Web Interface Based **Automation of Toll Collection System** Using Computer Vision

Presented to the Honorable Bench Panel of

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EAGLE

Background of the Project

- Long line of Traffic is a common problem behind every toll booths
- The mega Project like Padma Bridge are **built to save time**
- Toll Booths are always present before any mega project
- Due to the congestion in the toll booth we are **losing valuable time**

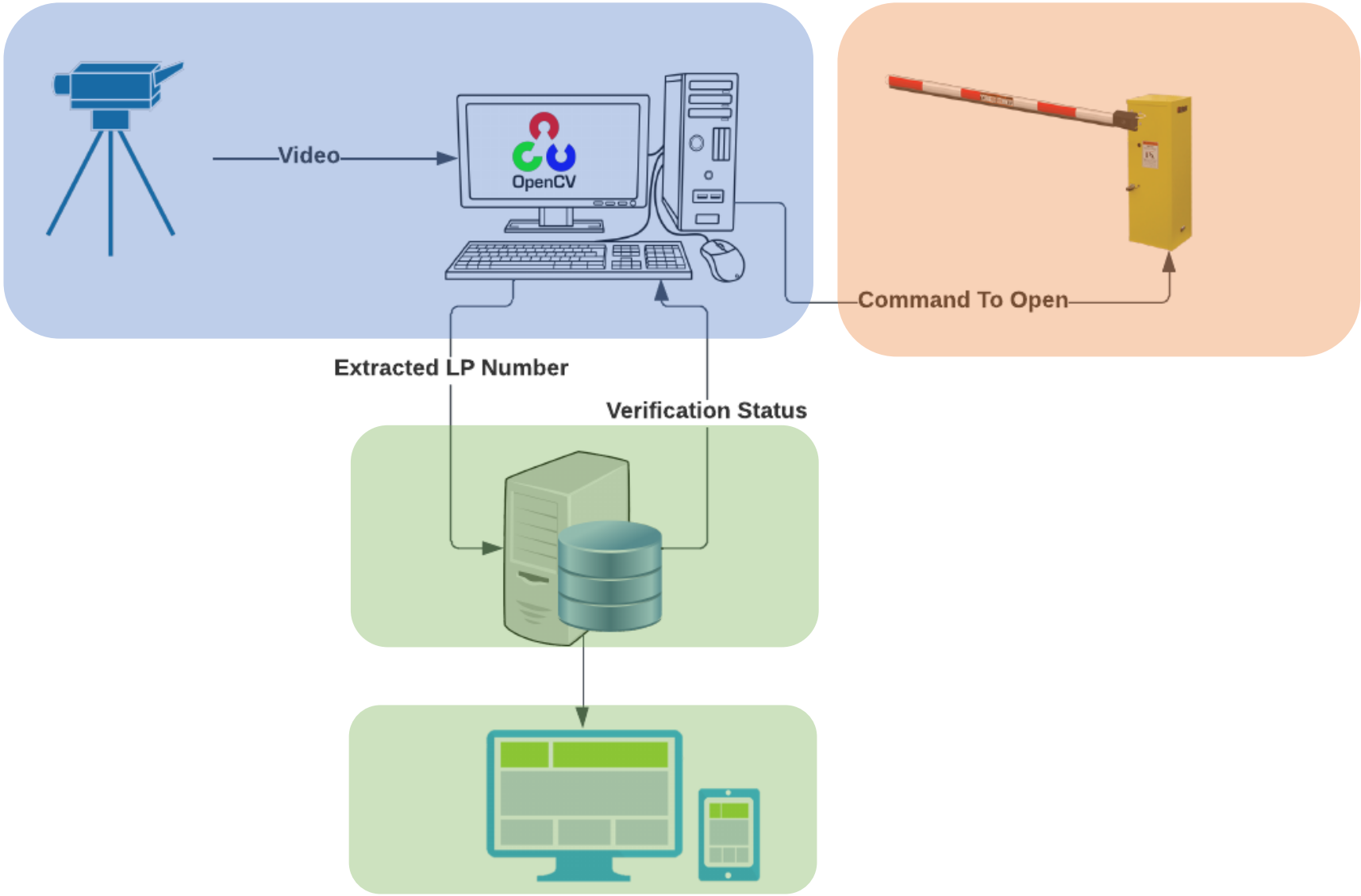
Reason For The Congestion

- Tolling Processes are **Maintained By Humans**
- Humans are **slow and easily bored** with **repetitive tasks**

An Abstract Solution

- **Automate** the whole process
  - Vehicle Recognition
  - Billing
  - Passing Mechanism
- Only manual monitoring for edge cases

