Intelligent Park Tracker & Vehicle Detection

A PROJECT REPORT

Submitted by

Het Shah. (150320107544)
Hardik Patel. (150320107533)

In fulfilment for the award of degree of
Bachelor of Engineering in Computer Engineering

COMPUTER ENGINEERING DEPARTMENT
L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY
GUJARAT TECHNOLOGICAL UNIVERSITY
AHMEDABAD

YEAR, 2018-19

L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER ENGINEERING DEPARTMENT

YEAR, 2018-19

CERTIFICATE

This is to certify that the Project entitled **"Intelligent Park Tracker & Vehicle Detection"** submitted by **Het Shah (150320107544)** towards the fulfilment of the requirements for the degree of Bachelor of Engineering in Information Technology of L.J. Institute of Engineering and Technology, Ahmedabad, under the Gujarat Technological University, Ahmedabad is the record of work carried out by him under my supervision and guidance. In my opinion, the submitted work has reached a level required for being accepted for examination. The results embodied in this project, to the best of my knowledge, haven't been submitted to any other university or institution for award of any degree or diploma.

Prof. Krunal J. Panchal
(Name Of Internal Guide)

Prof. Shweta Yagnik
(HOD-CE)

L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER ENGINEERING DEPARTMENT

YEAR, 2018-19

CERTIFICATE

This is to certify that the Project entitled **"Intelligent Park Tracker & Vehicle Detection"** submitted by **Hardik Patel (150320107533)** towards the fulfilment of the requirements for the degree of Bachelor of Engineering in Information Technology of L.J. Institute of Engineering and Technology, Ahmedabad, under the Gujarat Technological University, Ahmedabad is the record of work carried out by him under my supervision and guidance. In my opinion, the submitted work has reached a level required for being accepted for examination. The results embodied in this project, to the best of my knowledge, haven't been submitted to any other university or institution for award of any degree or diploma.

Prof. Krunal J. Panchal	Prof. Shweta Yagnik
(Name of Internal Guide)	(HOD-CE)

GUJARAT TECHNOLOGICAL UNIVERSITY

CERTIFICATE FOR COMPLETION OF ALL ACTIVITIES AT ONLINE PROJECT PORTAL

B.E. SEMESTER VIII, ACADEMIC YEAR 2018-2019

Date of certificate generation : 01 April 2019 (06:41:34)

This is to certify that, ***Shah Het Ketankumar*** (Enrolment Number - 150320107544) working on project entitled with ***Intelligent Park Tracker & Vehicle Detection*** from ***Computer Engineering*** department of ***L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD*** had submitted following details at online project portal.

Periodic Progress Reports (PPR)	**Completed**
Business Model Canvas (Image)	**Completed**
Business Model Canvas (Report)	**Completed**
Patent Drafting Exercise (PDE)	**Completed**
Final Plagiarism Report	**Completed**
Final Project Report	**Completed**

Name of Student : Shah Het Ketankumar Name of Guide : Mr. Krunal J Panchal

Signature of Student : _____ *Signature of Guide : _____

Disclaimer :
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B.E. SEMESTER VIII, ACADEMIC YEAR 2018-2019

Date of certificate generation : 01 April 2019 (07:22:11)

This is to certify that, ***Patel Hardik Tusharbhai*** (Enrolment Number - 150320107533) working on project entitled with ***Intelligent Park Tracker & Vehicle Detection*** from ***Computer Engineering*** department of ***L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD*** had submitted following details at online project portal.

Periodic Progress Reports (PPR)	**Completed**
Business Model Canvas (Image)	**Completed**
Business Model Canvas (Report)	**Completed**
Patent Drafting Exercise (PDE)	**Completed**
Final Plagiarism Report	**Completed**
Final Project Report	**Completed**

Name of Student : Patel Hardik Tusharbhai Name of Guide : Mr. Krunal J Panchal

Signature of Student : _____ *Signature of Guide : _____

Disclaimer :
This is a computer generated copy and does not indicate that your data has been evaluated. This is the receipt that GTU has received a copy of the data that you have uploaded and submitted as your project work.

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GUJARAT TECHNOLOGICAL UNIVERSITY

Undertaking about originality of work

We hereby certify that we are the sole authors of this UDP project report and that neither any part of this UDP project report nor the whole of the UDP Project report has been submitted for a degree by other student(s) to any other University or Institution.

We certify that, to the best of our knowledge, the current UDP Project report does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations or any other material from the work of other people included in our UDP Project report, published or otherwise, are fully acknowledged in accordance with the standard referencing practices. Furthermore, to the extent that we have included copyrighted material that surpasses the boundary of fair dealing within the meaning of the Indian Copyright (Amendment) Act 2012, we certify that we have obtained a written permission from the copyright owner(s) to include such material(s) in the current UDP Project report and have included copies of such copyright clearances to our appendix.

We have checked the write up of the present UDP Project report using anti-plagiarism database and it is in the allowable limit. In case of any complaints pertaining to plagiarism, we certify that we shall be solely responsible for the same and we understand that as per norms, University can even revoke BE degree conferred upon the student(s) submitting this UDP Project report, in case it is found to be plagiarized Team:

Name of Students	**Enrolment Number**	**Signature**
Het Shah	150320107544	
Hardik Patel	150320107533	

Place: Ahmedabad Date: _____

Prof. Krunal Panchal
(Name of Guide) (Signature of Guide)

Acknowledgement

The satisfaction and euphoria that accompany the successful completion of project report would be incomplete without mentioning names of people who made it possible, whose constant guidance and encouragement crowns all efforts with our success.

I am extremely grateful to **Prof. Shweta Yagnik** (HOD-CE) for providing all the required resources for the successful completion of our project.

I owe a great many thanks who helped and supported us during the process of making this project report. My deepest thanks to **Prof. Krunal Panchal**, the guide of our project.

Finally, I also wish to thank all my friends for supporting me during whole project report work.

Het Shah (150320107544)

Hardik Patel (150320107533)

Abstract

This project is all about to solve a few problems occurred in resident or business premises on a daily routine.

A Database of all member's vehicle information including its number plate will be created and by using that database it will determine whether that vehicle belongs to the native member or not and on that basis permission to enter in the premises will be determined.

After that it will also check whether the vehicle is parked properly or not, if not then an alert message will be generated.

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CHAPTER-1
INTRODUCTION

1.1 Introduction to System

Our project will detect an object(vehicle) and it will extract data from the recognized object using Computer Vision and after that object will be checked if it is placed according to blueprint or not. By expanding this, A vehicle will come to the premises and it will be checked if owner is the member of the premises or not, if he is member then his vehicle will be parked to its member area and non-member will park his vehicle in the visitor's parking, if it is improper then a alert will be generated in the system.

1.2 Limitations of Existing System

The existing system of traffic surveillance requires 24x7 monitoring. It detects or captures a number plate by using screenshots from the video footage. It is only used for detection of vehicles breaking the signals or drivers not wearing helmets or seat belts.

1.3 Objective to the New System

The objective of this system is to prevent haphazard parking in residential or business premises, by using different procedures and functions. Security concerns and trespassing problems will be solved using this system. Notifying and sending alerts to the authority for the improper parking

1.4 Problem Definition

In some residential and business premises nowadays, haphazard parking is done and it causes many people to feel lack of management. By using this system this haphazard problem will be solved. Visitors as well as members park their vehicles at unallocated places and which causes trouble to other members or non-members of that residential or business premises.

CHAPTER-2

REQUIREMENT ANALYSIS

2.1 Feasibility Study

This system detects wrong side vehicles which solves many problems caused in traffic control. It will be helpful to the traffic police as it provides an assistance to catch the vehicle violating traffic rules. In future, the same system can be modified easily and also be used for improved traffic management. Also, it can be modified and number plate detection can be done to find lost vehicles. A separate server is kept for the execution of the system, so hacking is less likely to happen. This system needs approval from the government to authorise the use into traffic enforcement centres.

