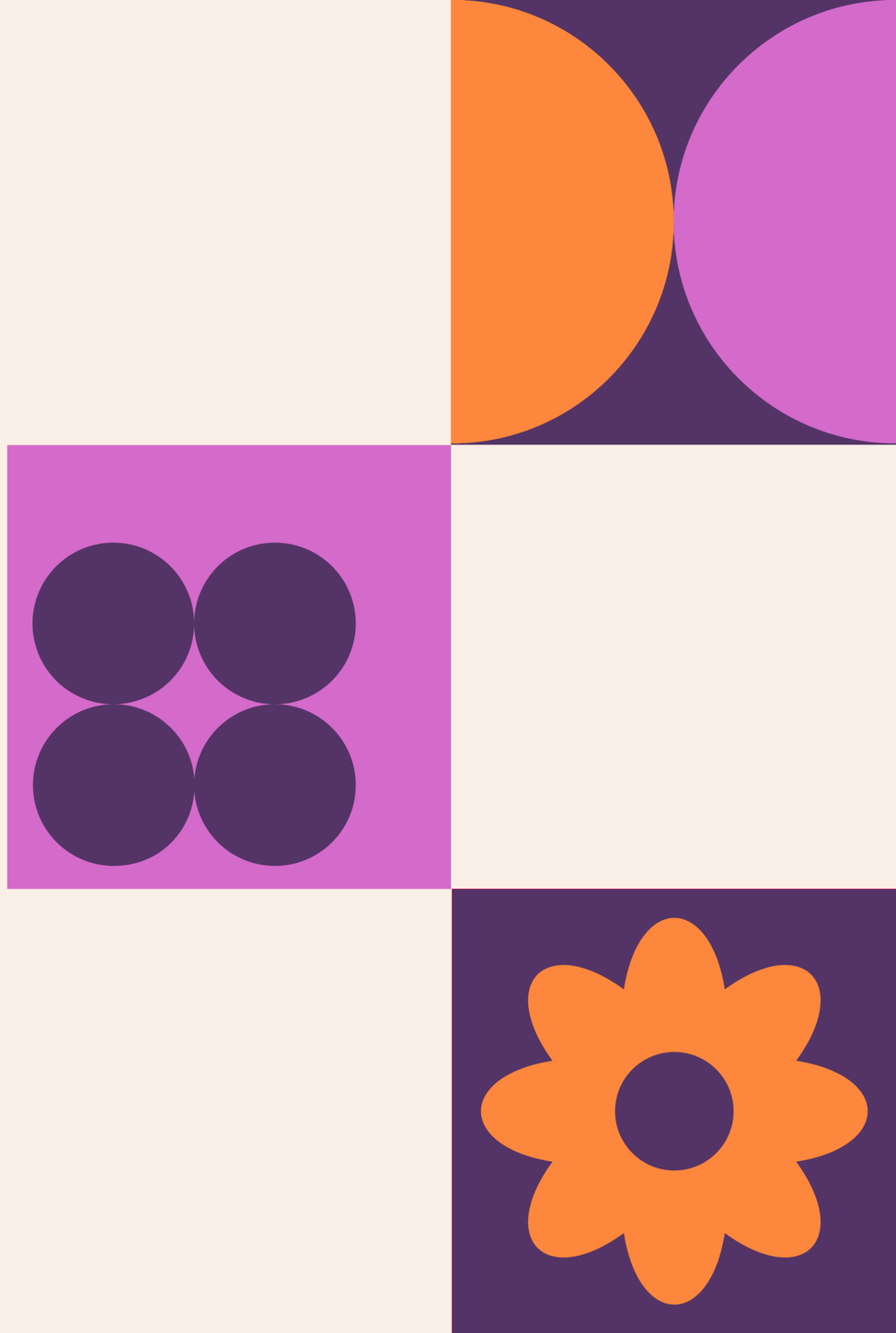
AUTOMATIC NUMBER PLATE DETECTION SYSTEM

ANPD



SYNOPSIS

Title of the Project

AUTOMATIC NUMBER PLATE DETECTION SYSTEM (ANPD)

Abstract

Automatic number plate detection (ANPD) systems have become increasingly popular in recent years due to their ability to automatically identify and recognize license plates on vehicles. ANPD systems are typically composed of a camera, image processing software, and a database of license plate information.