The Functional Block Diagram



Recognition

Billing

Detailed Solution

Traffic Flow control:
Hardware part

User Interface

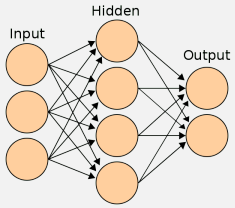
Recognition

Ways to Recognize a Vehicle

RFID

QR Code Scan

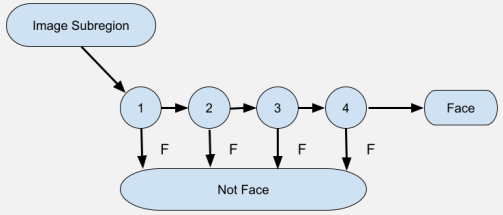
Hardcoded Computer vision



Deep Learning models

Our Implementation

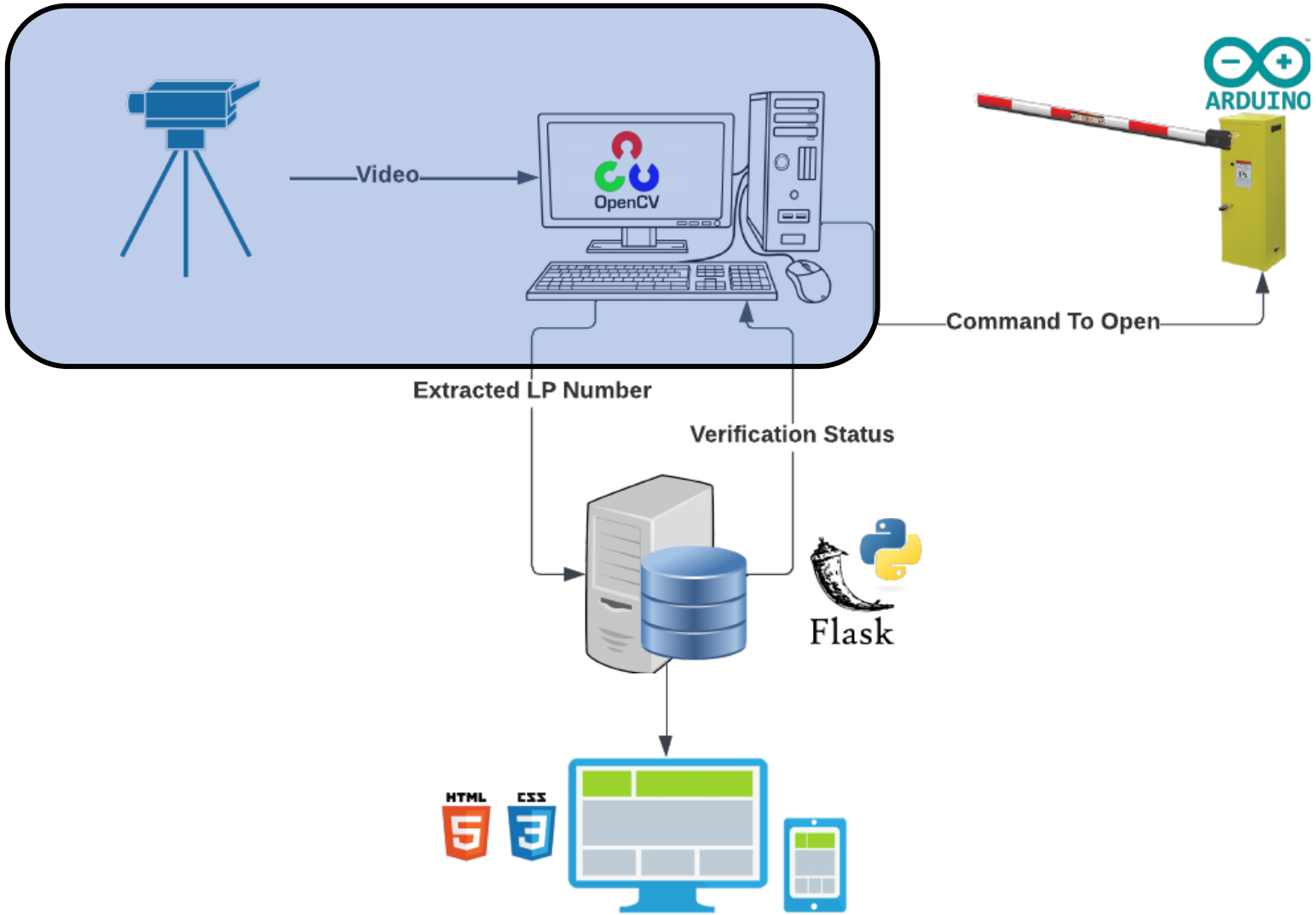
Computer Vision with OpenCV Python Library