2.2 Requirement of the system

Functional requirements:

CCTV cameras need to be installed at traffic signals/ crossroads. 24x7 surveillance is required to detect vehicles on the wrong side at any time of the day. Multiple vehicles should be detected at a time without any errors. Accuracy in the detection of number plate is must to avoid mistake in capturing the person who violated rules. This data is managed in a database where the vehicle owner is identified or notified.

Non functional requirements:

Availability: System should be available 24x7.

Maintainability: System maintenance is needed. Timely checks of various problems occurring in the system and that the system is working consistently.

Security: System should to be secure from intruders and other unauthorised users. Reliability: System should be reliable enough so that user isn't caused any trouble.

2.3 Tools and Technology Used

- Python

- Computer Vision
- Pycharm
- Spring Framework
- MySQL
- KNN algorithm

Python with AI/ML

Python is an OOPs based, high level, interpreted programming language. It is a robust highly useful language focused on rapid application development (RAD) and don't repeat yourself (DRY). Due to the ease of learning, scalability and adaptability of Python, it has become one of the fastest growing languages. Python's support and ever evolving libraries make it a good choice for any project whether Web App, Mobile App, IoT, Data Science or AI.

Why Python for Artificial Intelligence & Machine Learning?

Whether a startup or an MNC, Python provides a huge list of benefits to all. The usage of Python is such that it cannot be limited to only one activity. Its growing popularity has allowed it to enter into some of the most popular and complex processes like Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing, Data Science etc. The question is why Python is gaining such momentum in AI? And the answer lies below:

Less Code

AI involves algorithms – a LOT of them. Python provides case of testing – one of the best among competitors. Python helps in easy writing and execution of codes. Python can implement the same logic with as much as 1/5th code as compared to other OOPs language.

Prebuilt Libraries

Python has a lot of libraries for every need of your AI/ML project. Few names include Numpy for scientific computation, Scipy for advanced computing and Open CV for uploading files. Such a dedicated library saves developer's time spent on coding base level items.

Support

Python is a completely open source with a great community. There is a host of resources available which can get any developer up to speed in no time. Not to forget, there is a huge community of active coders willing to help programmers in every stage of developing cycle.

Flexibility

Flexibility is one of the core advantages of Python. With the option to choose between OOP's approach and scripting, Python is suitable for every purpose. It works as a perfect backend and it also suitable for linking different data structures together. The option to check a majority of code in the IDE itself is also a big plus of developers who are struggling between different algorithms.

About KNN Algorithm

K nearest neighbors is a simple algorithm that stores all available cases and classifies new cases based on a similarity measure (e.g., distance functions). KNN has been used in statistical estimation and pattern recognition already in the beginning of 1970's as a non-parametric technique.

A case is classified by a majority vote of its neighbors, with the case being assigned to the class most common amongst its K nearest neighbors measured by a distance function. If K = 1, then the case is simply assigned to the class of its nearest neighbor

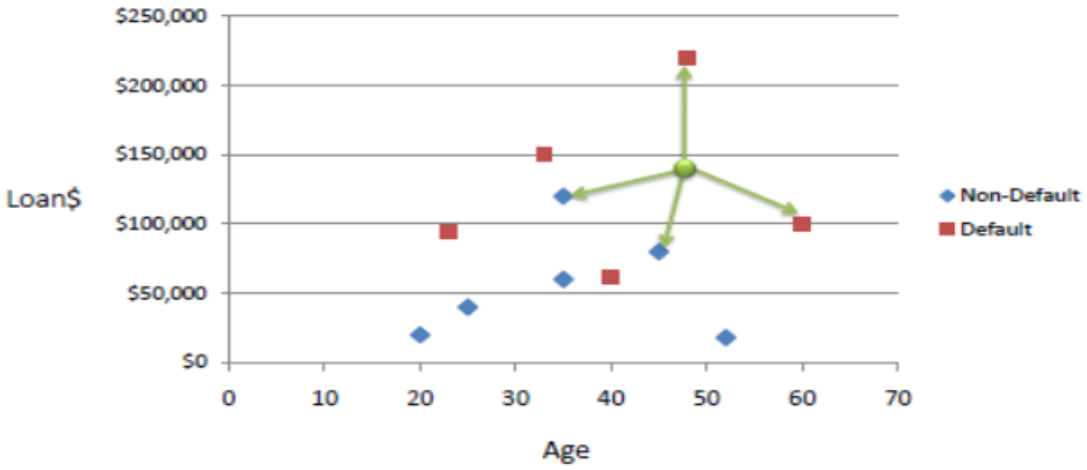

Fig. KNN Example

2.4 Project Estimation

Requirement gathering	1-10 days
Analysis	10-20 days
Design	21-50 days
Coding	51-95 days
Testing	96-104 days
Implementation	105-114 days
Documentation	115-122 days
Total Duration (approx.)	**122 days**

CHAPTER-3
SYSTEM DESIGN

3.1 Use-Case Diagram

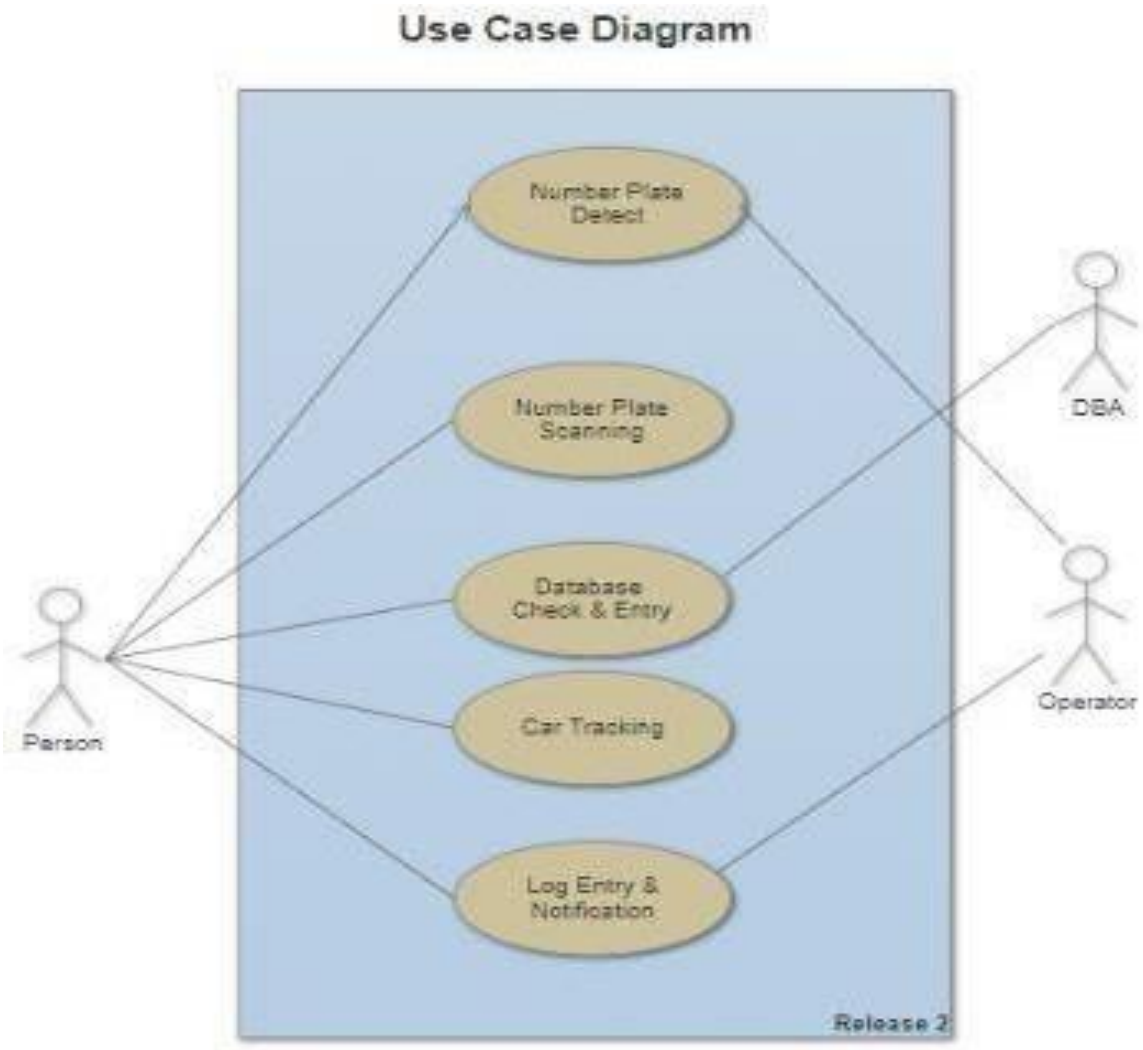

Fig 3(a)

