POLITECNICO DI MILANO 1863

SOFTWARE ENGINEERING 2 PROJECT

Requirement Analysis and Specification Document (RASD)

SafeStreets

Version 1.0

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Download page: https://github.com/TiberioG/GalbiatiRezaei.git

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1 Introduction

1.1 Purpose

1.1.1 Description of the given problem

SafeStreets is a crowd-sourced application that intends to provide users with the possibility to notify authorities when traffic violations occur, and in particular parking violations. The application allows users to send pictures of violations, including their date, time, and position, to authorities. Examples of violations are vehicles parked in the middle of bike lanes or in places reserved for people with disabilities, double parking etc.

SafeStreets stores the information provided by users, completing it with suitable meta-data every time it recieves a picture. In paricular it uses an external service which reads the license plate and stores the decoded string of the plate. Also it stores the type of the violation which is input by the user from a provided list. Lastly it stores the name of the street where the violation occurred which is retrieved from the geographical position where the user took the picture. In addition, the application allows both end users and authorities to mine the information that has been received. Two visualizations are offfered: the first is an interactive map where are highlighted with a gradient color the streets with the highest frequency of violations. The second is a list of the vehicles that committed the most violations.

In addition the app offers a service that creates automatically traffic tickets which can be approved and sent to citizens by the local police. This is done usind the data crowd-sourced by the users. The application guarantees that every picture used to generate a ticket has't been altered. In addition, the information about issued tickets is used to build statistics. Two kind of statistics are offered: a list of people who received the highest number of tickets and some trends of the issued tickets over time and the ratio of approved tickets over the violations reported.

1.1.2 Goals

[G1] Allow users to notify authorities about traffic violations

[G2] Allow users to send pictures with metadata of violations

[G3] Allow users to mine information recorded

[G4] Have at least two different priviledge for mining data

[G5] Generate traffic tickets

[G6] Generate statistics about issued tickets

[G7] Be sure every information uploaded is never altered

1.2 Scope

1.3 World and shared phenomena

Here are listed the phenomena related to the "machine" which means the software-to-be with the required working hardware and the "world" which is the real environment affected by the "machine". A phenomena can be shared by both machine and world if it's controlled by the world and observed by the machine or controlled by the machine and observed by the world.

Phenomenon	Shared	Who controls it
User wants to report a violation	N	W
User takes a picture	Y	M
The machine decodes the plate from the picture	Y	M
The user knows the reason why the veichle is in violation	N	W
The machine asks the user for the kind of violation	Y	M
The machine stores the violation reported	N	M
The user wants to see data visualization	N	W
The machine shows the data visualization	Y	M
The machine creates a ticket in the system	N	M
The machine checks any alteration of the picture	N	M
The authority user approves the ticket	Y	W
The authority user doesn't approve the ticket	Y	W
the authority sends the ticket to the offender	N	W

Table 1: World and Machine Table

1.4 Definitions, acronyms, abbreviations

1.4.1 Definitions

- Heatmap : A heatmap is a graphical representation of data that uses a system of color-coding to represent different values

- Enduser : a regular citizen whic will use the app

- Authority user : someone who's working for an authority like (police, municipality etc.) recognized

- Geocoding : the process of converting addresses (like a street address) into geographic coordinates (latitude and longitude)

- Reverse geocoding: the process of converting geographic coordinates into a human-readable address

1.4.2 Acronyms

- ALPR : Automated Licence Plate Recognition

- GUI : Graphical User Interface

- GDPR : EU General Data Protection Regulation

- API : Application Programming Interface

1.4.3 Abbreviations

1.5 Revision history

This is the first released version 10/11/2019.

1.6 Reference Documents

References

[1] OpenALPR Technology Inc. , OpenALPR documentation http://doc.openalpr.com

[2] Ministero delle infrastrutture e dei Trasporti, DECRETO LEGISLATIVO 30 aprile 1992, n. 285 Nuovo codice della strada, https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato: decreto.legislativo:1992-04-30;285!vig=

[3] GOOGLE inc, Google Maps Platform Documentation | Geocoding https://developers. google.com/maps/documentation/geocoding/start

[4] GOOGLE inc, Google Maps Platform Documentation | Heatmap https://developers. google.com/maps/documentation/javascript/heatmaplayer

1.7 Document Structure

2 Overall Description

2.1 Product perspective

2.1.1 Class Diagram

The following class diagram is a high-level class diaram which should be intended as a model of the application structure. During the implementation part more classes and attributes can be created and used.

User This class is the father of the two possible kind of users: **EndUser** and **Authority** which are needed because our application is intended to be multi-user and with at least two privileges for data that can be viewed and possible functions accessible.

Location Every user is in a **Location** class used to represent the location as latitude and longitude coming from the OS of the smartphone.

Reverse Geocoding This interface is used to communicate with the external Geocoding service to get a readable address from the coordinates as explained in section 2.4.2.

Violation This class is used to store all the data related to the reported violation. The *kind* attribute is selected by the user from a list of possible kind of violations in the form section as explained in [UC4b] . The photo is here reported as an attribute but can also be implemented as a separate class. It's mandatory that one and only one picture is associated to every violation. In the **Violation** class we store also the raw latitude and longitude in case there will be need of those data later, as an example if it's imposssible get precise location using reverse geocoding.

