**Software Requirements Specification (SRS) Document**

**Project Name: NeoEM**

**Team Name: 29**

**Members: Arushi Mittal, Meghna Mishra, Mihir Bani, Samay Kothari**

|  |  |
| --- | --- |
|  |  |

# **Brief problem statement**

NeoEM platform is designed to monitor road safety. It includes automated image recognition, computer vision programs, AI and ML methods for screening the vehicles, detection of registration plates (custom ANPR) for lane violations and other traffic violations. The software architecture enables automatic detection of other real time traffic violations. The details are recorded in real-time, flagged and stored for future applications.

# **System requirements**

C++, Python, Machine Learning, Embedded C/C++, VGG Image Annotator, YoloV5, Django REST API, React, SQL

# **Users profile**

The system will be used by the drivers of emergency vehicles such as ambulances, fire trucks, etc and law enforcement organizations such as police stations. The users do not require any familiarity, they just need to fit the device onto their vehicles.

GUI has two types of users: Admin and User. The admin is allowed to approve and view clips of various traffic violations along with other details such as location, license plate number, etc. Users can upload videos of the traffic violations.

**Feature requirements (described using use cases)**

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **User Case Name** | **Description** | **Release** |
| 1 | Automatic License Plate Detection | Detect license plates of vehicles and the registration numbers of the vehicles. | R1 |
| 2 | Automatic Traffic Violation Detection | Detect vehicles that violate any traffic rules. | R1 |
| 3 | Automatic Lane Blocking Detection System | Detect vehicles that block the path of emergency vehicles such as ambulances. | R1 |
| 4 | Store information and report | Uploading and reporting the video of the violations to authorities so they can take the required action. | R1 |
| 5 | Geotagging | Store the location of the traffic violation | R1 |
| 6 | Admin Register | Authorities can register as admin with admin rights. | R2 |
| 7 | User Register | People can register as user with user rights. | R2 |
| 8 | Login | Login functionality for admins and users | R2 |
| 9 | Admin: View dashboard | Admin can see all reported violations and details | R2 |
| 10 | User Upload page | Users can upload videos of suspected traffic violations | R2 |
| 11 | Admin: Search violations | Enables admin to search for violations with filters for type, date, locations, etc | R2 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Use case diagram**

(later)