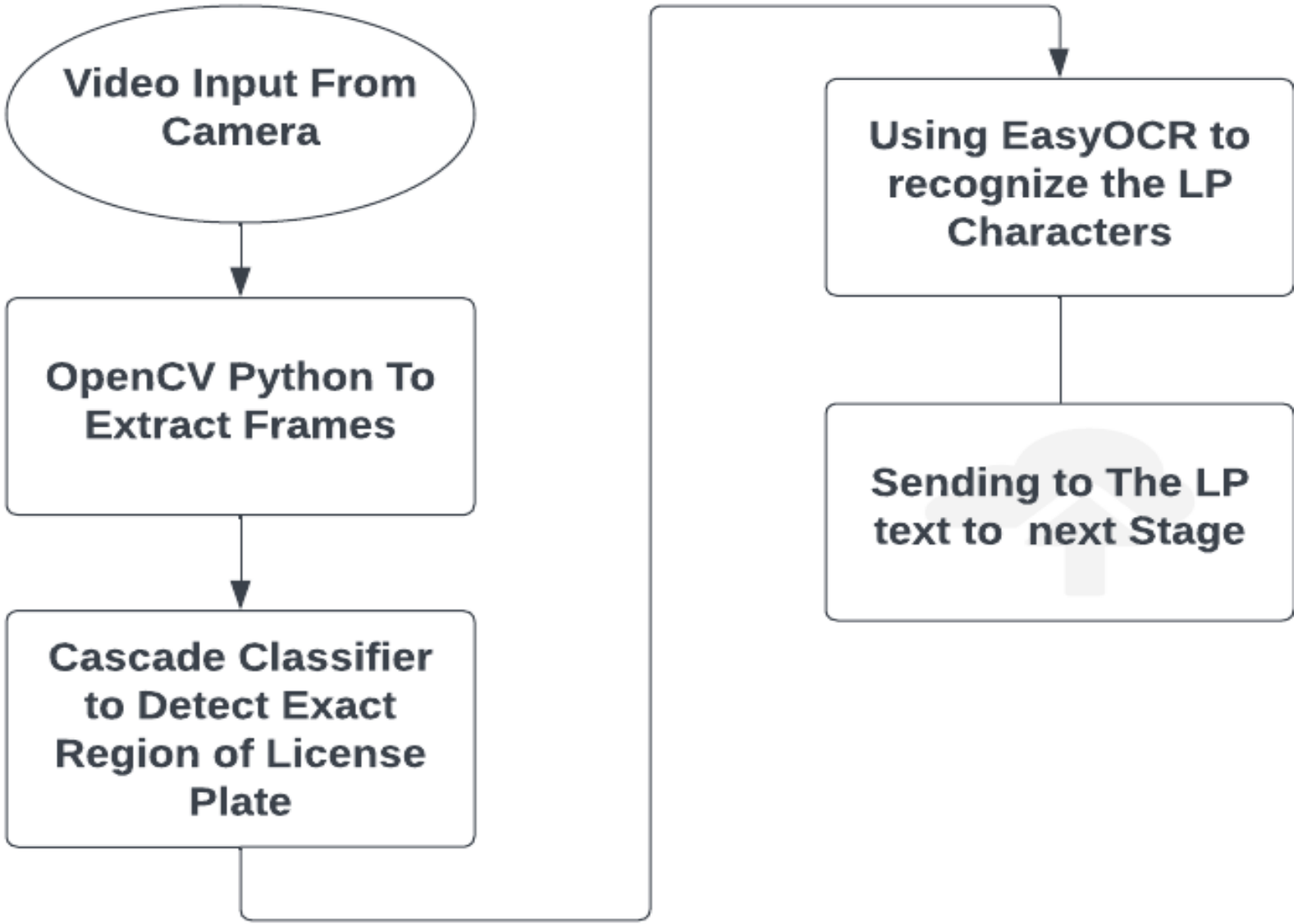
Cascade Classifier

EasyOCR Library

Location of The Section

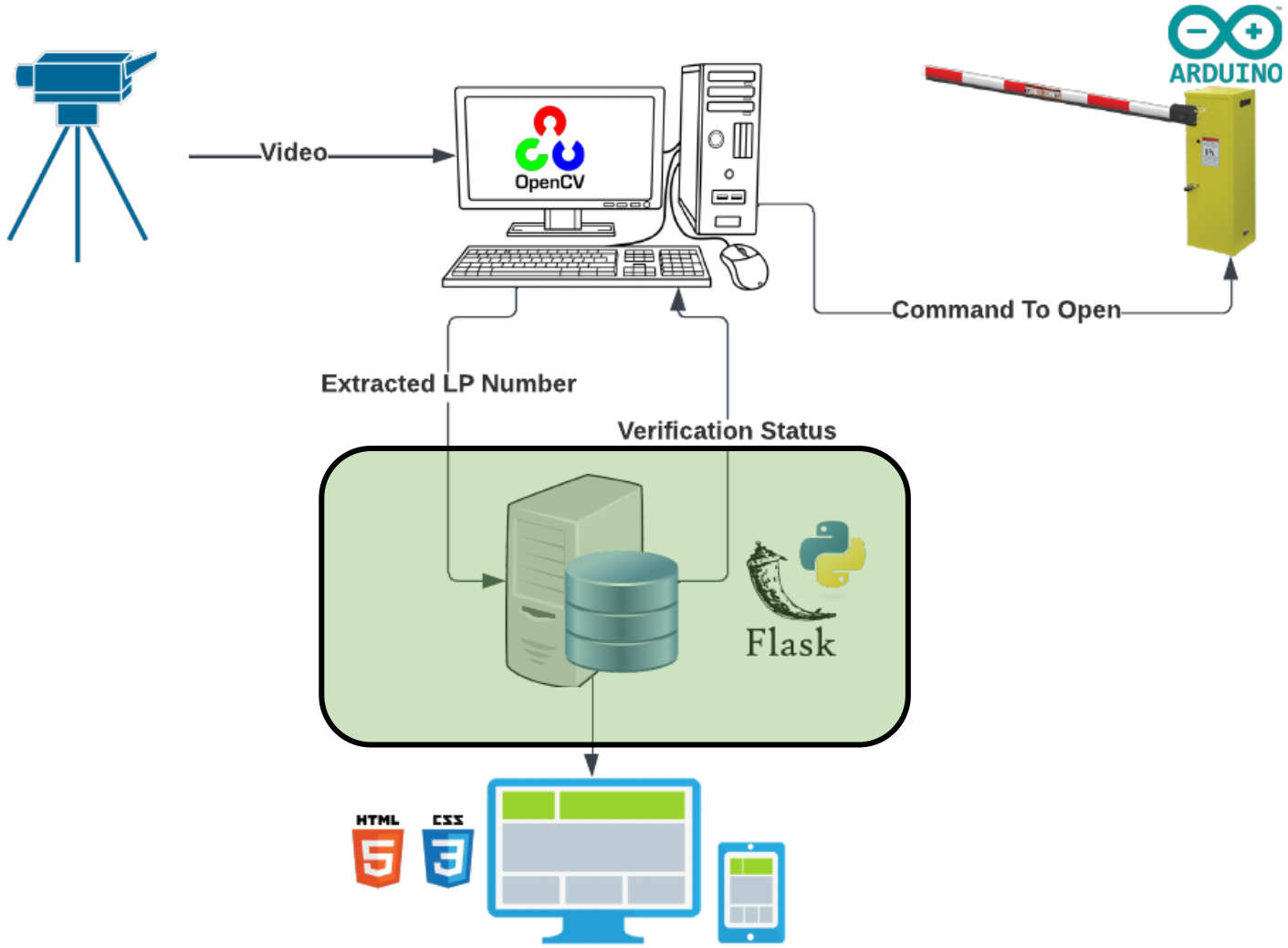


Flow Diagram For This Section



Billing

Location of the Section in Flow Diagram

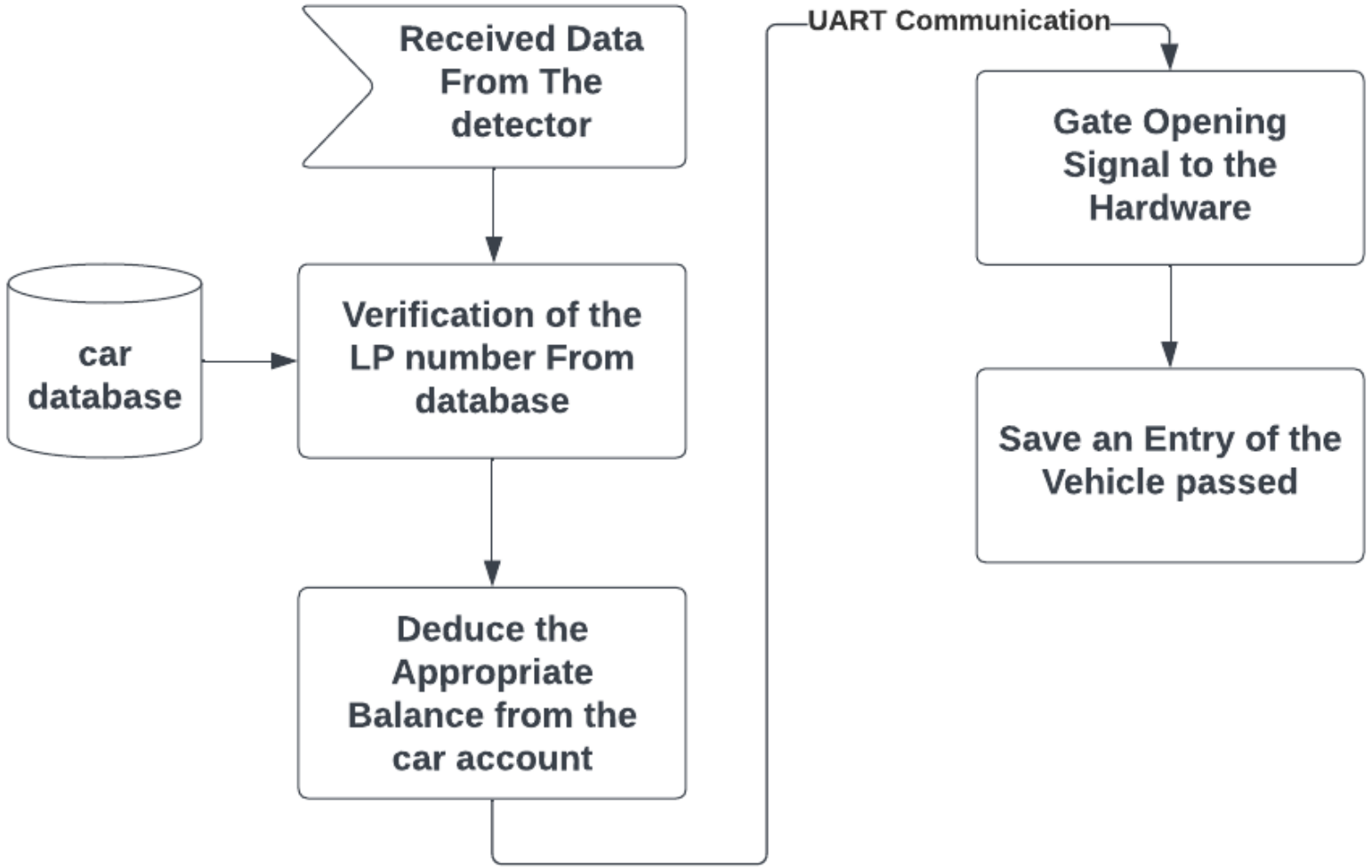


Used Tech Stacks

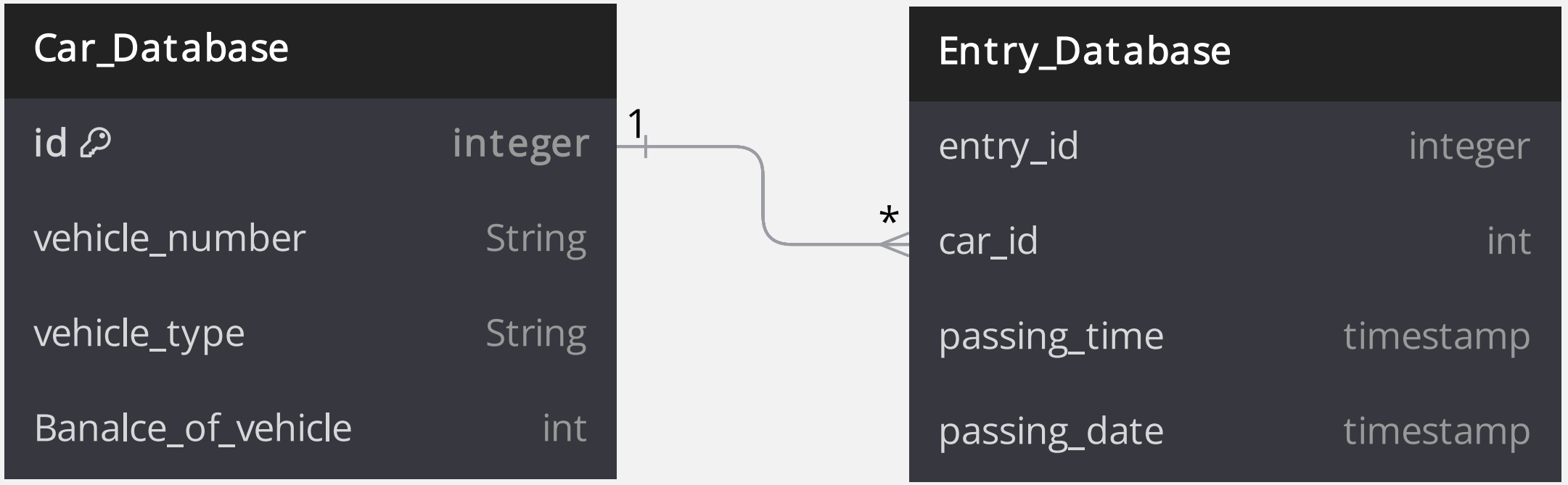
Python

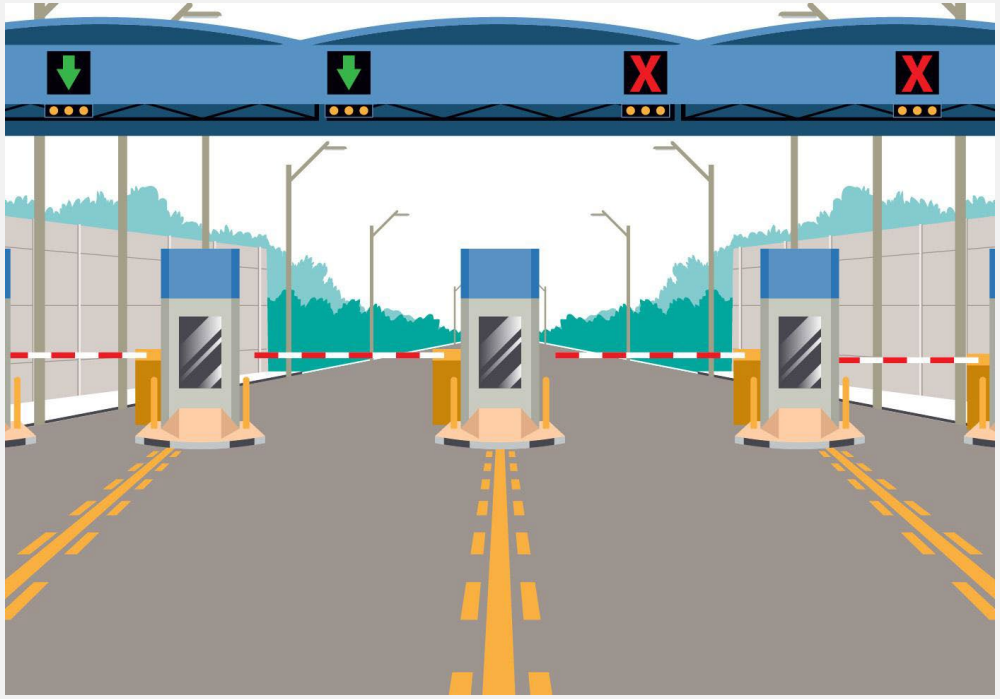
Flask Server

Flow Diagram of Tolling