ALPR This interface is needed to interact with the external ALPR service which receives a picture and returns a string containing every licence plate found in the picture. This interface is used to complete the attribute *licence plate* of every violation.

MinedInfo Classes **MinedSteets** and **MinedOffenders** are used to represent the data coming from the database of all violation and processed to offer different kind of visualizations.

Heat Map visualizer This interface is used to communicate with the external service providing a map of streets with an overlay highliting the spots where violation occurred.

Ticket This class is used to represent the ticket with the fine for the owners of violationg veichles. Every instance will be automatically creadted by the system, using data coming from the instances of the **Violation** class. This data has to be combined with data from some authority database eg. the database of all registered veichels plates, the database of violation sof the traffic law . The attribute *valid* is a boolean value, set by the class **CheckValidity** TRUE if the picture associated to the correspinding violation has't been altered. Otherwise the ticket is considered not valid, and the attribute is set to FALSE. The attributes *kind violation*, *violation street*, *violation street numb licence plate*, *dateviolation* are copied from the instnces of **Violation**. The attributes *amount* and *date payment due* are filled by the connection with the external authority database containing the amount of money to be paid for every fine and the standard deadline for payment. The attribute *Offender name* and *Offender surname* are used to store the identity of the owner of the veichle, these should be filled knowing the plate and quering the external licence plate registration database.

Figure 1: High-level Class Diagram

Statistics   The classes **StatsOffenders** and **StatsTrends** are used to represent the data about the issued ticket and used for visualizations.

CheckValidity   Is a class used to check if the picture taken has been altered or not. I's either possible to directly implement this functionality or use an external service.

2.2   Product functions

2.2.1   Report violation

The main function of SafeStreets is allowing users to report traffic violations, in particular when parking violations occour. User will be required to take a picture of the veichle responsible of the violation ad select the kind of violation.

Once opened, the app the will show on display the camera recording mode in order to start reporting the violation by taking the picture. Some alerts will appear reminding the user he has to include the plate of the veichle and the violation must be visible.

2.2.2   Explore Data

The app will offer the possibility to the users to visualize the data collected. Two kind of visualizations are offered:

1. Heatmap of streets where most violations occurred

2. Vehicles that committed the most violations

In order to get those data the system will periodically query the database of violations in order to create a table where the count of violation is stored, both for streets and vehicles. There will be a section in the app called "Explore Data" where will be able to choose which kind of data to visualize.

2.2.3   Issue a ticket

This function is used to create tikets to send fines to the owners of veichles which have been reported by SfeStreets. Every time a new violation is inserted in the database the System will use the new data available to generate a proposal of ticket, combining the data from violations with data coming from Municipality databases.

A ticket has the following structure:

1. Place where violation occurred

2. Date when violation occurred

3. Plate of veichle

4. Article and code of violation

5. Amount to be paid

6. Date when the payment is due

Place, date, plate are data coming from the instances of Violation class. To create a complete ticket we need to associate the kind of violation to an article and code of the traffic legislation.