3.2 Activity Diagram

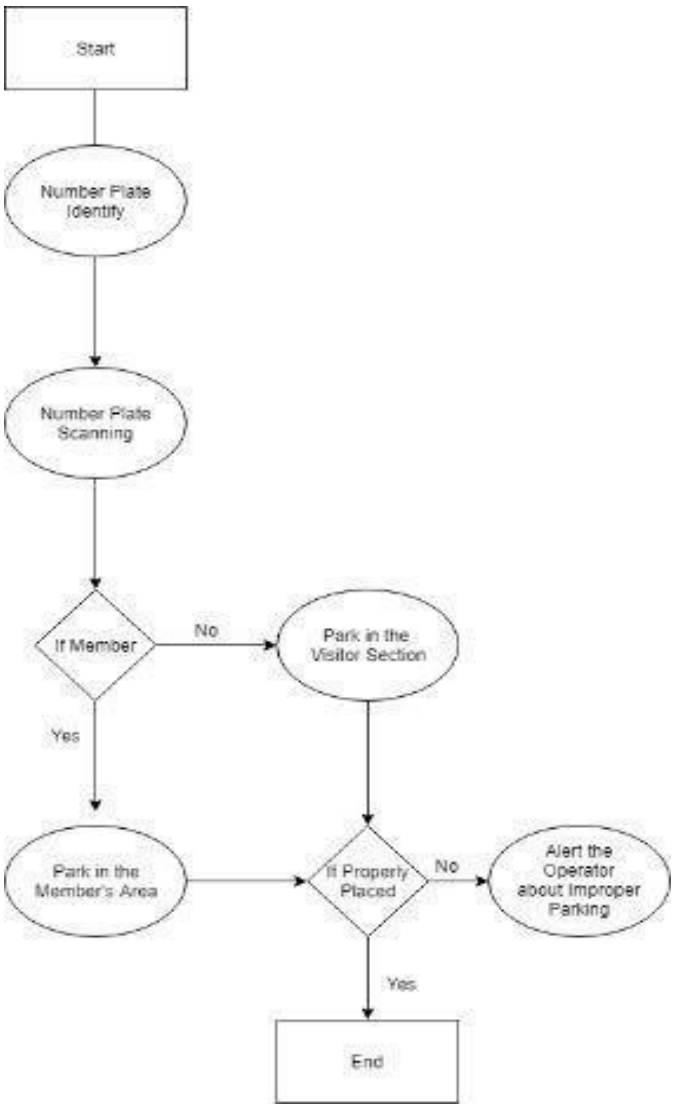

Fig 3(b)

3.3 Sequence Diagram

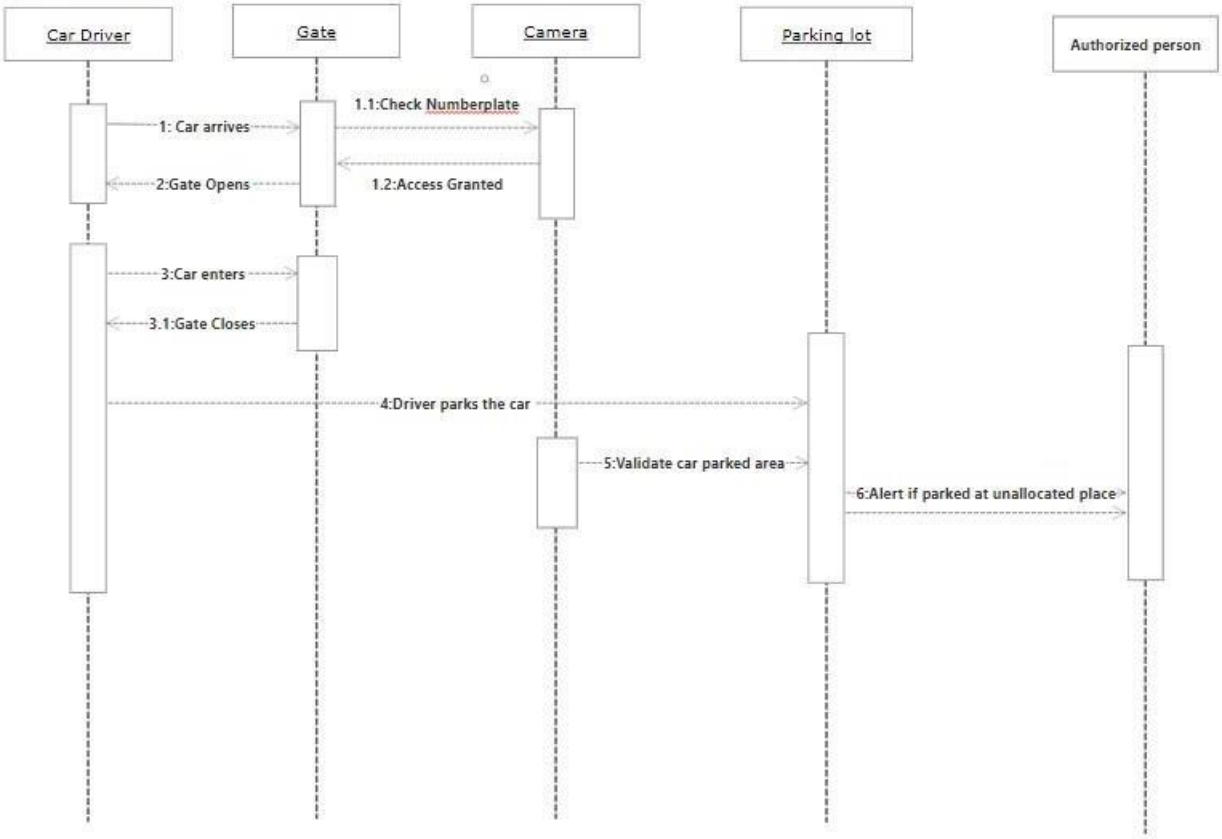

Fig 3(c)

