entries and leaving of people and vehicle.	By handheld device also	High	Navin Jayhar. S

5.CODING & SOLUTIONING

5.1 Feature 1:

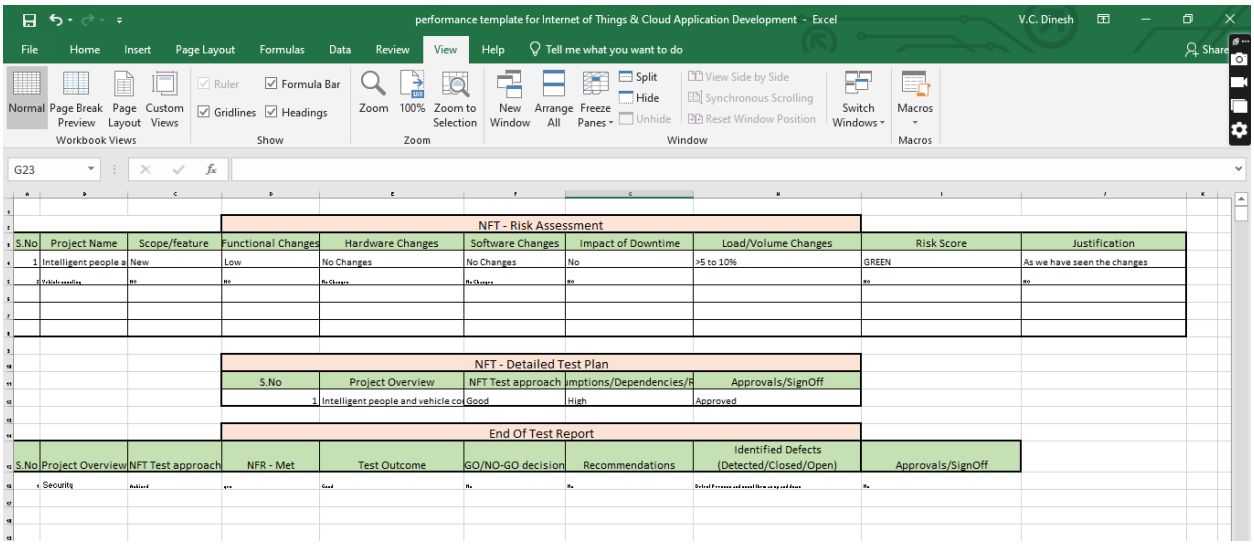
One of features is to people counting by python opencv technique. Python is used to detect the human by frames and the output is as up and down for enter and leaving.

5.2 Feature 2:

The Second is that stores the data in IBM Cloud and node red that can be monitored in mobile also that gives one more advantages.

6.RESULTS

6.1 Performance Metrics:



Model Performance Testing:

Project team shall fill the following information in the performance testing template.

Parameter	Values	Screenshot
Metrics	Python accuracy of prediction and output screenshot	 

7.ADVANTAGES & DISADVANTAGES

Advantages:

- Security takes a lead.
- Capture of video addition with up and down data.
- Easy monitor to owners.
- Less system requirements.
- People can be counted easily.
- Low video resolution does not affect the accuracy, in fact, the lower the resolution

Disadvantages:

- Anything that has disadvantages. One of main is slow at some rush time.
- Speed of entries is limited.
- Overspeed than frame cannot taken into account.

8.CONCLUSION

The solution relies on the camera system that was previously installed for surveillance, recording or any other purposes. You don't have to spend a fortune on sensors purchasing and installation. Any IP camera model with RTSP stream capability would be supported. Our software can work where sensor solution can't because of a much wider field of view in a regular camera compared to a sensor. You can even connect a webcam or run analytics on a pre-recorded video files .The effectiveness of the surveillance technology while used by government entities is determined to be the following: The department has no information regarding the efficacy of this technology in fulfilling

9.FUTURE SCOPE

Important: keep in mind that not all people counter systems provide the same level of information. If you're looking for a people counting system, you'll want to inquire about its breadth of capabilities, explore the software.