An external service or a code writted ad hoc will be used to check if the picture has been modified. If the result of this check is positive the ticket just created will be flagged as *valid* and
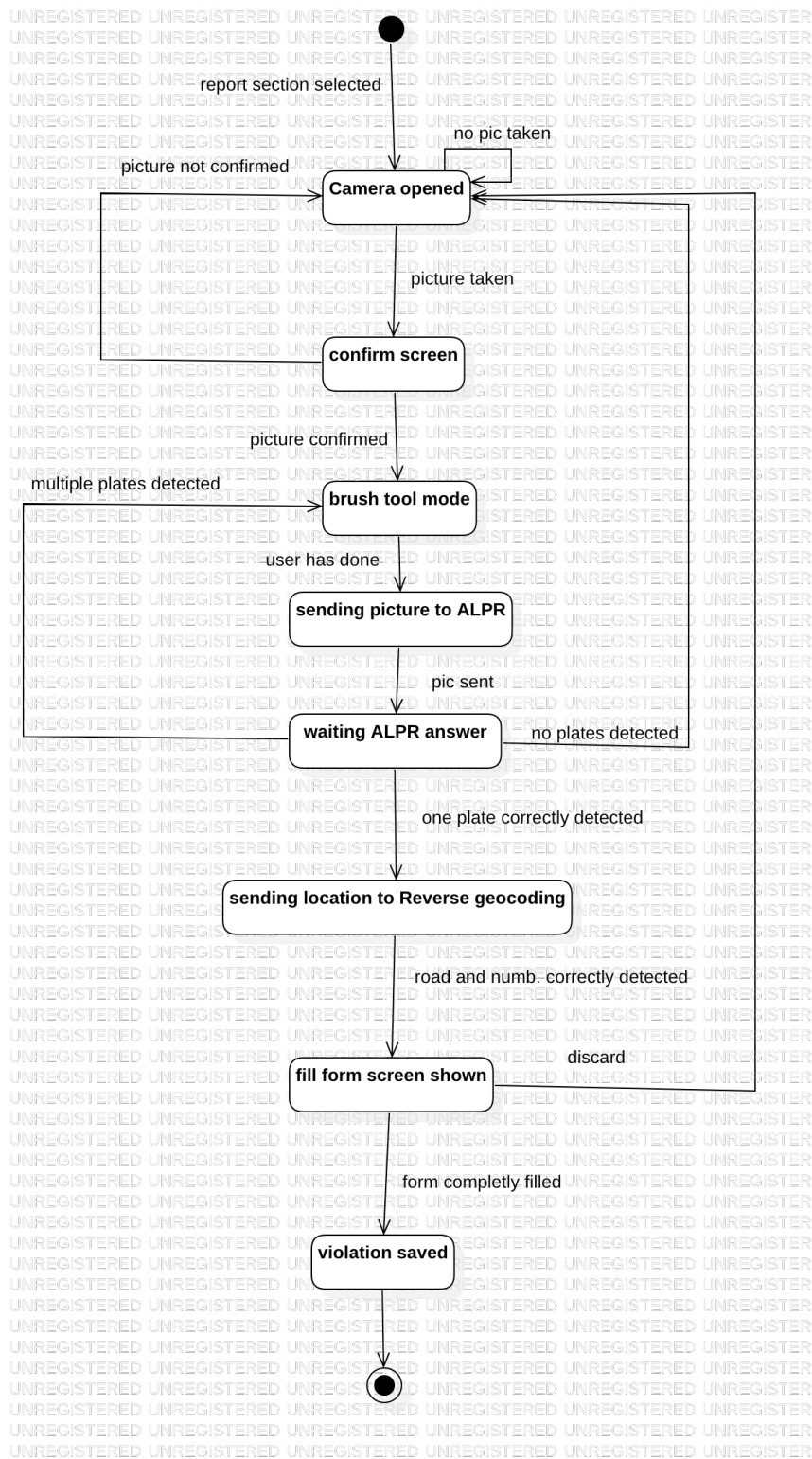
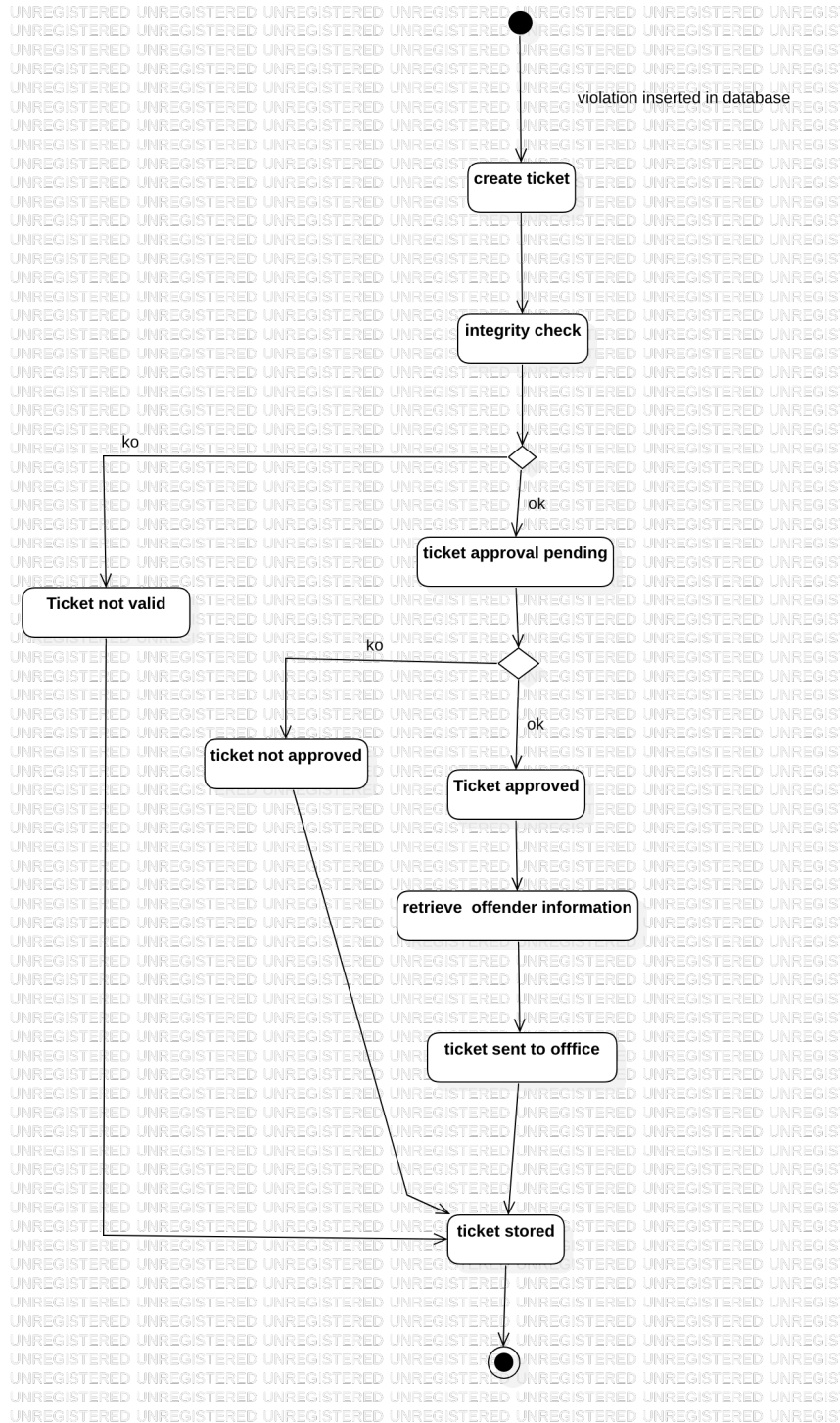Figure 2: Violation reporting state diagram

Figure 3: Tickets creation and approval state diagram

will go in ticket approval state. In any other case, if the picture has been modified, the ticket is stored as *not valid* for debug purposes. Exaples of possible uses can be: bulding statistics or investigate if there are users who are trying to cheat or create spam violations.