3.4 State Diagram

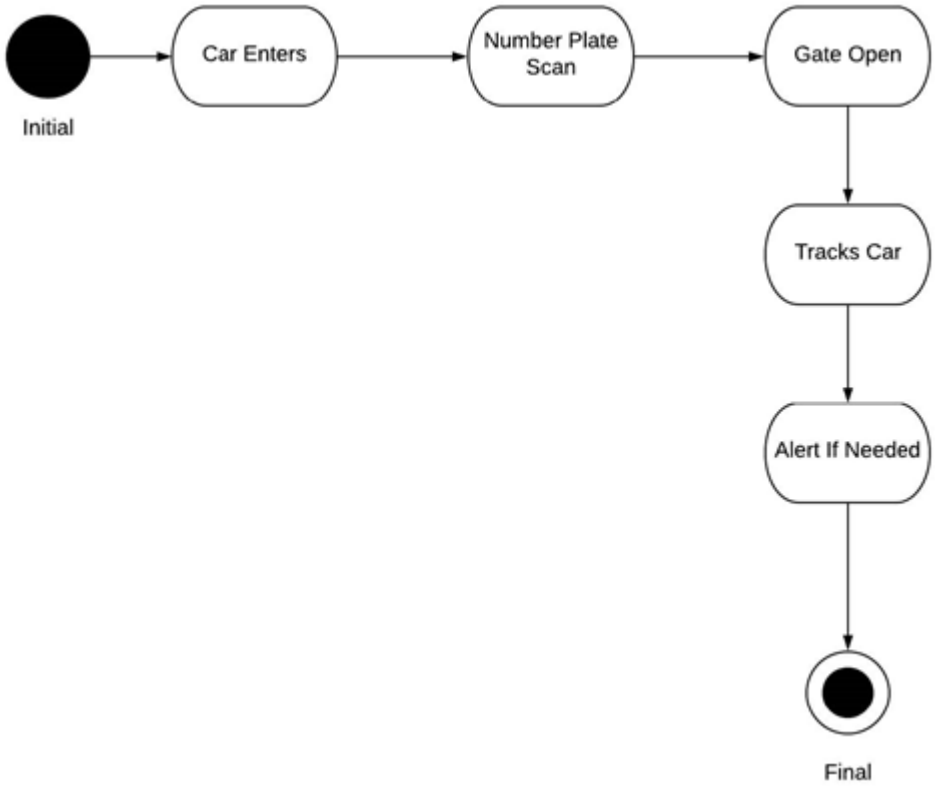

Fig 3(d)

3.5 Class Diagram

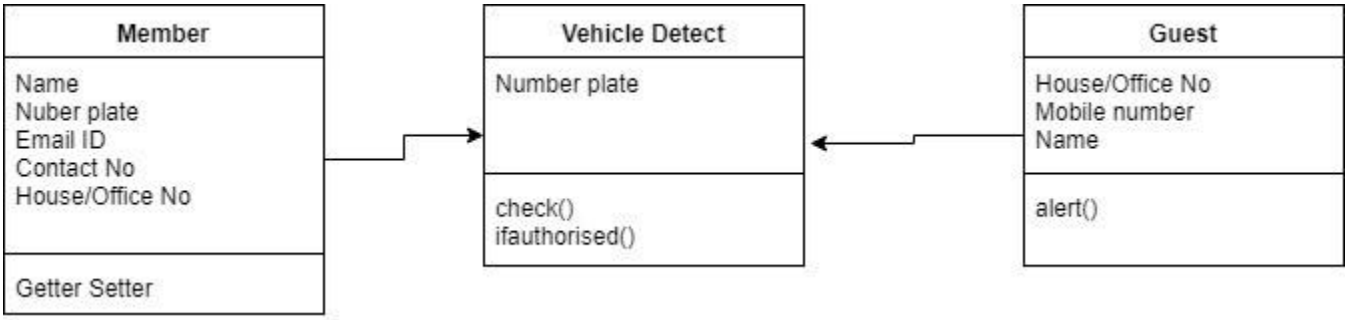

Fig 3(e)

Chapter-4
DATA DICTIONARY

Table 1: Registration

User Registration Details:

REGISTRATION			
Field Name	Data Type(Size)	Constraint	Description
Login ID	Int(10)	Primary Key	User Id of the user (Auto Incremented)
First Name	Varchar(50)	Not null	Name of the User
Last Name	Varchar(50)	Not null	Surname of the User
Email ID	Varchar(100)	Unique Key	Email ID of the User
Contact No	Varchar(15)	Not null	Phone No of the User
Password	Varchar(50)	Not null	Password of the User
Number Plate	Varchar(50)	Not null	Number plates of each vehicle

Fig 4(a)

Table 2: Login

User Login Details:

LOGIN			
Field Name	Datatype(Size)	Constraint	Description
Login ID	Int(10)	Primary Key	Login ID of the User
Email ID	Varchar(100)	Not null	Email ID of the User
Password	Varchar(50)	Not null	Password of the User

Fig 4(b)

Table 3: Home Page

Residents Vehicle Detail:

VEHICLE REGISTRY			
Field Name	Datatype(Size)	Constraint	Description
Vehicle's Owner Name	Varchar(25)	Not null	Full name of the vehicle's owner
Vehicle No Plate	Varchar(20)	Primary Key	Residents number plate entry
Vehicle Name	Varchar(50)	Not null	Name of vehicle with model no
Vehicle Type	Varchar(50)	Not null	What type of vehicle is it? E.g. 2 wheeler,4 wheeler etc.

Fig 4(c)

Chapter-5

SNAPSHOTS

Login Page

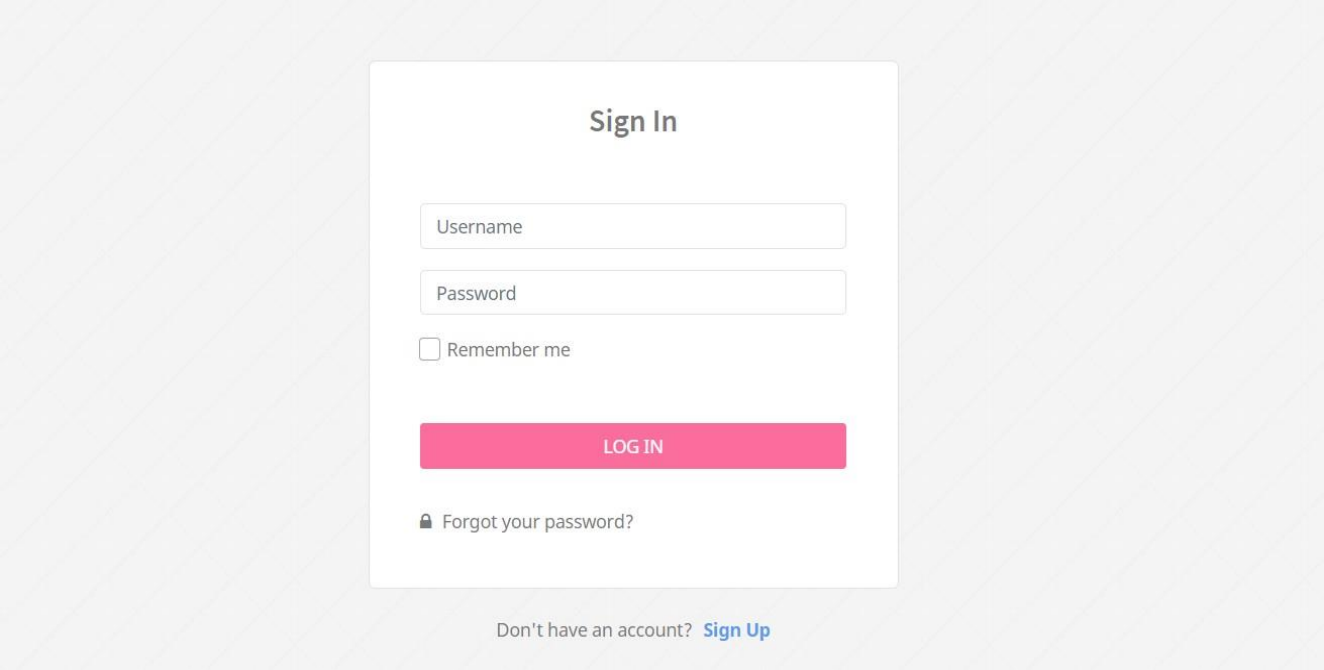

Fig 5(a)