Objective of the Project

Automatic number plate detection (ANPD), also known as Automatic Vehicle Identification (AVI), can be implemented using existing multi-purpose CCTV surveillance cameras or dedicated ANPD cameras. These systems use optical character recognition (OCR) software to isolate and identify vehicle registration details. A typical ANPD system includes hardware and software components including roadside camera systems, control centre computer systems, software Applications to manage captured data, and a central database of vehicle registration details.

Project Category

Web Based Application with AI and Machine Learning

Languages to be used

FRONT END : HTML, CSS, JINJA, Python (flask)
BACK END : Python
DATABASE : Firebase, SQL

Structure of the proposed Project

The designed application provides admin view. The admin view is meant to search for vehicles, to see previous data and records etc. The admin/user has a real time control of the application such as, over ride the number plate detection process.

Module Description

ADMIN

1. Registration :

    a) csv file method
    b) single entry system
    c)Adminn Registartion

Module Description

2. Manage the Entry and Exit Gates :

a) Access the gates
b) monitor the gates

3. Manage Records :

Admin can add and view records. Admin can access all the records.

Module Description

4. Log System :

a) Application log :

It records all the actions of the user or the Admin.

5. Search :

Admin can search for data just by entering number plate details.

Module Description

6. Vehicle page :

Admin can access the whole page which consists vehicle details. vehicle details include vehicle number, Owner name, position of the owner etc. It would also contain the details such as the last time when vehicle entered the establishment.

Module Description

7. Graphs and Data :

a) Categorisation of vehicles:
categories such as establishment owned vehicles, establishment hired vehicles, personal vehicles of essential personal, visitors, etc.
b) Other graphs

Module Description

8. Print Data system :

It is the feature for admin to print specific vehicle details in pdf format.

Module Description

VEHICLE

1. Enter :

   vehicle enters through the gate, the number plate is scanned by machine learning model

2. Exit :

   vehicle exits the establishment.

Any Other Information

TensorFlow(to implement machine learning in the system)
Google cloud vision API OCR(for character recognition)
Google cloud AutoML(for machine learning)

Future Scope of the Project

The system can be enhanced using sensors at the entrance.
The Guard or any recognized or registered authority(Admin) can access the site using a mobile phone and then enter the number of people and send the data to the application.

SOFTWARE REQUIREMENTS AND SPECIFICATIONS

Introduction

The Software Requirement Specification (SRS) is a collection and organisation of all the requirements surrounding a project. As the vision document was a board statement of a user’s needs goals and objectives and features of the system, the SRS begins the detailing of those needs and features of the system, the SRS begins the detailing of those needs and features and how they are going to be implemented in the solution.

Introduction

purpose

This SRS Documentation is of the project Automatic Number Plate Detection (ANPD) version 1.0, this document is a comprehensive description of the intended purpose and environment for ANPD under development. This document will fully describe as to what the ANPD system will do and how it will be expected to perform. The document aims to analyse and give in depth insight into the complete system.

Introduction

Document Conventions

This document follows MLA Format. Bold-faced text has been used to emphasize sections and subsection headings. Diagram illustrations may be used to help illustrate complex concepts of system components.

Introduction

Intended Audience and Reading Suggestions

While the software requirement specification (SRS) document is written for a more general audience, this document is intended for individuals directly involved in the development of ANPD system such as Project managers, developers, testers, users and stakeholders. This document need not be read sequentially; users are encouraged to jump to any section they find relevant.

Introduction

Product Scope

ANPD is used primarily for number plate detection, Our main objective is to detect vehicle number plates and to validate the number plate and either allow access or deny access.

Overall Description

Product Perspective

The world today is moving towards technologically advancements, but there are these small things that people usually miss in our case it is the guard at the gate system. We have seen for ages a guard on a gate who stands guard and checks and validates any vehicle which enters the establishment but with our project ANPD we are determined to eliminate the process of manually checking and logging all entries and exists in and out of the establishment. We are implementing machine learning models which will automate the process of validating vehicles.

Overall Description

Production Functions

- Registration
- Managing gates
- Record managing
- Logs system
- Search
- Vehicle page
- Graphs and data
- Printing data

Overall Description

User Classes and Characteristics

There are two user classes in this product. They are

1. Admin
2. Vehicle

Overall Description

1. Admin

- Registration
- Manage the Entry and Exit gates
- Manage records
- Log system
- Search
- Vehicle Page
- Graphs and data
- print data system

Overall Description

2. Vehicle

- Enter
- Entry

Overall Description

Operating Environment

Front End: HTML, Java script, CSS, Jinja (Flask: Python)
Back End: Python
Other API's: TensorFlow Lite, Google cloud vision API
Application Type: Client Server Application
Database: MySQL, firebase
Operating System: Windows 7 or better, MAC, Linux
Browser: Google Chrome, Mozilla Firefox, Microsoft Edge etc
Devices: Smart Phones, Desktop

Overall Description

Design and Implementation Constraints

- The software is designed and is uploaded on the web. We need constant internet connection to use the software.
- The software depends on cloud database for data that is pre stored. Hence it is vital that the database is online while the system is up.
- The coding of the front end is done using HTML, CSS, Java script and bootstrap hence it is necessary that we implement a browser that supports these languages.