If a ticket is considered valid, the next state is pending-approval status. Authority users (e.g. policemen) will check manually the pending-approval tickets reading all data before the approval. We have chosen to add this human control before sending the fine because every ticket should be signed by authorities. If ticket is not approved it will go in approval-denied status and will be stored for debug purposes and for statistics.

If ticket has been approved it will have to be sent to the offender. The system will connect to the external vehicle registration database in order to retrieve the name, surname, address of the offender knowing the licence plate of his/her vehicle. Now we have all the data to print the ticket and send it via regular mail. There will be an office of police-station which will do the job.

2.2.4   Ticket statistics

This function has the purpose to show

Two kind of visualizations are offered:

1. List of offenders with highest number of tickets emitted

2. Trends of emitted tickets

The first visulaization will be available only to authorities. In a section of the app it will be possible to see for each citizen who has ever received a ticket, the count of those ticket received, in descending order. Note that this is different compared to the other visulization "veichels that committed the highest number of vioations" explained in section 2. In this ticket statistic view we are considering only emitted tickets and we are aggregating all tickets of a specific citizen. Actually in case a citizen he has multiple veichles, here we are countin all the tickets emitted for all of his veichles.

2.3   User characteristics

2.4   Assumptions, dependencies and constraints

2.4.1   Domain assumptions

[D1] Device has a working internet connection

[D2] Device has a camera accessible via software

[D3] The device should acquire position with an accuracy of enouth meters in order to univocally determine the road (e.g. 5 meters)

[D4] We have access to an ALPR service which is able to read every licence plate in a picture and return each of them as a string

[D5] ALPR service has an accuracy of more than 95%

[D6] The device should take pictures with enough resolution to be able to read by the ALPR service

[D7] Every vehicle that can be reported should have a licence plate visible

[D8] The number and kind of violations should be finite (defined by the law)

[D9] Every authority account is verified and it's not possible to be created using the front end

[D10] We have access to the vehicle registration database where are stored licence plates, names and the addresses of the owners of every vehicle registered

[D11] We have access to a database where are stored all the codes of violations and the amount of fine for the violation

[D12] The only way to upload pictures of violation is thuough the application

2.4.2 Dependencies

Since we're creating a mobile app, the main dependency is to have a smartphone, which has to provide the following features:

1. Internet connection, possibly using 2G/3G/4G in order to be available where there is no WiFi, considering the use case "on the road"

2. A camera with good resolution

3. GPS sensor

Also there is need to use some external software or APIs :

- ALPR service : the app will be dependent on a third-party service to read the licence plate of the cars like the open source OpenALPR [1]

- Reverse Geocoding: the app will be dependent on some maps API to get the full address, knowing the coordinates of location coming fromm the GPS of the device. An example of this service is Google Maps API [3]

- Map and Heatmap : The app will be dependent to some Maps API used to show the map and an overlay. An example of this service is Google Maps API [4]

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3 Specific Requirements

3.1 External Interface Requirements

This section provides a detailed description of all inputs and outputs from the system. It also gives a description of the hardware, software and communication interfaces and provides basic prototypes of the user interface.

3.1.1 User Interfaces

In this section we present the mockups of the GUI.

Figure 4 shows the login page where it's possible to access the registration form for new users.

Figure 4: [GUI] Login screen

After login the user will enter by default into the first tab "Report", see Figure 5, where is shown what the camera is recording and the user can start taking the picture of the violation. For the first time a user logs in some banner can appear showing each function of the app. Also we show on the screen some useful reminders about how the picture to be submitted should be.

Figure 5: [GUI] Report | open camera view

After the picture has been taken, the apps shows it as in Figure 6 and a "brush tool" will appear, which can be used to cover any other plate appearing in the picture, not related to the veichle being reported.

Figure 6: [GUI] Report | picture of violation taken screen

Figure 7 shows how appears the form where the user has to select the kind of violation he is rporting from a scroll-down list. Each row has an info button, when pressed the GUI will show a verbal description of the violation related.
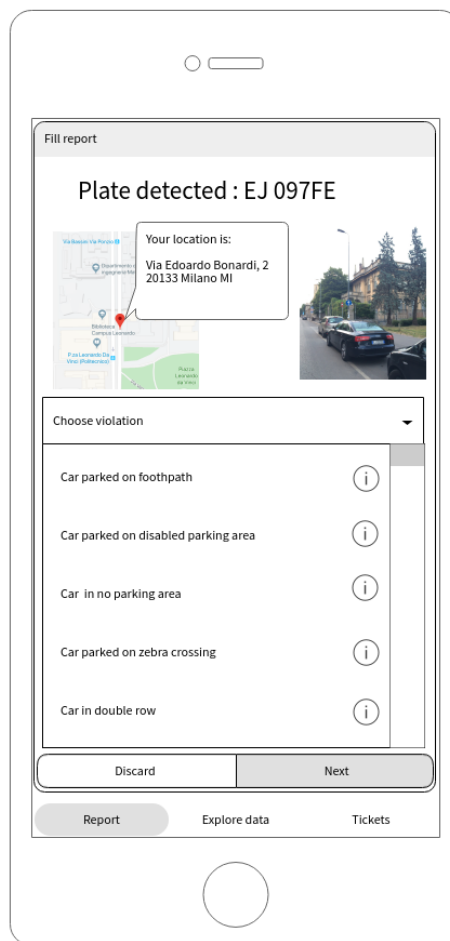
Figure 7: [GUI] Report | violation info form screen