Sign Up

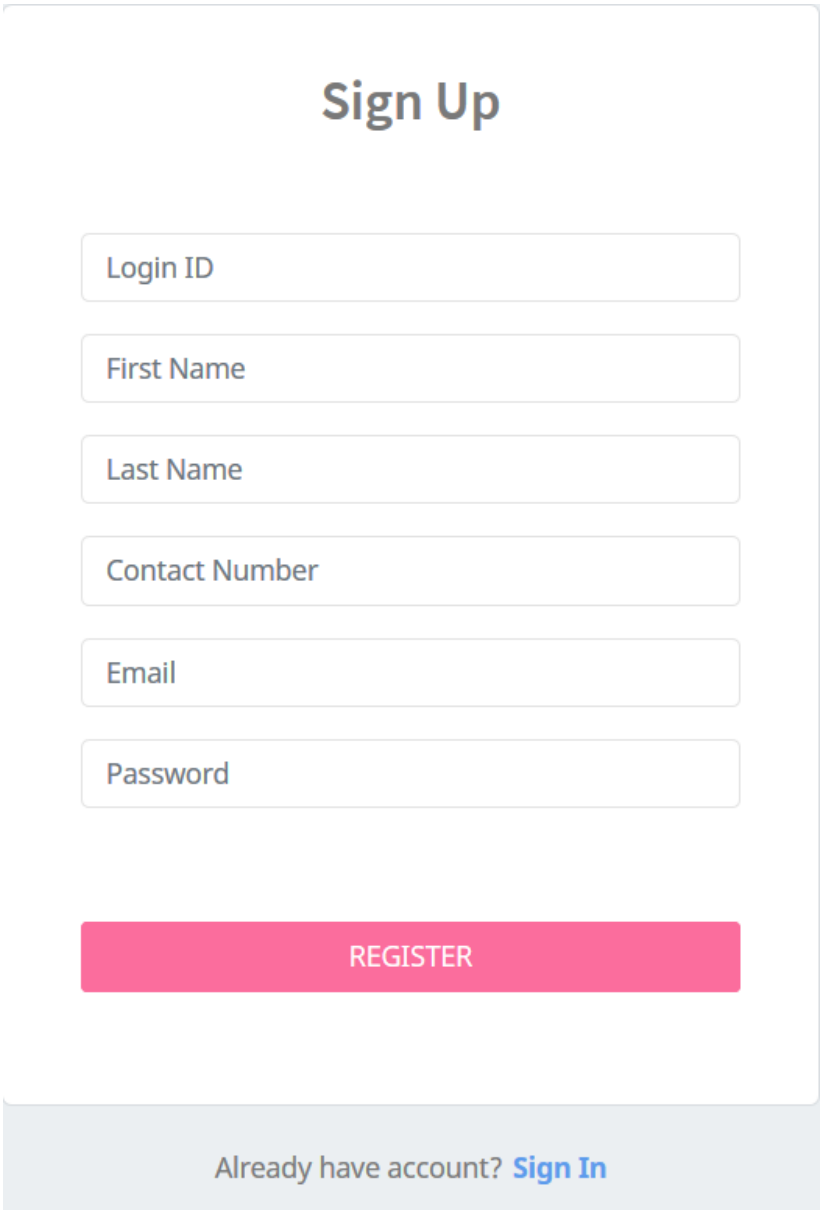

Fig 5(b)

Number plate
Detection

Fig 5(c)

Member Details

```
The Details of the member: -

Numplate: -   MCLRNF1
First Name: -   Hardik
Last Name: -   Patel
Email ID: -   patelhardik98@gmail.com
Phone Number: -   8980809328
```

Fig 5(d)

User Interface - Dashboard

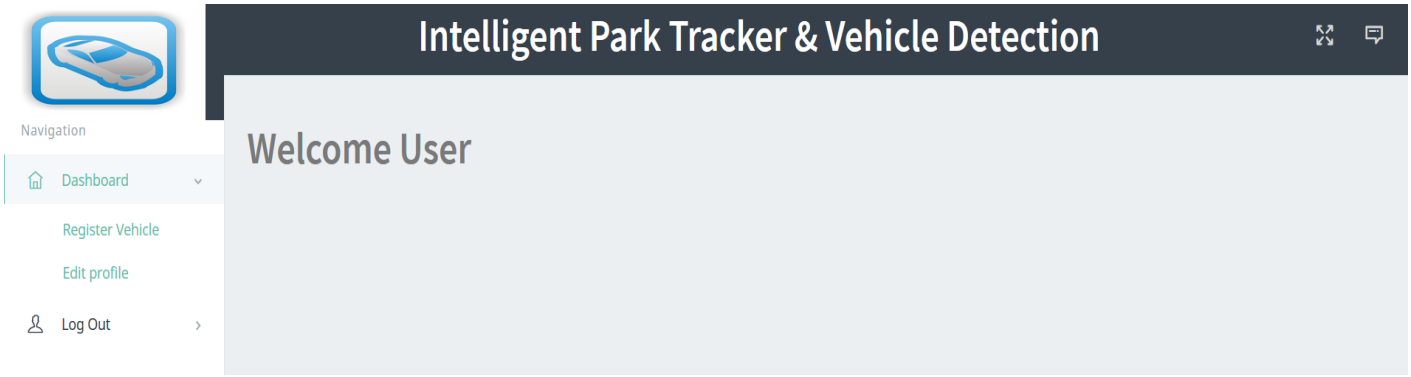

Fig 5(e)

CHAPTER-6
TESTING

T/C No.	Module	Input Data	Expected Result	Actual Result	Status
1	Registration	Member Details	Registered	Registered	Pass
2	Login	User Id, Password	Login	Login	Pass
3	Detection	Car Image	Fetching Number plate Data	Most of the time working	Pass
4	Member Identification	Numberplate data	Member Details	Member Details	Pass

CHAPTER-7
FUTURE ENHANCEMENT

- Working in any weather condition can be improved as it's our drawback.
- Camera quality can be improved.
- Can track multiple cars at a time.
- Fully Automated System.
- Face detection can be included.

CHAPTER-8
CONCLUSION

In the conclusion we can say that, with the help of our system there will be well organized parking management and there will be no conflicts about parking in a residential and business premises. Haphazard parking problem will be solved afterwards using this system by keeping track of vehicles. As we know that nowadays there are many problems related to parking in many premises, especially in flats where non-residential cars are found parked in residential one's.

In order to overcome that problem, we came up with this system. With the help of our system there will be well organized parking management and there will be no conflicts about parking in a residential and business premises. Haphazard parking problem will be solved afterwards using this system by keeping track of vehicles.

