CENG 407

Software Design Description (SDD)

Licence Plate Recognition System

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1. Introduction

1.1 Purpose

This software design document describes the License Plate Recognition System architecture and system design. This includes the architectural features of the system which operations each module will perform. The aim is to guide a design that can be easily implemented by any user reading this report. The primary audience for this document is License Plate Recognition System users and developers.

1.2 Overview

Each chapter contains the following topics in order.
Section 2 introducing the system context and design, and discussion the background to the project.
Section 3.1 is the Architectural Design, which determines the design to perform all functions included in the system. Each of these entities has a brief description concerning the services that it provides to the rest of the system.
Section 3.2 includes the providing decomposition of software components, including the hierarchy and control and data flows.
Section 4 discusses the User Interface Design, and how it can be created with maximum user efficiency and ease of use.
Section 5 is the which requirement specification will satisfy with the which component.

1.3 Definitions and Acronyms

Term	Definition
Activity Diagram	An activity diagram is a behavioral diagram i.e. it depicts the behavior of a system. An activity diagram portrays the control flow from a start point to a finish point showing the various decision paths that exist while the activity is being executed.
Architectural Design	Architectural design is a concept that focuses on components or elements of a structure. An architect is generally the one in charge of the architectural design. They work with space and elements to create a coherent and functional structure.
Camera	A device for recording visual images in the form of photographic, film or video signals.
Class Diagram	Class diagram is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects.
Character Recognition	Character recognition is a process which allows computers to recognize written or printed characters such as numbers or letters and to change them into a form that the computer can use.
Character Segmentation	Character segmentation is an operation that seeks to decompose an image of a sequence of characters into sub images of individual symbols. It is one of the decision processes in a system for optical character recognition (OCR).
Decomposition Diagram	A decomposition diagram shows a complex, process, organization, data subject area, or other type of object broken down into lower level, more detailed components. For example, decomposition diagrams may represent organizational structure or functional decomposition into

	processes.
Interface	Interface is a shared boundary across which two or more separate components of a computer system exchange information.
Licence Plate	A license plate is a sign on the front and back of a vehicle that shows its license number. A rectangular, usually metal plate that bears a sequence of numbers, letters, or both and is issued by a government to identify an officially registered vehicle. one of the signs with numbers on it at the front and back of a car.
Licence Plate Recognition System	License plate recognition system is a type of technology, mainly software, that enables computer systems to read automatically the registration number (license number) of vehicles from digital pictures.
Optical Character Recognition (OCR)	Optical character recognition or optical character reader is the electronic or mechanical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo or from subtitle text superimposed on an image.
Software Design Description	A software design description is a representation of a software design that will be used to record design information, address various design concerns, and communicate that information to its design.
Support System Manager	Someone who helps the License Plate Recognition System when there is a problem with the system, camera or license plate reading.
Users	The person using the License Plate Recognition System.
User Interface Design	Focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access, understand, and use to facilitate those actions. UI brings together concepts from interaction design, visual design, and information architecture.

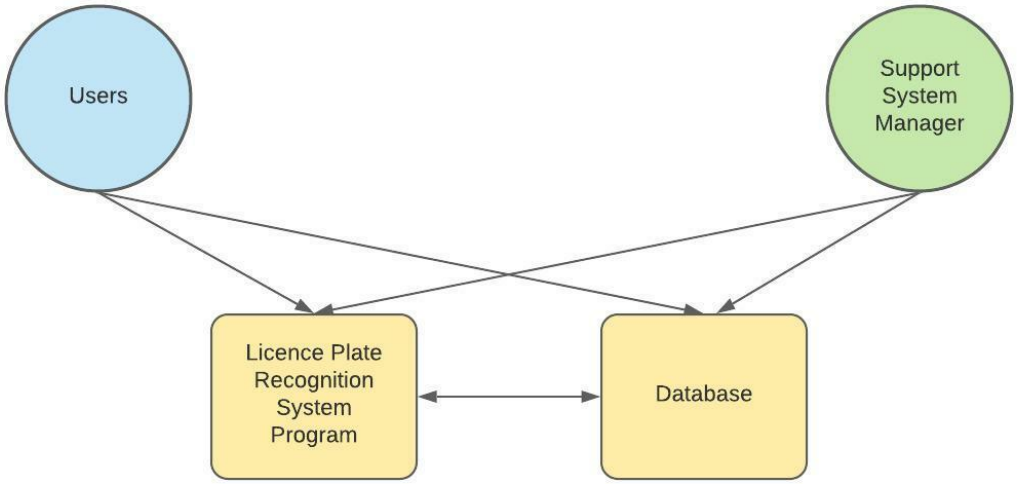
2. System Overview

The license plate recognition system is made by detecting the license plate region of the vehicles with the vehicle image and reading and separating the characters on the plate with image processing. By developing the license plate recognition system with deep learning and image processing, it will be tried to work towards detecting license plate recognition.