Figure 8 shows the view of the plates which have committed the highest number of violations.

Figure 8: [GUI] Explore data screen | offenders

Figure 9 shows the view of the heatmap, with a map generated by the external API with the colored overlay which represents the number of violation occurred.

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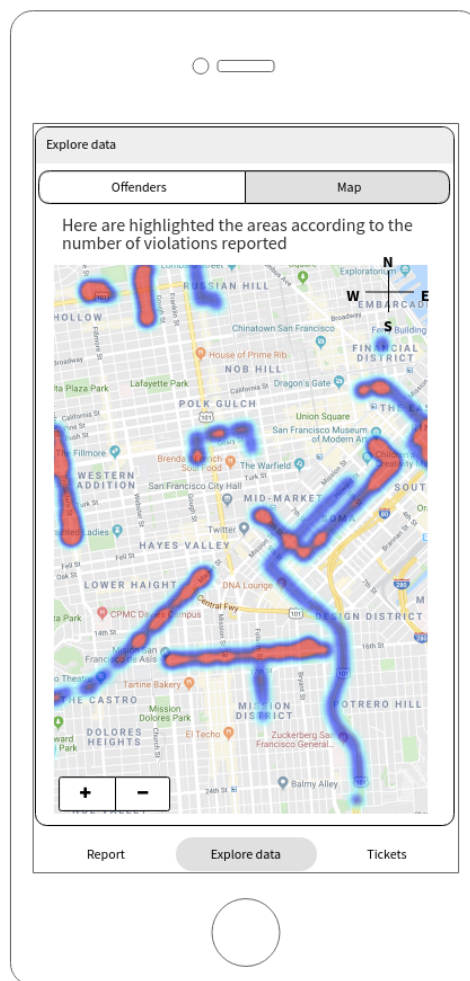
Figure 9: [GUI] Explore data | heatmap

Figure 10 shows the interface only available to Authority Users where are listed all the tickets that are pending for approval. For each ticket all the key informations are sgown: picture, location, plate, code of the violation.
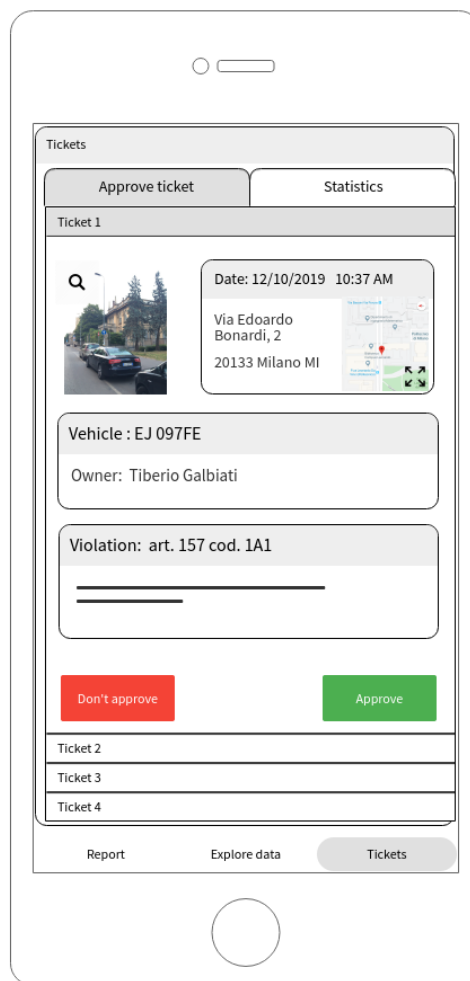
Figure 10: [GUI] Ticket | approval screen

3.1.2 Hardware Interfaces

there is no need to have hardware interfaces since we are developing a mobile application with a server side. Iternet connection, GPS, and camera are all managed by the OS of the smartphone where the application will run.

3.1.3 Software Interfaces

3.1.4 Communication Interfaces

3.2 Functional Requirements

The functional requirements are those which are the fundamental actions of the system. Here we present for every goal a list of related requirements and domain assumption. Evrey function shoud work olnly after succesful login.