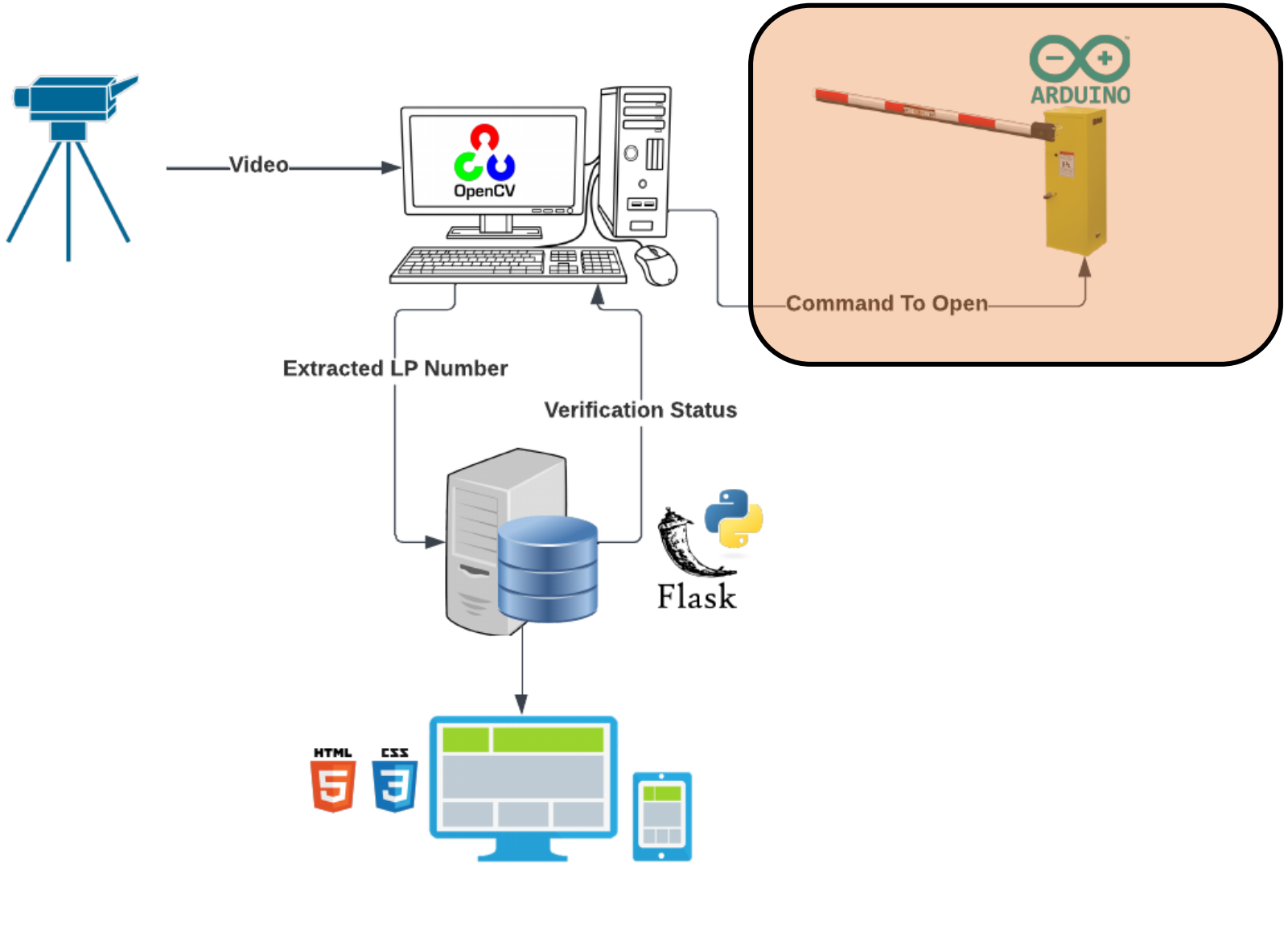
Data Structure





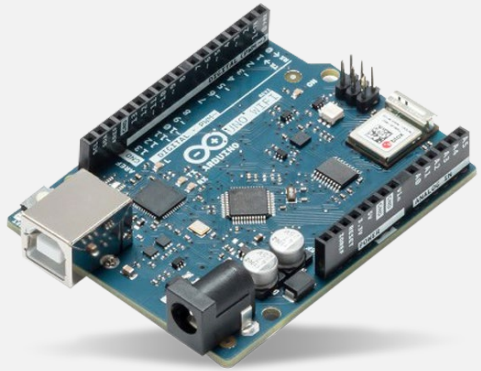
Traffic Flow control: Hardware part

Location of the Section



The Hardware's

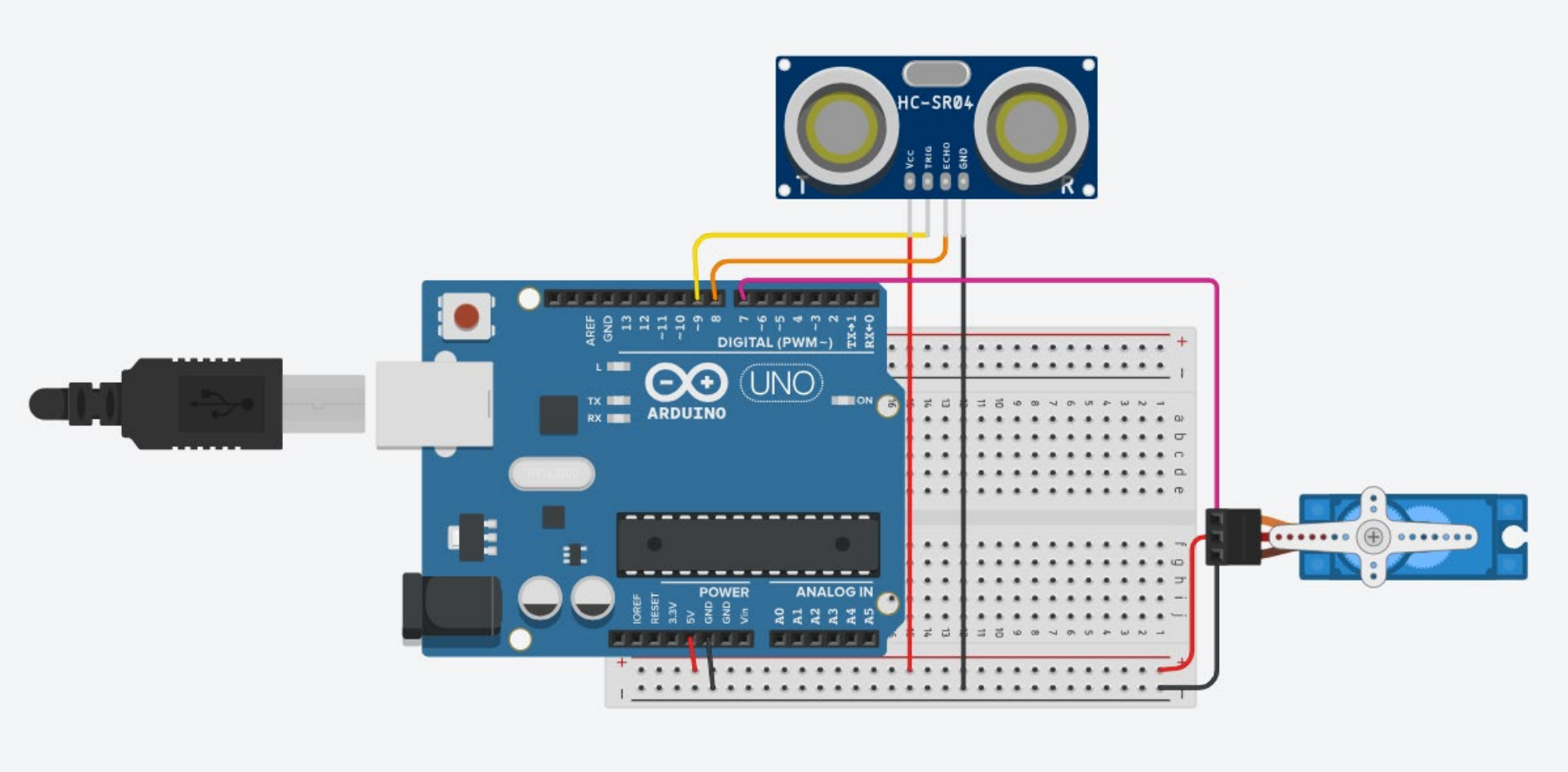
Arduino Uno



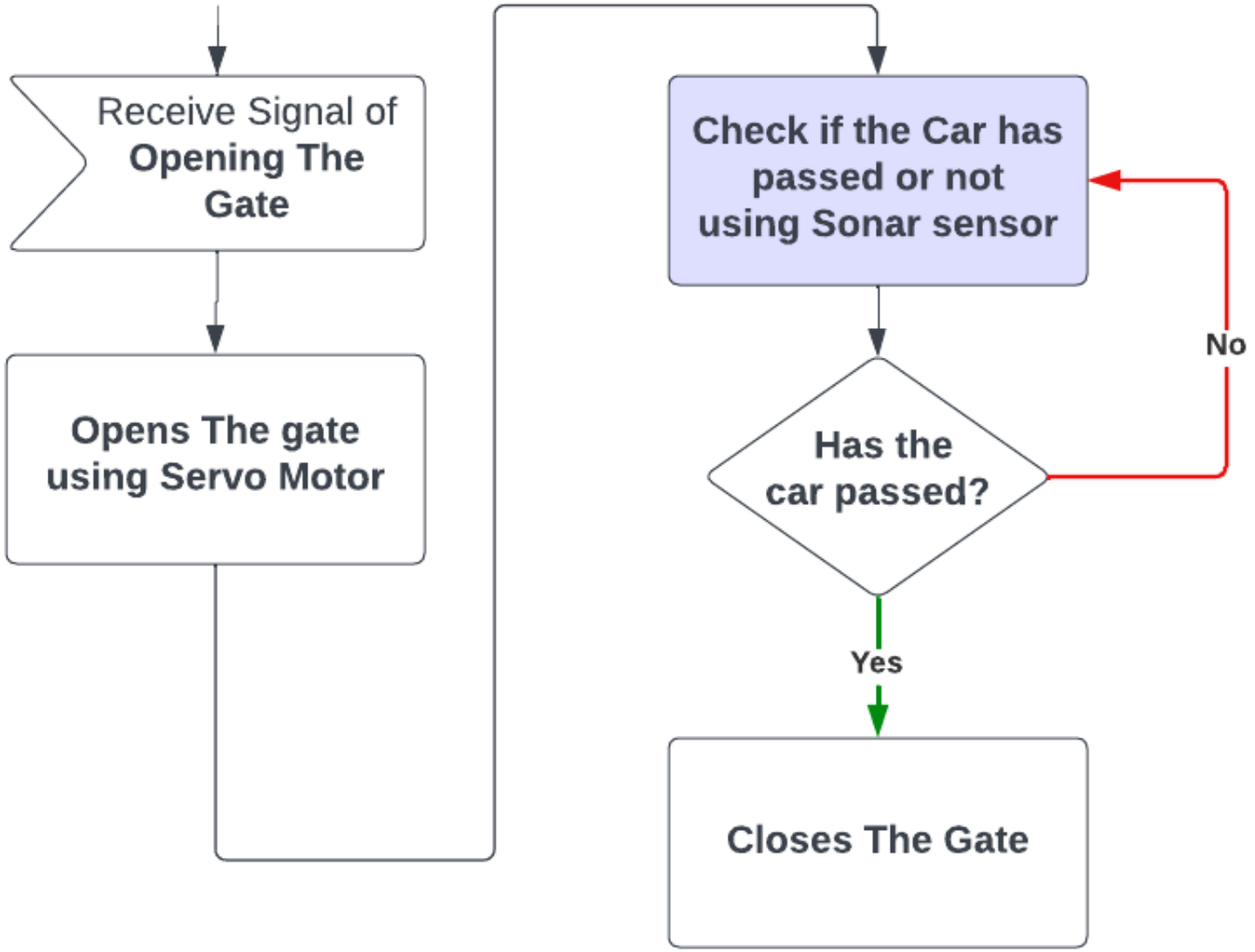
SG90 Servo Motor

HC-SR04 Sonar Sensor

The Hardware Setup

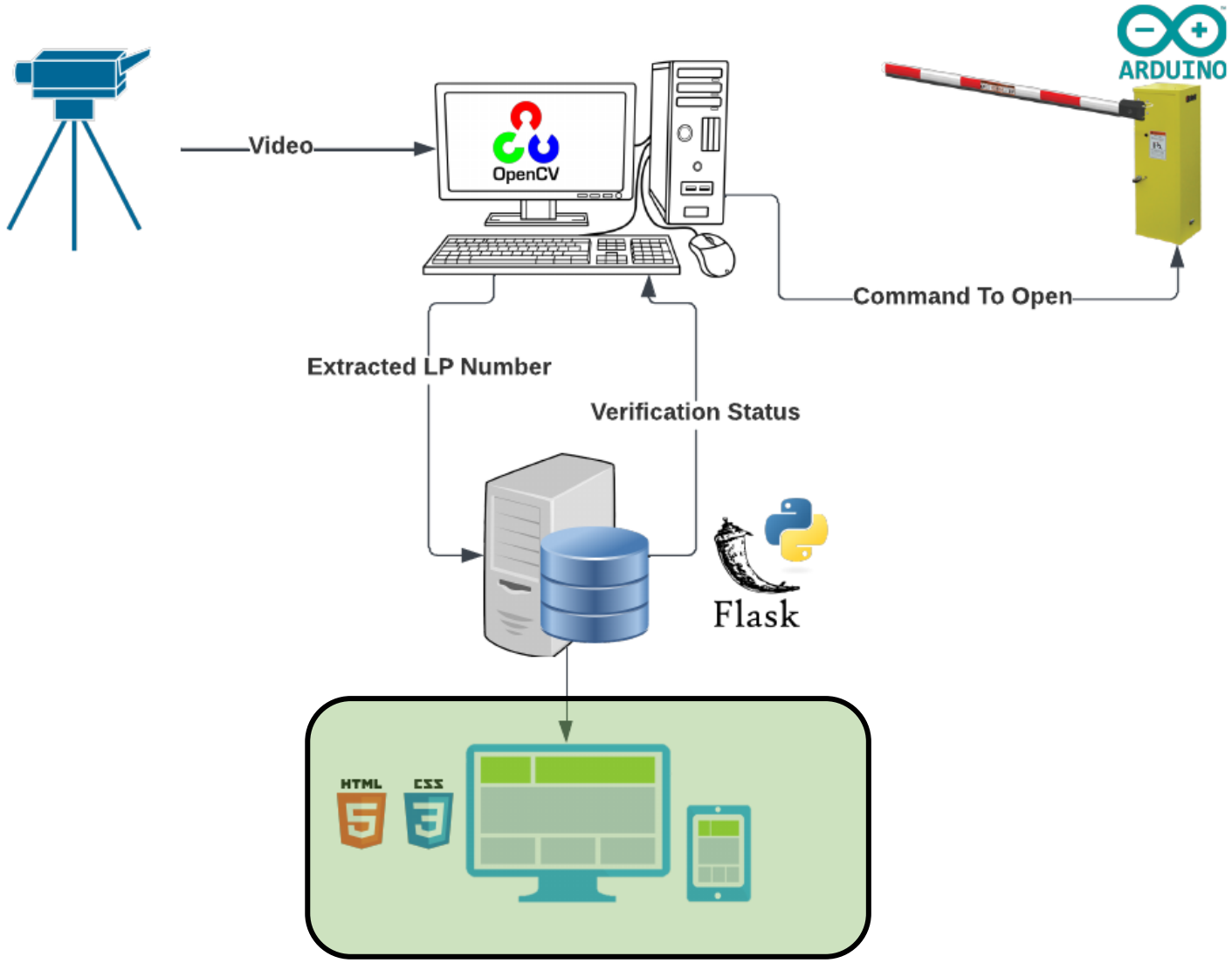


The Programming Logic