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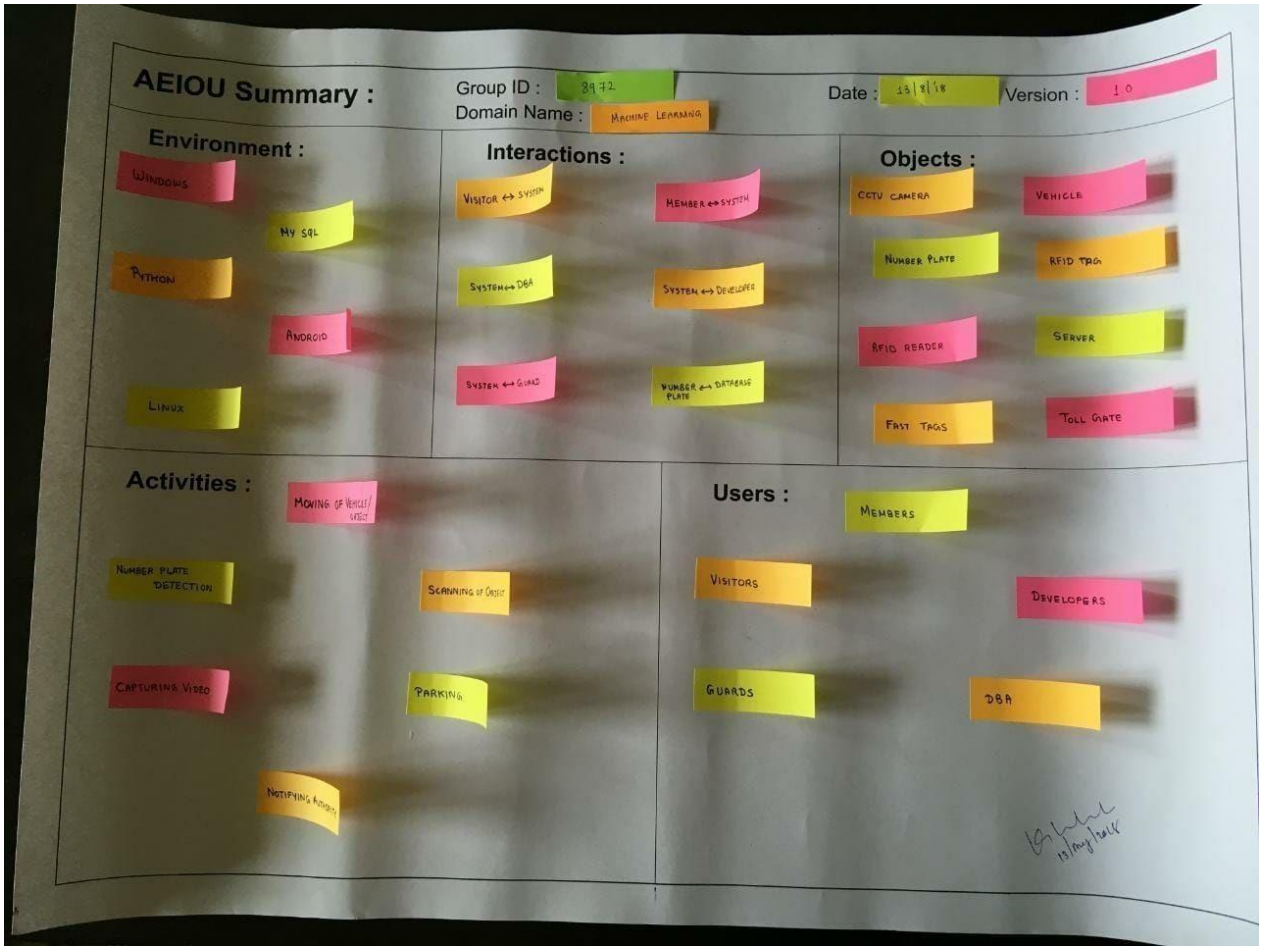
Chapter-8

REFERENCES

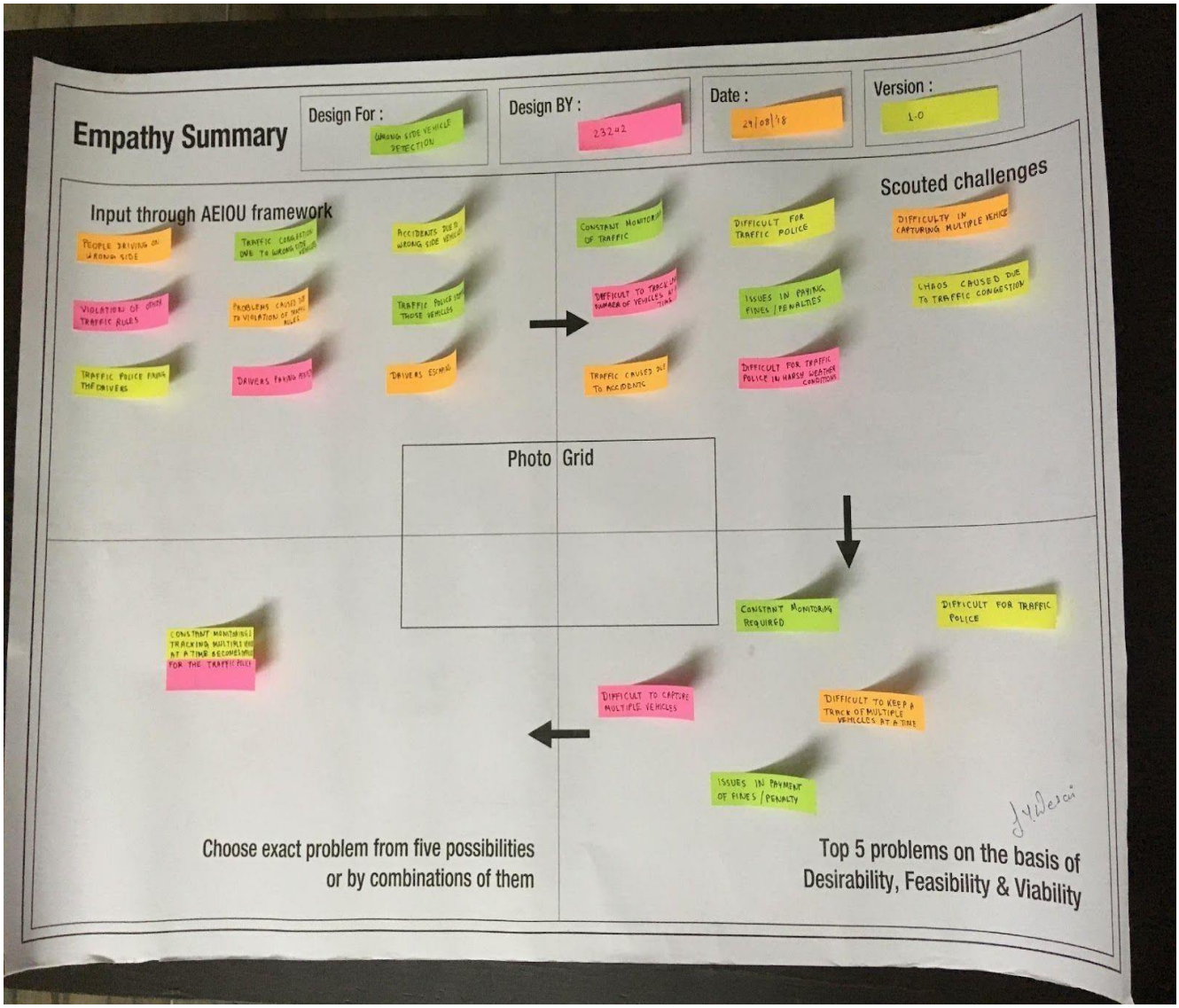
1. https://pyimagesearch.com
2. https://www.youtube.com/user/sentdex
3. https://en.wikipedia.org/wiki/Computer_vision
4. https://www.quora.com/How-does-Google-blur-faces-and-license-plates-on-Google-Maps
5. https://patents.google.com/patent/CN106781520A/en?q=numberplate&q=detection&q=vehicle&q=tra cker&language=ENGLISH
6. https://www.quora.com/search?q=automatic+number+plate+detection