In the Plate Recognition System, the recognition process of the plates first takes place by finding all the contours in the picture. It happens that each stroke has its bounding rectangle. Then it has to compare and verify the side ratio and area of each bounding rectangle with an average plate. Image segmentation is then applied to the image within the verified contour to find the characters inside the plate. As the last step, the characters on the plate are recognized by using OCR (Optical Character Recognition). In the license plate recognition system, there is also a training phase by using the deep learning method for more recognition of the license plate in the images. Thus, different directions of vehicles and license plate positions can be better detected using multiple images or different sections of a video. In this way, it also provides convenience in terms of accuracy and speed in plate recognition.

3. System Design

3.1 Architectural Design

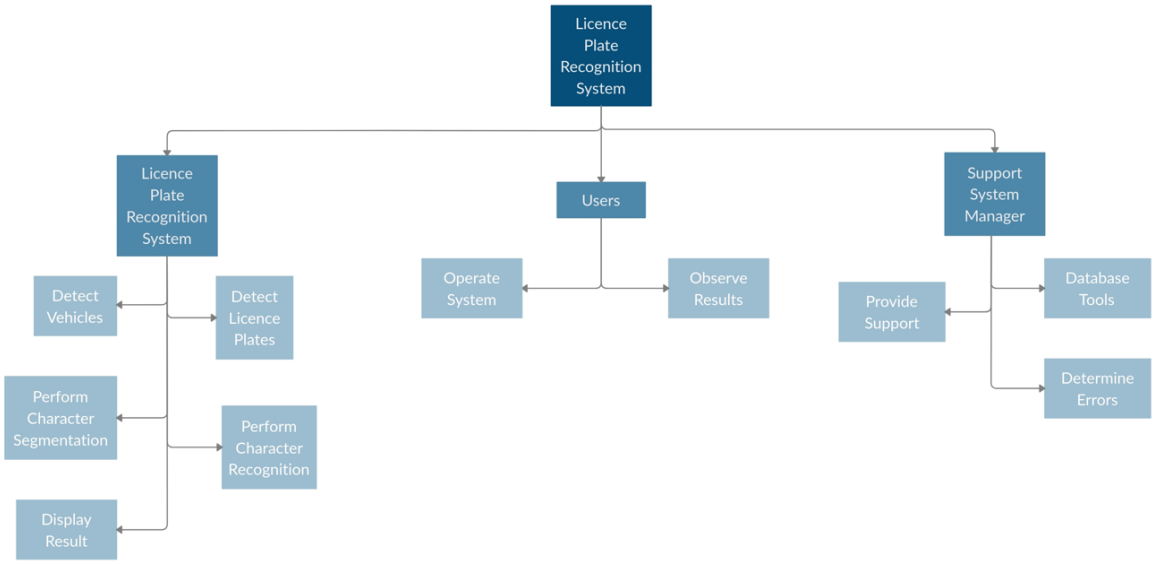


1. Licence Plate Recognition System Program: It is the part where the users run the License Plate Recognition System project and the whole project is located.