- **[G1] Allow users to notify authorities about traffic violations**

  [D1] Device has a working internet connection

[D8] The number and kind of violations should be finite (defined by the law)

[R1] User must be able to choose the kind of violation from a list

[R2] User must be able to read detailed information about each kind of violation he can report

- **[G2] Allow users to send pictures with metadata of violations**

[D2] Device has a camera accessible via software

[D3] The device should acquire position with an accuracy of enouth meters in order to univocally determine the road (e.g. 5 meters)

[D4] We have access to an ALPR service which is able to read every licence plate in a picture and return each of them as a string

[D5] ALPR service has an accuracy of more than 95%

[D6] The device should take pictures with enough resolution to be able to read by the ALPR service

[D7] Every vehicle that can be reported should have a licence plate visible

[R3] Date, time and position should be automatically added to the violation reported

[R4] We should require the user to send again a picture in case the plate is not visible

[R5] The user must be able to select the veichle to report in case there are other veichles in picture

[R6] Application must automatically determine the street name where User is

- **[G3] Allow users to mine information recorded**

[R7] Application must be able to count occurrency of violations

[R8] Application must be able to count violation for each veichle

[R9] Application should show the all the veichles ordered with the number of violations

[R10] Application should visualize the areas where violation occurred

[R11] Application must use a gradient of color to show the occurrencies of violations as an overlay of a interactive map

- **[G4] Have at least two different priviledge for mining data**

[D9] Every authority account is verified and it's not possible to be created using the front end

[R12] Regular endusers can see the list of veichles with the highest number of violations but they cannot see the actual licence plate, instead of that a generic identifier is shown

[R13] Authority users can know the exact licence plate when mining data about offenders

[R14] Only authority users can access the ticket approval section

- **[G5] Generate traffic tickets**

[D10] We have access to the vehicle registration database where are stored licence plates, names and the addresses of the owners of every vehicle registered

[D11] We have access to a database where are stored all the codes of violations and the amount of fine for the violation

[R15] Application must be able to read every violation stored and automatically generate a ticket

[R16] application showld offer to authorities the possibility to approve tickets or not

- **[G6] Generate statistics about issued tickets**

[R17] Application must store all the tickets created

[R18] Application must read all the history of tickets created

- **[G7] Be sure every information uploaded is never altered**

[D12] The only way to upload pictures of violation is thuough the application

[R19] The application must be able to know if a picture has been altered

[R20] If a picture has been altered the applcation must automatically flag as not valid the corresponding ticket

3.2.1   Use Cases diagrams

Here are presented the use case diagrams for each main function. In the next section each use case will be verbally presented.
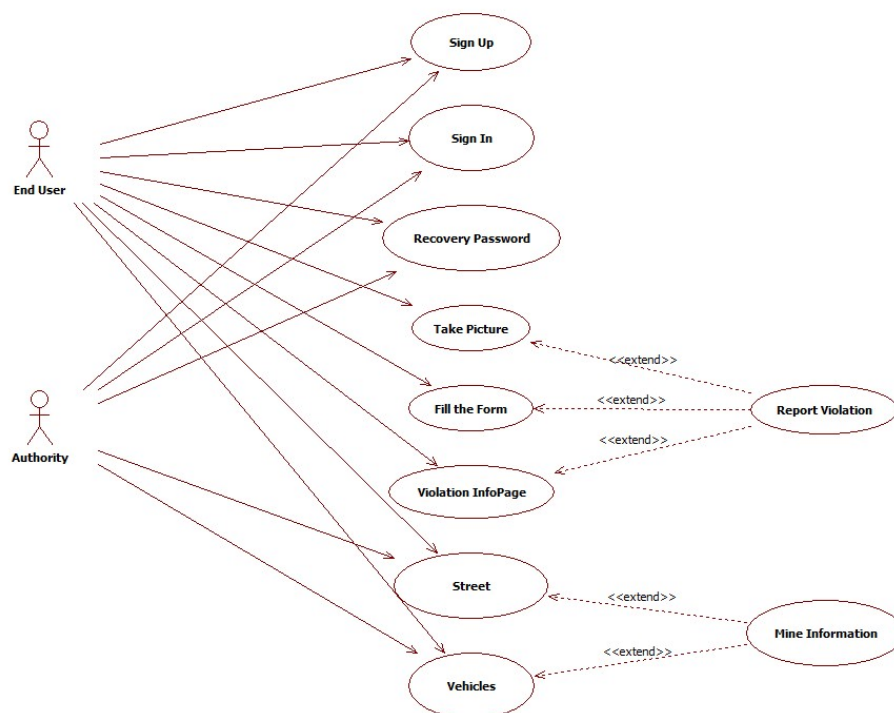
Figure 11: [GUI] Basic service use case diagram
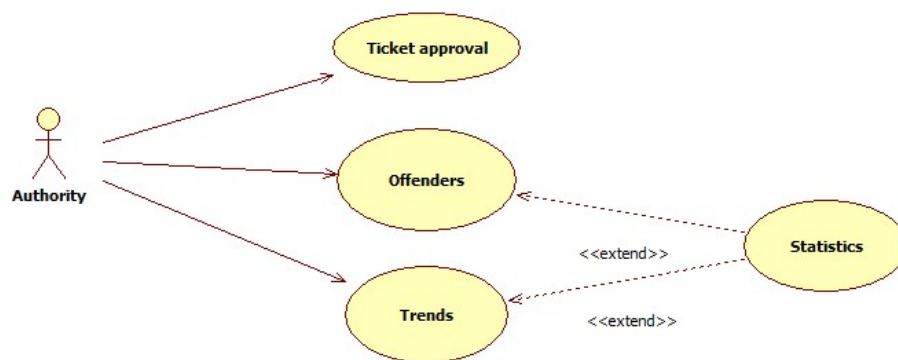
Figure 12: [GUI] Advanced function use case diagram

3.2.2 Use Cases Description

In the following section a description of each use case is provided. For every use case is reported: an ID defining each case, the entry conditions, the steps to accomplish the exit condition and any exception that may occur.