Chapter-10 Appendix

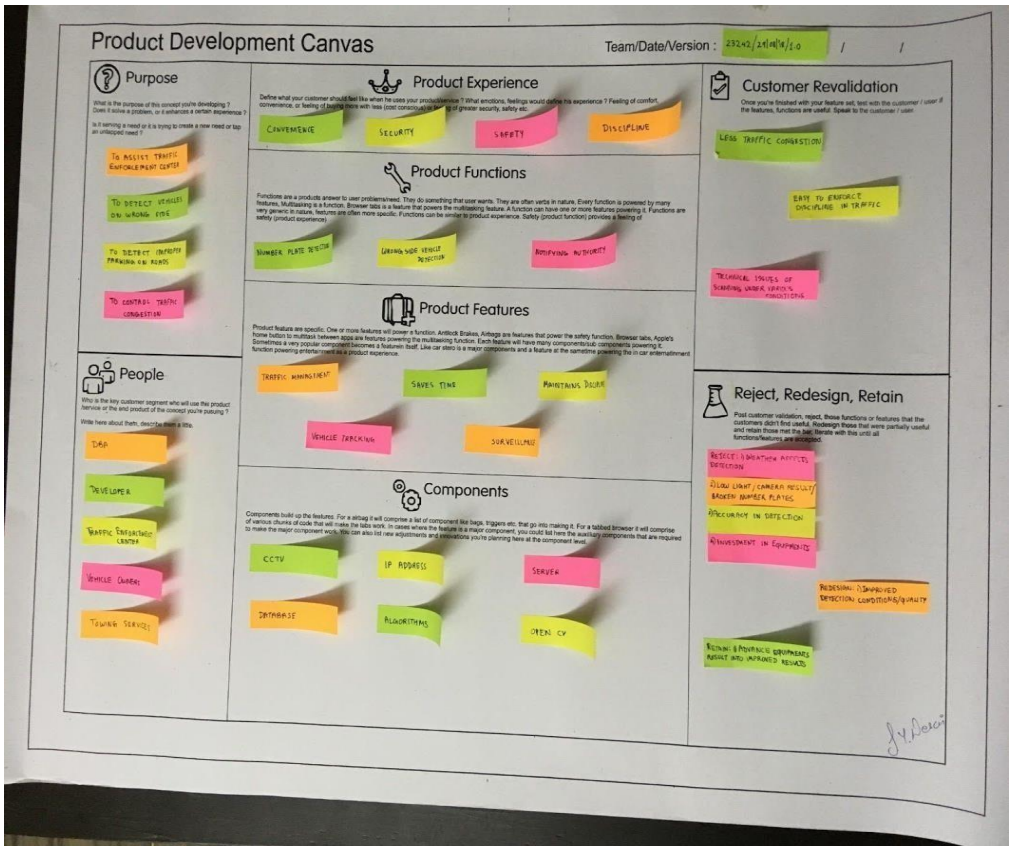
10.1 AEIOU SUMMARY



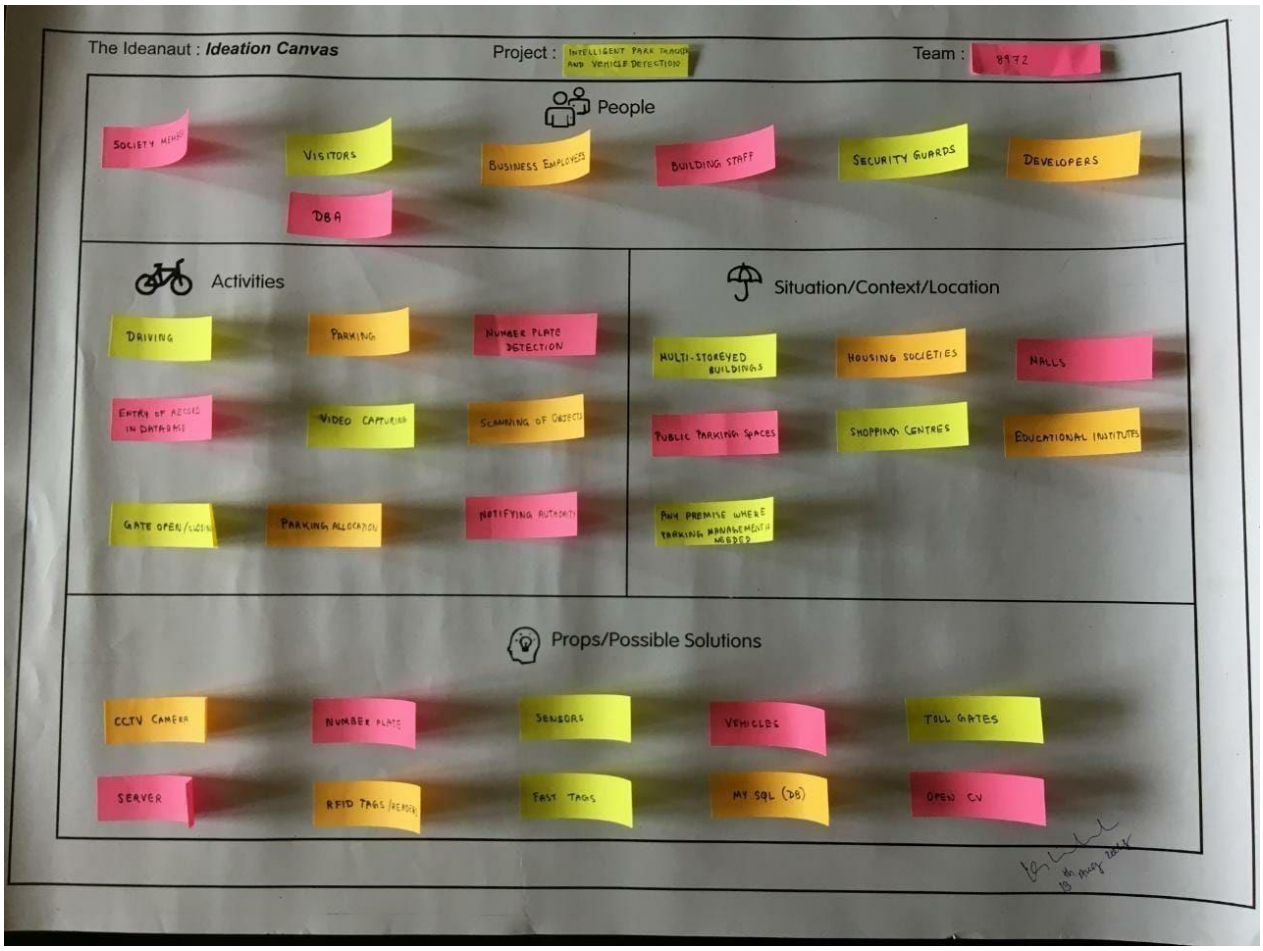
10.2 EMPATHY SUMMARY



10.3 PRODUCT DEVELOPMENT CANVAS



10.4 IDEATION CANVAS



10.5 Periodic Progress Reports (PPR)

College : L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD
StudentName : Shah Het Ketankumar
EnrollmentNo : 150320107544 Department : Computer Engineering
MobileNo : 9099033688 Discipline : BE
Email : hetshah2510@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : First PPR

Project : Intelligent Park Tracker & Vehicle Detection

Status : Reviewed

1. What Progress you have made in the Project ?
Studied on python libraries & machine learning algorithms
2. What challenge you have faced ?
Hard to find the approach to our problem
3. What support you need ?
Exposure to new python libraries
4. Which literature you have referred ?
Python Docs

Comments

Comment by Internal Guide :
None
Comment by External Guide :
None
Comment by HOD :
None
Comment by Principal :
None
Comment by University Admin :
None

College : L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD
StudentName : Shah Het Ketankumar
EnrollmentNo : 150320107544 Department : Computer Engineering
MobileNo : 9099033688 Discipline : BE
Email : hetshah2510@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Second PPR

Project : Intelligent Park Tracker & Vehicle Detection

Status : Reviewed

1. What Progress you have made in the Project ?
Started working on KNN Algorithm
2. What challenge you have faced ?
Took too much time to learn algorithms
3. What support you need ?
In-depth explanations of the important functions of python libraries.
4. Which literature you have referred ?
Online courses based on Python & Machine Learning.

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

College : L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD
StudentName : Shah Het Ketankumar
EnrollmentNo : 150320107544 Department : Computer Engineering
MobileNo : 9099033688 Discipline : BE
Email : hetshah2510@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Third PPR

Project : Intelligent Park Tracker & Vehicle Detection

Status : Reviewed

1. What Progress you have made in the Project ?

Got 70% of accuracy in the testing of number plates. Removed Noise from the image

2. What challenge you have faced ?

Couldnt able to get accuracy in scanning numberplates.

3. What support you need ?

Wants to know how to train different types of data

4. Which literature you have referred ?

Web Surfing StackOverflow, Sentdex - youtube channel. Continuation of Online Courses.

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
None

Comment by University Admin :
None

College : L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD
StudentName : Shah Het Ketankumar
EnrollmentNo : 150320107544 Department : Computer Engineering
MobileNo : 9099033688 Discipline : BE
Email : hetshah2510@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : Forth PPR

Project : Intelligent Park Tracker & Vehicle Detection

Status : Reviewed

1. What Progress you have made in the Project ?

Currently working on OCR algorithm Also trying Google Computer Vision API Improved User Interface

2. What challenge you have faced ?

Integrating python and java code in one platform

3. What support you need ?

Guidance on integrating two languages in one platform.