**Use case description**

|  |  |
| --- | --- |
| **Use Case Number:** | UC-01 |
| **Use Case Name:** | Automatic License Plate Detection |
| **Overview:** | Detect license plates of vehicles and the registration numbers of the vehicles. |
| **Actors:** | The vehicles with the device installed. |
| **Pre condition:** | Image annotation and labeling, creation of Machine Learning model |
| **Flow:** | System must accurately detect the license plates and registration number |
|  | Alternate Flows: Ignore, if not able to capture the data from license plates. |
| **Post Condition:** | The numbers will be recorded and the vehicles details stored along with it |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-02 |
| **Use Case Name:** | Automatic Traffic Violation Detection |
| **Overview:** | Detect vehicles that violate any traffic rules. |
| **Actors:** | Vehicles with equipment installed. Law enforcement authorities |
| **Pre condition:** | The License plate detection system must function properly, and Model based on traffic rules violations |
| **Flow:** | Main (success) Flow:   1. Identification of violation of traffic rules. 2. Noting the license plate of the vehicle that violated rules. |
|  | Alternate Flows:  Ignore if no violations detected |
| **Post Condition:** | Saving the data recorded and sent for further features. |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-03 |
| **Use Case Name:** | Automatic Lane Blocking Detection System |
| **Overview:** | Detect vehicles that block the path of emergency vehicles such as ambulances. |
| **Actors:** | Emergency Systems |
| **Pre condition:** | Image recognition model should be trained, devices should be installed, license plate detections should work. |
| **Flow:** | Main (success) Flow:   1. Detecting the violation 2. Marking the specific vehicle in the video frame that committed the violation |
|  | Alternate Flows: Not storing the video clip since, if no violation detected |
| **Post Condition:** | Store the data to either local storage or cloud |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-04 |
| **Use Case Name:** | Store information and report. |
| **Overview:** | Uploading and reporting the video of the violations to authorities so they can take the required action. |
| **Actors:** | Vehicle drivers as well as law enforcement authorities. |
| **Pre condition:** | Devices should be installed on the vehicles.  The model should be trained and ready.  Videos must be recorded, labelled and processed. |
| **Flow:** | Main (success) Flow:   1. Uploading the labelled videos to cloud storage or saving locally. 2. Sending the data about violations, if any, to concerned authorities. |
|  |  |
| **Post Condition:** | The concerned authorities must have the data about the type and details of the violations which occurred. |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-06 |
| **Use Case Name:** | Admin register |
| **Overview:** | Registration of admin authorities of the city and storing them in the database |
| **Actors:** | Admins for the portal, police officials and others |
| **Pre condition:** | Email and username shouldn’t be existing already, password should be strong |
| **Flow:** | Main (success) Flow:  Enter the email, username, and password and role for the login |
|  | Alternate flow: Throw error for the respective errors |
| **Post Condition:** | Dashboard should show.  If Authentication done, then show the violations that the admin has rights to, for that particular area or city. |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-07 |
| **Use Case Name:** | User register |
| **Overview:** | User registration |
| **Actors:** | Users(citizens) |
| **Pre condition:** | Email and username shouldn’t be existing already, password should be strong |
| **Flow:** | Main (success) Flow:  Enter the email, username, and password and role for the login |
|  | Alternate flow: Throw error for the respective errors |
| **Post Condition:** | Dashboard should show.  If Authentication is done, then show the user dashboard and give him/her the rights to upload videos. |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-08 |
| **Use Case Name:** | Login |
| **Overview:** | Login functionality for admins and users |
| **Actors:** | Admins and Users |
| **Pre condition:** | Admin/User must already have finished registering. |
| **Flow:** | Main (success) Flow:   1. Entering the username and password. 2. Authentication of entered username and password. |
|  | Alternate Flows: |
| **Post Condition:** | Admin/User must be able to view their dashboard/upload page. |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-09 |
| **Use Case Name:** | Admin: View dashboard |
| **Overview:** | Admin can see all reported violations and details |
| **Actors:** | Admins |
| **Pre condition:** | Admin must already have finished registering or logging in. |
| **Flow:** | Main (success) Flow:   1. Admin can view the reported videos and either accept or reject them.. |
|  | Alternate Flows: |
| **Post Condition:** | The changes made by the Admin should be reflected in the dashboard and database. |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-10 |
| **Use Case Name:** | User Upload Page |
| **Overview:** | Users can upload videos of suspected traffic violations |
| **Actors:** | Drivers or bystanders who observe traffic violations and wish to report video evidence |
| **Pre condition:** | Users must have an account and be logged in to upload videos |
| **Flow:** | Main (success) flow:   1. Users can successfully upload videos 2. Videos and user information can be stored in a database |
| **Alternate Flow:** | Display error in case file exceeds size limit, or is not in a supported format |
| **Post Condition:** | Uploaded video is stored in the database for analysis and approval by admins. |

|  |  |
| --- | --- |
| **Use Case Number:** | UC-11 |
| **Use Case Name:** | Admin: Search Violations |
| **Overview:** | Enables admin to search for violations with filters for type, date, locations, etc |
| **Actors:** | Users logged in as admins |
| **Pre condition:** | Violations must be uploaded with fields tagged for type, date, locations, etc. |
| **Flow:** | Main (success) Flow:   1. Violations are presented with the correct values as specified by the admin. 2. In case of no results, this must be reflected on the GUI |
|  |  |
| **Post Condition:** | The admins must be able to access different violations shown n the search result. |