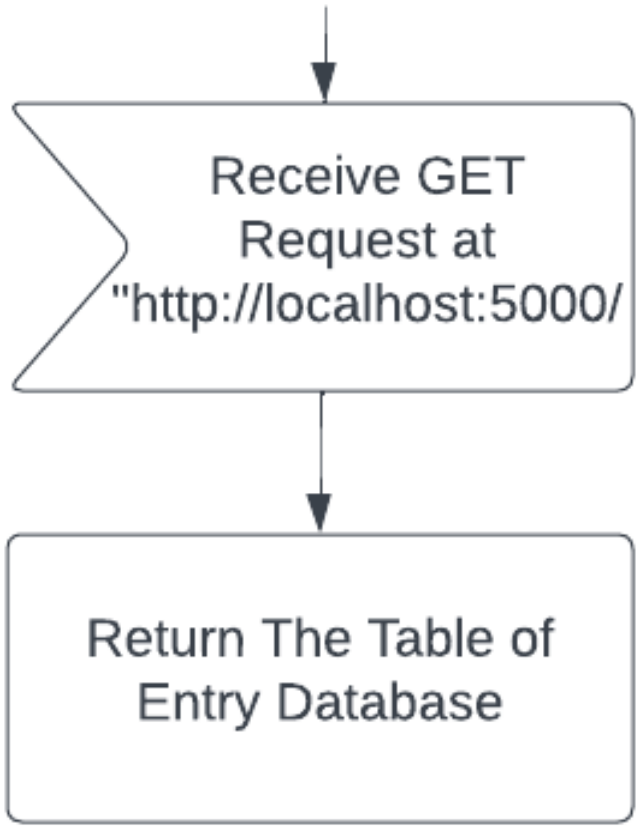


User Interface

Location of the Section in Flow Diagram



Diagram


Receive GET
Request at
"http://localhost:5000/
Return The Table of
Entry Database

Tech Stack

- Python
  - Using Flask In the Route of “/” we serve the Table of passed Cars
- HTML and CSS
  - To Make the Table

The Web Interface

List of Passed Cars

Car Number	Vehicle Type	Balance	Passing Date	Passing Time
AAE 225	heavy	5000	07/07/2023	22:35