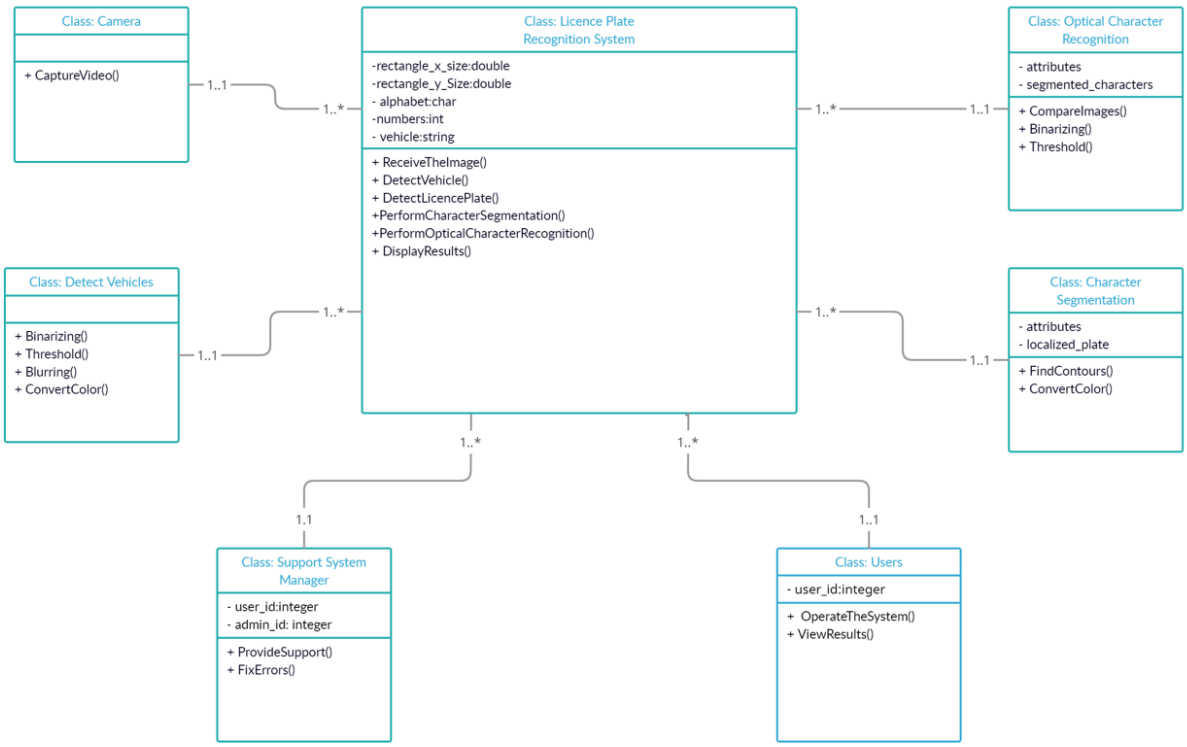
2. Database: It is the place where license plate information is stored in the License Plate Recognition System project.

3.2 Decomposition Description

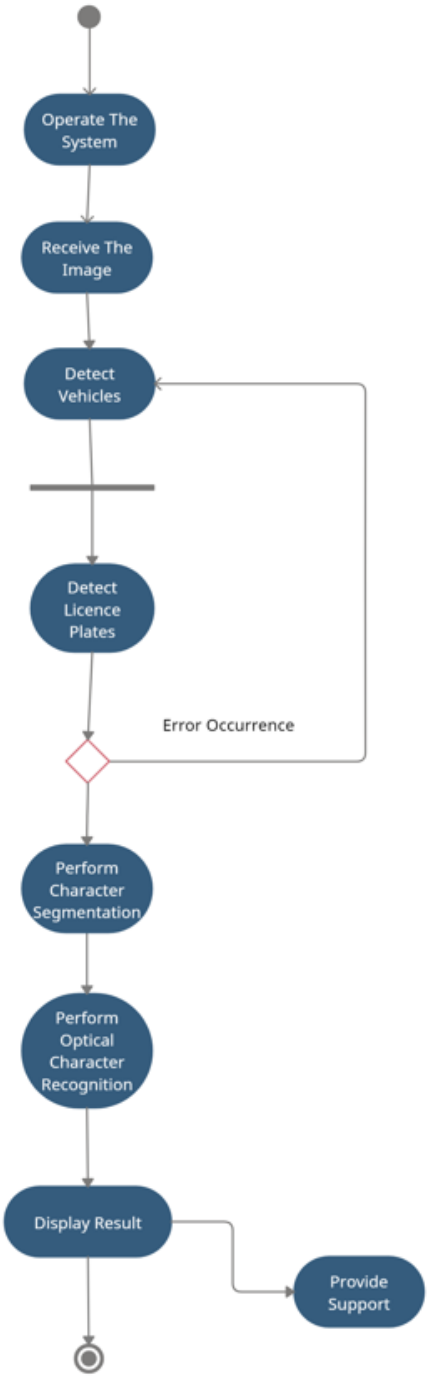
Decomposition Diagram:



Class Diagram:

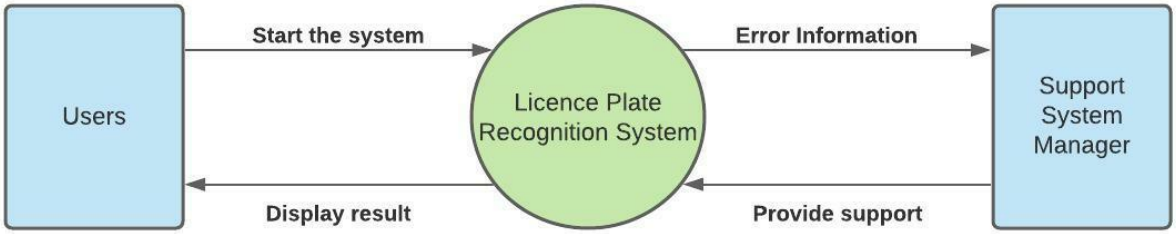


Activity Diagram:

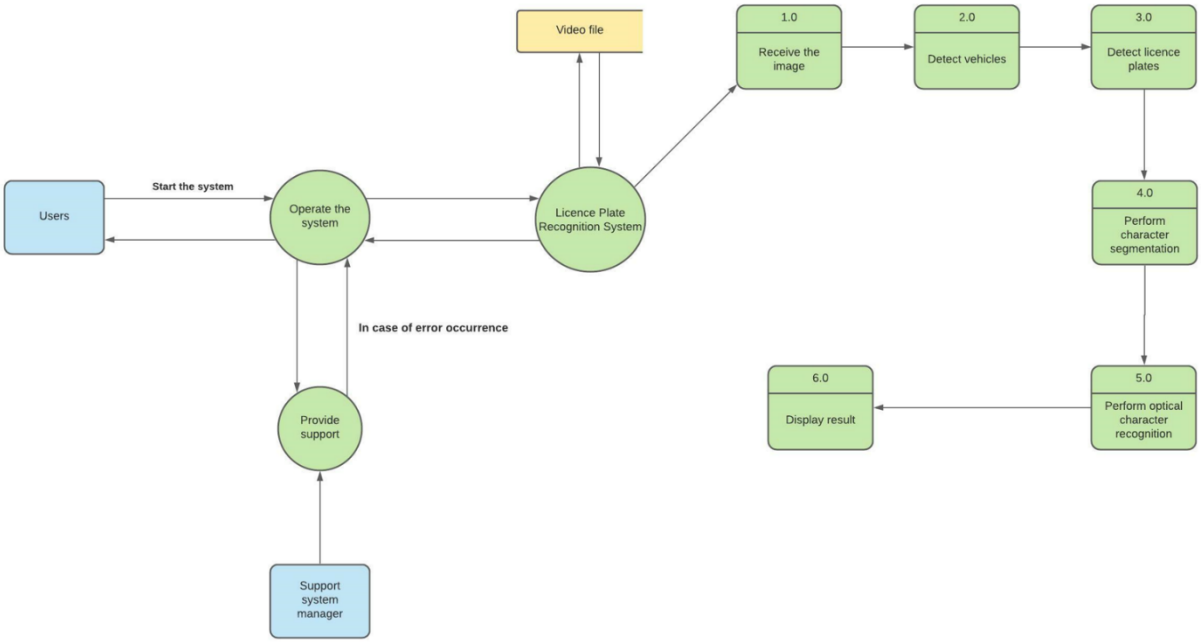


Data Flow Diagram (DFD):

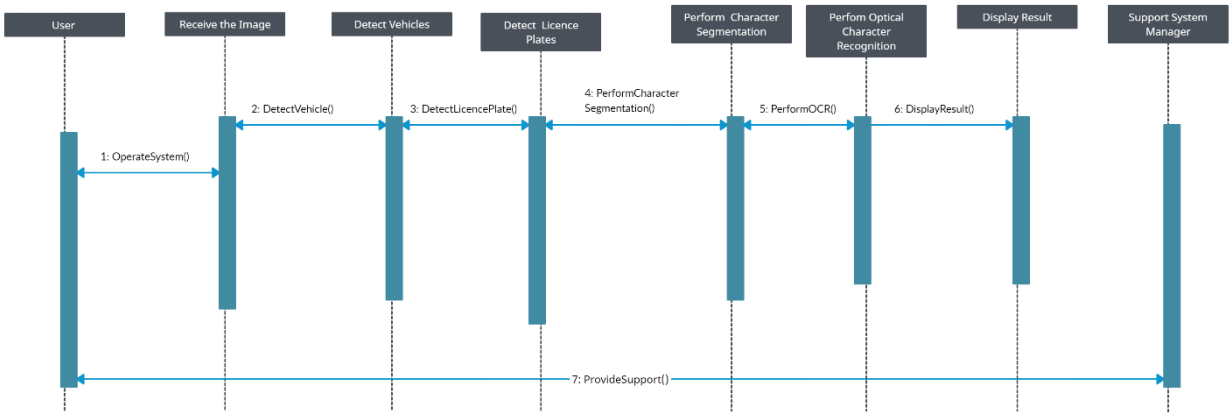
LEVEL 0:



LEVEL 1:

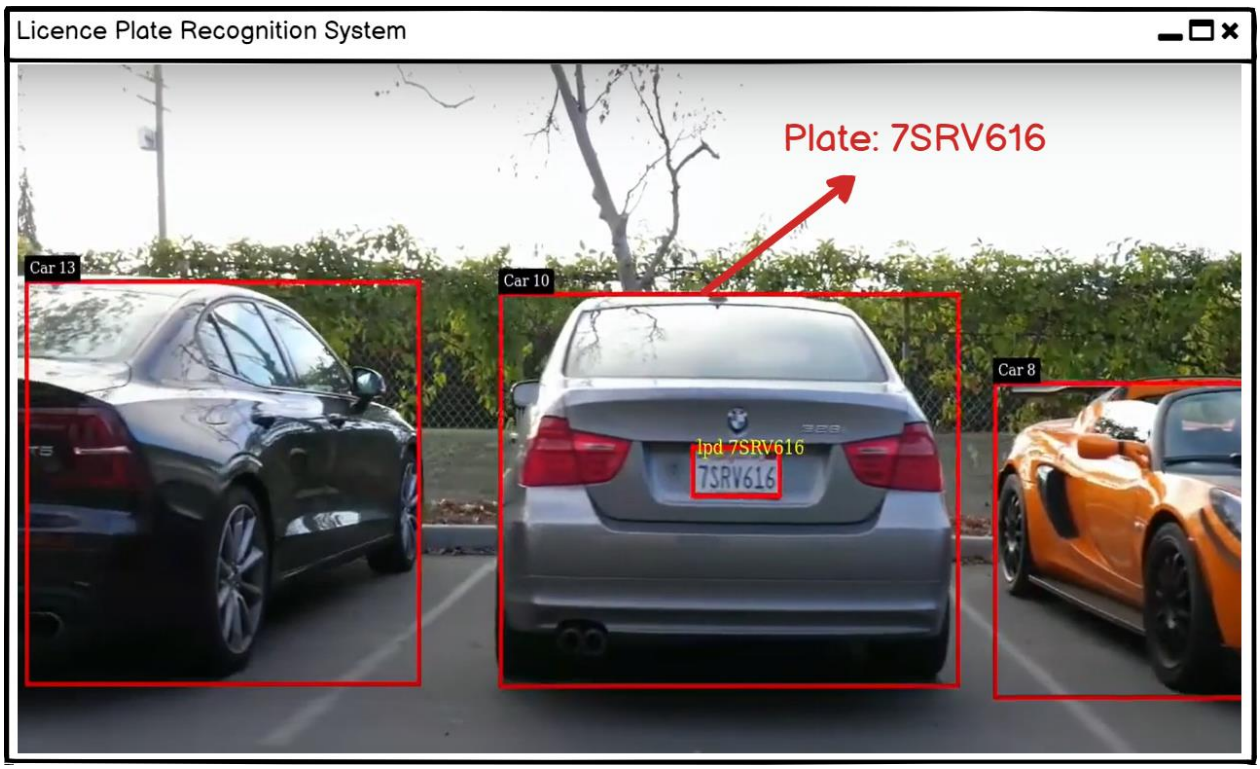


Sequence Diagram:



4. User Interface Design

- **Display Result**



After users run the License Plate Recognition System, the system performs license plate recognition. The license plate of the vehicles is recognized through the image taken from the video. After the users run the program, the result of the license plate recognition process is

written on the screen as in the interface. In this way, users can clearly see the result of the license plate recognition process.

5. References

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