Also: make sure that the people counter device you choose can work as a cohesive system and provide actionable data.

We say this because several "basic" people counter devices display footfall numbers on the device itself. That might work for some users. But in this day and age of IoT and business intelligence data, we see little reason to go for an antiquated device that won't even connect to the Cloud or an analytics platform.

10 APPENDIX

10.1 Source Code: (PersonCount.py)

```
import numpy as np
import cv2
import Person
import time
import pyttsx3
import requests
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
organization = "i5ew2z"
deviceType = "Peoplecounter"
deviceId = "123456"
authMethod = "use-token-auth"
authToken = "12345678"
engine = pyttsx3.init()
engine.say('Hello')
engine.runAndWait()

cnt_up   = 0
cnt_down = 0

#Fuente de video
#cap = cv2.VideoCapture(0)
#cap = cv2.VideoCapture('people.mp4')


#Propiedades del video
##cap.set(3,160) #Width
##cap.set(4,120) #Height

#Imprime las propiedades de captura a consola
cap = cv2.VideoCapture('people.mp4')
#cap = cv2.VideoCapture(0)
for i in range(19):
    print (i, cap.get(i))

w = cap.get(3)
h = cap.get(4)
frameArea = h*w
areaTH = frameArea/250
print ('Area Threshold', areaTH)
```

```
#Lineas de entrada/salida
line_up = int(2*(h/5))
line_down   = int(3*(h/5))

up_limit =   int(1*(h/5))
down_limit = int(4*(h/5))

print ("Red line y:",str(line_down))
print ("Blue line y:", str(line_up))
line_down_color = (255,0,0)
line_up_color = (0,0,255)
pt1 =  [0, line_down];
pt2 =  [w, line_down];
pts_L1 = np.array([pt1,pt2], np.int32)
pts_L1 = pts_L1.reshape((-1,1,2))
pt3 =  [0, line_up];
pt4 =  [w, line_up];
pts_L2 = np.array([pt3,pt4], np.int32)
pts_L2 = pts_L2.reshape((-1,1,2))

pt5 =  [0, up_limit];
pt6 =  [w, up_limit];
pts_L3 = np.array([pt5,pt6], np.int32)
pts_L3 = pts_L3.reshape((-1,1,2))
pt7 =  [0, down_limit];
pt8 =  [w, down_limit];
pts_L4 = np.array([pt7,pt8], np.int32)
pts_L4 = pts_L4.reshape((-1,1,2))

#Substractor de fondo
fgbg = cv2.createBackgroundSubtractorMOG2(detectShadows = True)

#Elementos estructurantes para filtros morfoogicos
kernelOp = np.ones((3,3),np.uint8)
kernelOp2 = np.ones((5,5),np.uint8)
kernelCl = np.ones((11,11),np.uint8)

#Variables
font = cv2.FONT_HERSHEY_SIMPLEX
persons = []
max_p_age = 5
pid = 1
def ibmwork(cnt_up,cnt_down,deviceCli):
    data = { 'UP' : cnt_up, 'down': cnt_down}
        #print data
    def myOnPublishCallback():
```

```
        print ("Published Up People Count = %s" % str(cnt_up), "Down People Count = %s " %
str(cnt_down), "to IBM Watson")

    success = deviceCli.publishEvent("PeopleCounter", "json", data, qos=0,
on_publish=myOnPublishCallback)
    if not success:
        print("Not connected to IoTF")



    deviceCli.disconnect()


def ibmstart(cnt_up,cnt_down):

    try:
            deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method":
authMethod, "auth-token": authToken}
            deviceCli = ibmiotf.device.Client(deviceOptions)
            print(type(deviceCli))
            #.....................................................
```

10.2 Github & Project Video Demo Link:

Our Github Repository Link:

https://github.com/naanmudhalvan-SI/PBL-NT-GP--6522-1680931598/tree/main

Our Project Video Demo link:

https://youtu.be/6MhnNLj9SC0