AAE 015	light	4800	07/07/23	23:28
AAE 012	light	4700	07/07/23	23:29
AAE 011	light	4900	07/07/23	23:26
AAE 015	light	4800	07/07/23	23:28
AAE 012	light	4700	07/07/23	23:29
LPL-9012	heavy	4500	07/07/23	23:29
AAE 012	light	4700	07/07/23	23:29

Advantages

- ❑ Smart Process
- ❑ Saves Time
- ❑ Easy to Monitor and Use
- ❑ No Learning Curve for Users

Disadvantages

- Costly to setup
- Integration is Complex

Further Improvement Scopes

- Using a machine learning Model to Improve Accuracy
- Better encryption in communication
- Better interactive Web Interface
- Microcontroller-less Traffic Arm control

References

[1] A. Ashrafee, A. Mohammed Khan, M. Sabik Irbaz, and P. Alpha Ltd Abdullah Al Nasim, “Real- time Bangla License Plate Recognition System for Low Resource Video-based Applications.”

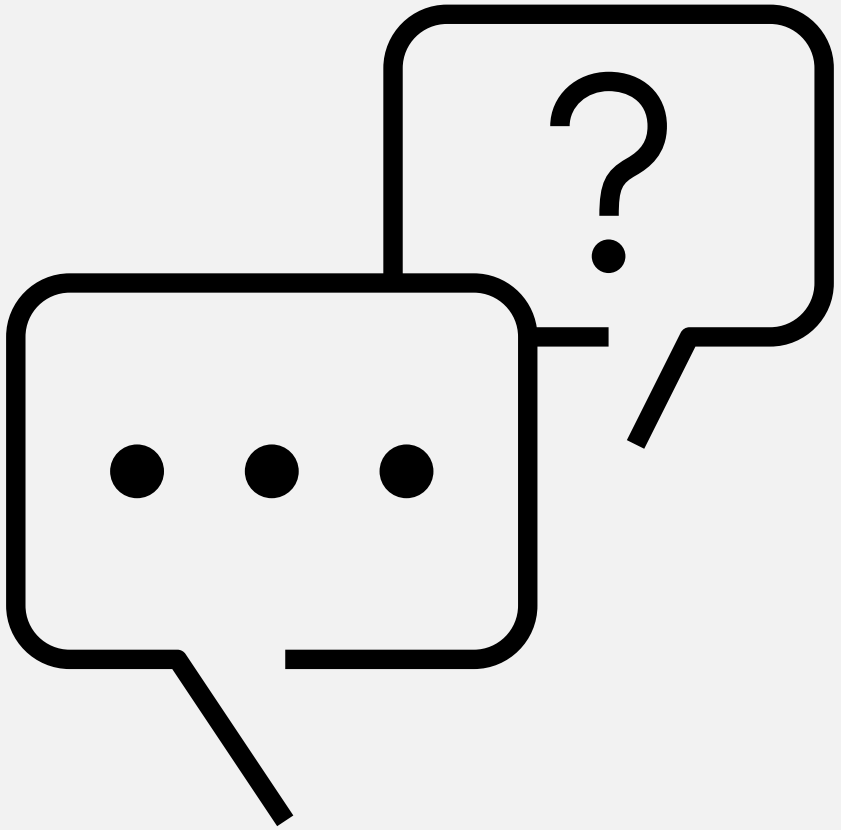
[2] ShutterStock.com

[3] https://www.youtube.com/watch?v=ltpnWBBT7NI&t=252s.

[4] https://github.com/entbappy/Car-Number-Plates-Detection

[5] chat.openai.com

Question Answer Section

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TASHAKKUR ATU
GRACIAS
SUKSAMA
ARIGATO
SHUKURIA
GOZAIMASHITA
EFCHARISTO
JUSPAXAR
GRAZIE
MEHRBANI
THANK
YOU
BÏYAN
SHUKRIA
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