Overall Description

- The capturing and uploading of the image is done using Raspberry PI and camera unit, hence it is essential that Hardware components such as Raspberry PI are up and running, There is also a need for providing the Raspberry PI unit with constant Electricity and Internet Connection.
- The AI Systems can be faulty sometimes as a Machine Learning model can never be 100% Accurate with data, Hence there must be safeguards to tackle this problem.

Overall Description

User Documentation

Admins will be given a user manual of the system and they will be trained by the developers about the features.

Overall Description

Assumptions and Dependencies

- As the system is web-based system it can be used both on computers and mobiles.
- The system is dependent on the Admin for certain inputs such as registrants, vehicle data etc.
- The system where the web-application is accessed and the raspberry pi unit are connected to the internet.
- Admin can Override any system i.e. if the system malfunctions or there is human intervention is needed

External Interface Requirements

User Interfaces

It provides a GUI for the admin, here he or she can login and access the system. From here the admin can access the functions of the system. The GUI is designed using HTML, CSS, Java script and is handled in the server by Python’s Flask web framework. This is primarily used because the languages and framework mentioned above are supported in most of the used browsers.

External Interface Requirements

Hardware Interfaces

The user need not have any specialised hardware installed in the system. The minimum requirements are 4 GB of RAM and 200 GB of Hard disk space. The Establishment is need not have any other infrastructure as we install Raspberry pi systems and cameras with the system. The website and database are stored and hosted through cloud.

External Interface Requirements

Software Interfaces

Browser should support HTML/HTML 5 compatible for experience for admin and all its users. The website communicates with the database in order to get the information about the vehicles and then makes graphs and gives information based on that data.

System Features

Registration and Login

The primary admin username and password are stored in the database by developers before hand which allows them to login at the beginning of this web app. The Admin can then register users of the application and also register vehicles such as employee vehicles, Establishment owned vehicles and other vehicles which will be then store in the database.

System Features

Manage Entry and Exit Gates

The admin can access this page as to monitor the gates, this module will give the admin access to the data that is retrieved from the gates where the system is installed. the admin can monitor any activities happening in the gate.

System Features

Manage records

The admin can access all the records of all the vehicles from this option. The admin can choose the timeline from which he wants access the records. This process can only be accessed by the admin, this is of high priority.

System Features

Search

The admin access the vehicle details just by entering the numberplates in the search bar and the system will provide the details.

System Features

Search

The admin access the vehicle details just by entering the numberplates in the search bar and the system will provide the details.

System Features

Graphs and data

This is one of the main features of the system as this feature gives out the data in form of Graphical charts and various other methods. Here the system will collect all the data necessary for the creation of graphs and then it will show it the user in a visually appealing manner. This is a very high priority module.

Other Non-Functional Requirements

Performance Requirements

Quickest possible algorithms are required to implement in the system for recognition process and validation process as time is of the essence. Traffic is heavy at morning, afternoon and evening hours the process should be completed within minutes. The server and databases should be working 24 hours a day 7 days a week and the same goes for the raspberry pi installed in the gates.

Other Non-Functional Requirements

Safety Requirements

The application is password protected and access limited based on the level of authorisation. The admin has access to all the processes the guard and drivers have access to their particular features. Data can be managed only by the admin.

Other Non-Functional Requirements

Safety Requirements

The application is password protected and access limited based on the level of authorisation. Data can be managed only by the admin.

Other Non-Functional Requirements

Security Requirements

The data in the system is secured and is only accessible to the developers and admin, the application is password protected. The database is coded in a way to stop any SQL injection attacks. The application uses sessions and cookies as a measure of stopping DDOS attacks.

Other Non-Functional Requirements

Software Requirements

- Security
- Maintainability
- Reliability
- Portability
- Correctness
- Flexibility

Other Non-Functional Requirements

Business Rules

- The Admin can only access the records.
- The Admin can only access the Real Time data and monitor gates.
- The Admin can only register new admins and vehicles.
- The Admin can only override the system