4. Which literature you have referred ?

Google CV API docs Conversations with mentors Explored online machine learning forums.

Comments

Comment by Internal Guide :
None

Comment by External Guide :
None

Comment by HOD :
None

Comment by Principal :
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Comment by University Admin :
None

10.6 Business Model Canvas (BMC)

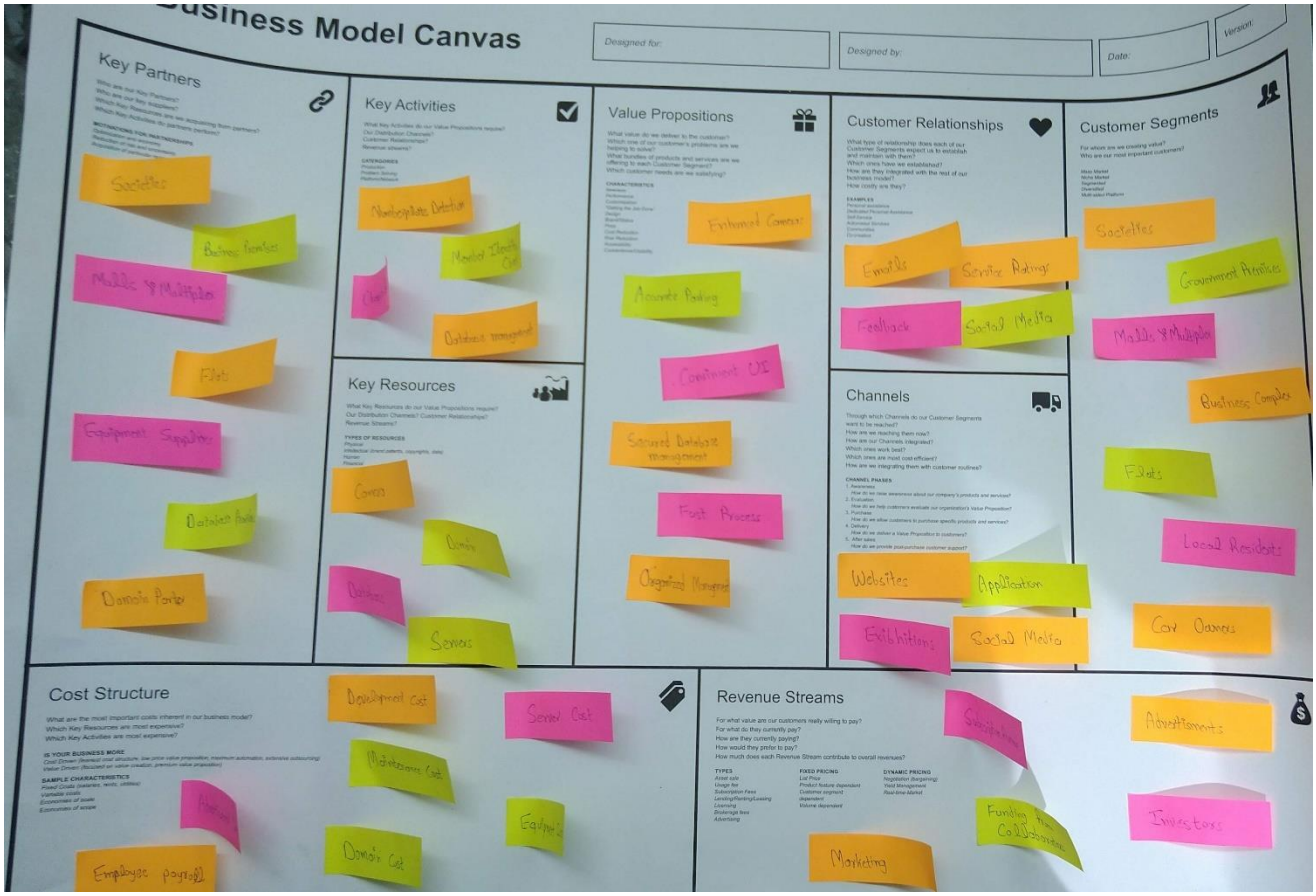

Fig.10.6(a) BUSINESS MODEL CANVAS

10.7 Patent Drafting Exercise (PDE)

College : L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD
Department : Computer Engineering
Discipline : BE
Semester : Semester 8
Project Name : Intelligent Park Tracker & Vehicle Detection
Team ID : 35986

Form 1 – APPLICATION FOR GRANT OF PATENT

Applicants :

Sr. No	Name	Nationality	Address	Mobile No.	Email Id
1	Patel Hardik Tusharbhai	Indian	Computer Engineering , L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD , Gujarat Technologycal University.	8980809328	patelhardik2706@gmail.com
2	Shah Het Ketankumar	Indian	Computer Engineering , L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD , Gujarat Technologycal University.	9099033688	hetshah2510@gmail.com

Inventors :

Sr. No	Name	Nationality	Address	Mobile No.	Email Id
1	Patel Hardik Tusharbhai	Indian	Computer Engineering , L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD , Gujarat Technologycal University.	8980809328	patelhardik2706@gmail.com
2	Shah Het Ketankumar	Indian	Computer Engineering , L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY, AHMEDABAD , Gujarat	9099033688	hetshah2510@gmail.com

			Technologycal University.		

I/We, the applicant(s) hereby declare(s) that:

Following are the attachments with the applications :

Form 2 - PROVISIONAL/COMPLETE SPECIFICATION

1 . Title of the project/invention :
Intelligent Park Tracker & Vehicle Detection

2. Preamble to the description :
Provisional

3. Description

a) Field of Project / Invention / Application :
Computer Vision

b) Prior Art / Background of the Project / Invention :
Machine Learning, Computer Vision

c) Summary of the Project / Invention :
With the help of this project, we can avoid haphazard parking in resident or business premises.

d) Objects of Project / Invention :
Cameras, Database

e) Drawings :

f) Description of Project / Invention : (full detail of project) :
This project is all about to solve a few problems occurred in resident or business premises on a daily routine.
A Database of all members vehicle information including its number plate will be created and by using that database it will determine whether that vehicle belongs to the native member or not and on that basis permission to enter in the premises will be determined.
After that, it will also check whether the vehicle is parked properly or not, if not then an alert message will be generated.

g) Examples :

h) Claims (Not required for Provisional Application) / Unique Features of Project
Accurate Number plate detection
Solving the Parking problem
Preventing unauthorized vehicles

4. Claims

5. Date and signature

6. Abstract of the project / invention :
This project is all about to solve a few problems occurred in resident or business premises on a daily routine.
A Database of all members vehicle information including its number plate will be created and by using that database it will determine whether that vehicle belongs to the native member or not and on that basis permission to enter in the premises will be determined.
After that, it will also check whether the vehicle is parked properly or not, if not then an alert message will be generated.

Form 3 – STATEMENT AND UNDERTAKING UNDER SECTION 8

Name of the applicant(s) :

I/We, Patel Hardik Tusharbhai ,Shah Het Ketankumar

Hereby declare :

Name,Address and Nationality of the joint applicant :

(i) that I/We have not made any application for the same/substantially the same victim invention outside India.

(ii) that the rights in the application(s) has/have been assigned to

Name of the Country	Date of Application	Application Number	Status of the Application	Date of Publication	Date of Grant
N/A	N/A	N/A	N/A	N/A	N/A

(iii)That I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within three months from the date of filing of such application.

Dated this 29 day of March 2019

To be signed by the applicant or his authorised registered patent agent :

Signature.....

Name of the Natural Person who has signed :

Patel Hardik Tusharbhai ,Shah Het Ketankumar

To,
The Controller of Patents,
The Patent Office,
At Mumbai

Plagiarism Checker