ID: [UC1]
Name: Sign-Up
Actor: Guest
Entry conditions:

1. A citizen who wants to use the service

Event flow:

1. The guest reaches the registration page containing the relative form

2. The guest fills up the form and clicks on "Sign up" to complete the process

3. The system redirects the user to his profile page and sends a confirmation email

Exit conditions:

- The guest has successfully registered in the system

Exceptions:

1. The guest left an empty field or typed something wrong an error message is displayed and theuser is asked to fill the form again.

ID: [UC2]
Name: Login
Actor: User
Entry conditions:

1. The user has already registered

Event flow:

1. The user reaches the login page containing the relative form

2. The user types the username and password in the login form and click on "Login" button

3. The system redirects the user to the application homepage

Exit conditions:

- The user has access to the application functionalities

Exceptions:

1. Username and password didn't correspond or the username didn't exist, an error message isdisplayed and the user is asked to fill the login form again

---

ID: [UC3]
Name: Recover Password
Actor: User
Entry conditions:

1. The user has already registered

Event flow:

1. The user reaches the login page containing the relative form

2. The user clicks on "Password recovery" button and is redirected to the password recovery page.

3. The user inserts his email and clicks on "reset password"

4. The system sends an email to the user with a link and instruction to reset the password

5. The user chooses and types a new password and confirms

6. The application check whether the entered password is strong enough or not

7. The system redirects the user to the login page

Exit conditions:

- The user has changed his password

Exceptions:

1. The inserted email doesn't match any user in the database, it is displayed an error mes-sageand the user is asked to retype a valid email.

ID: [UC4a]
Name: Report a violation - taking picture
Actor: User
Entry conditions:

1. User is logged in

Event flow:

1. User enters the section "Report a violation"

2. System opens the camera of smartphone and ask user to take a picture of the violation

3. The system reminds the user that violation and the licence plate of the veichle which is inviolation must be visible

4. The user takes the picture

5. The system shows the picture just taken

6. The system asks the user: if there are other plates visible in the picture, which are not the oneof the veichle to be reported, use the finger to delete them

7. The system enters in "brush tool mode" and the user covers the other licence plates

8. When done, user press continue button

9. The system sends the picture to the ALPR service which returns the string containing the platedecoded

10. The system shows now on the screen the "report vioaltion form"

Exit conditions:

1. User must continue to next [UC4b]

Exceptions:

1. If no plate is found, the user has to repeat this use case, starting from taking the picture again

2. If the ALPR service returns more than one plate, the user is informed that must delete the notrequired plates and the system goes agin to the "brush tool mode"

3. If user doesn't continue to the next use case: e.g. presses exit button, or closes the app formore than 10 minutes, the picture taken is discarded

---

ID: [UC4b]
Name: Report a violation - fill the form
Actor: User
Entry conditions:

1. User has successfully completed the precedent [UC4a]

2. User is in the fill-form section of the app

Event flow:

1. The system sends GPS location to the external service to get the complete address of the user

2. the form is pre-filled with the address that is given by the external service

3. The user must choose from a list of violations the one referred to the picture taken which wantsto report. In the UI every row contains the name of the violation and a "info" button

4. the user can choose to send the form or exit

Exit conditions:

1. The violation is correctly inserted and stored

Exceptions:

ID: [UC4b1]
Name: Report a violation - fill the form - violation infopage
Actor: User
Entry conditions:

1. User is in Use case [UC4b]

2. User has pressed the "info" button of a violation from the list

Event flow:

1. System shows a brief decriprion of the selected violation

Exit conditions:

1. User goes back to Use case [UC4b]

Exceptions:

ID: [UC5a]
Name: Mine information - street heatmap
Actor: User
Entry conditions:

1. User is logged in

Event flow:

1. User enters the section "Explore data"

2. The user chooses to get the map about streets with highest frequency of violations

3. The system retrieves data from the database of violations, counting for each street the number of occurrencies

4. The system sends to the external maps API the count of violation and the road name

5. The app shows the map with an overlay which higlights the areas with a gradient color according to the number of vioations occurred

Exit conditions:

User wants to go back to "Explore data" area **Exceptions**:

1. If there are no records the app will report no data available message

---

ID: [UC5b]
Name: Mine information by Authority - offenders
Actor: AuthorityUser
Entry conditions:

1. AuthorityUser is logged in

Event flow:

1. AuthorityUser enters the section "Explore data"

2. The system asks which kind of data the AuthorityUser wants to know

3. The AuthorityUser chooses to get the data about veichles that committed the highest number of violations

4. The system queries the table where for each licence plate is associated the count of violations

5. The system will report in a tabular way the plate of the veichle and the count of violations committed

6. If the AuthorityUser scrolls down, the system will offer the chance to load more rows

Exit conditions:

1. AuthorityUser wants to go back to "Explore data" area

Exceptions:

1. If there are no records the app will report no data available message

---

ID: [UC5c]
Name: Mine information by EndUser - offenders
Actor: EndUsers
Entry conditions:

1. User is logged in

Event flow:

1. User enters the section "Explore data"

2. The system asks which kind of data the user wants to know

3. The User chooses to get the data about veichles that committed the highest number of violations

4. The system queries the table where for each licence plate is associated the count of violations

5. the System associates an anonymized sequential identifier to each plate

6. The system will report in a tabular way the identifier of the veichle and the count of violations

7. If the User scrolls down the system will offer the chance to load more rows

Exit conditions:

1. User wants to go back to "Explore data" area

Exceptions:

1. If there are no records the app will report no data available message

---

Advanced function
ID: [UC6]
Name: Ticket approval
Actor: AuthorityUser
Entry conditions:

1. A new violation is inserted in database

2. AuthorityUser logged in

Event flow:

1. Every time a new violation is created by a EndUser the system will create automatically a ticket to be approved

2. AuthorityUser enters the section "Tickets"

3. AuthorityUser enters the section "Approve Tickets"

4. The System will show the list of tickets available for approval

5. AuthorityUser selects one tiket and system will show the related details

6. System will ask the AuthorityUser if he wants to approve or not the ticket

Exit conditions:

1. User wants to go back to "Ticket" area

2. AuthorityUser approves the ticket

3. AuthorityUser doesn't approve the ticket

Exceptions:

1. If there are no tickets pending, the app will report no data available message

---

ID: [UC5]
Name: Ticket statistics selection
Actor: AuthorityUser
Entry conditions:

1. AuthorityUser logged in

Event flow:

1. AuthorityUser enters the section "ticket statistics"

2. The system will show the available ticket statisics options available to show

Exit conditions:

1. the AuthorityUser chooses the kind of statistics he wants to see

Exceptions:

ID: [UC5]
Name: Statistics - offenders
Actor: AuthorityUser
Entry conditions:

1. AuthorityUser logged in

2. AuthorityUser has selected to see the statistics about offenders

Event flow:

1. The system queries the table about all tickets, getting the count of tickets associated to every citizen present in the database of ticket created

2. The system will report in a tabular way the name of the citizen and the count of approved tickets he has received

3. If the AuthorityUser scrolls down, the system will offer the chance to load more rows

Exit conditions:

1. the AuthorityUser wants to go back to other sections

Exceptions:

ID: [UC5]
Name: Statistics - trends
Actor: AuthorityUser
Entry conditions:

1. AuthorityUser logged in

2. AuthorityUser has chosen to see the Statistics - trend option

Event flow:

1.

2.

Exit conditions:

Exceptions:

3.2.3 Requirements traceability matrix

Requirement	Use Case
[R1]	[UC4b]
[R2]	[UC4b1]
[R3]	[UC4b]
[R4]	[UC4a]
[R5]	[UC4a]
[R6]	[UC4b]
[R7]	[UC5a]
[R8]	[UC5b] [UC5c]
[R9]	[UC5b] [UC5c]
[R10]	[UC5a]
[R11]	[UC5a]
[R12]	[UC]
[R13]	[UC]
[R14]	[UC]
[R15]	[UC]
[R16]	[UC]
[R17]	[UC]
[R18]	[UC5a]
[R19]	[UC5a]
[R20]	[UC5a]

Table 2: Traceability matrix

3.3 Performance Requirements

3.4 Design Constraints

3.4.1 Standards compliance

The app shoudld be available for the two main operating systems of smartphones: Android Os and Apple iOS.

3.4.2 Hardware limitations

The app will have a server side and a client side (smartphone). On server side limitations can be the size of available storage and the bandwidth. On smartphone side we have the network connectivity (3G/4G connection) and GPS limitations in some areas.

3.4.3 Any other constraint

Application should be compliant to European GDPR.
The traffic violations which can be reported should be compliant to the local traffic code where the app will be used.
For an use in Italy the app should be compliant to the "Codice della Strada", in particular parking violations are reported in Art. 157.

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3.5 Software System Attributes

3.5.1 Simple User Interface

The user interface has to be as simple and intuitive as possible, the application should allow an average user to set up an account and start using the application understanding its functionality in no more than a dozen minutes. In addition there should be a complete tutorial to makes it easy using the application.

3.5.2 Reliability

The application provides a reliable service in which individual users can easily log in and report the violations in the most optimal way. Furthermore it Warranties that the chain of custody of the information coming from the users is never broken, and the information is never altered. This would provide a secure and reliable system. In addition, if the license plate is not readable from the picture the application should warn the user to send an other photo.

3.5.3 Availability

The application must offer the maximum availability, granting its service every day at any time (24/7). The lack of service must be minimal.Reporting violation and taking the information about the vioalation coming from SafeStreets must be active every day at any time. The lack of service is acceptable only if it is due to maintenance. In this case, users must receive a warning 48 hours before.

3.5.4 Security

The application need to be safe and it does not have particular security concerns except the ones related to unauthorized login. The login of Users and especially of authorities must be very safe to avoid reporting. Moreover, the means of communication must be encrypted to save the confidentiality of information sent to SafeStreets.

3.5.5 Maintainability

The application will be maintained and designed in such a way it makes it easier to maintain and it should be understandable for both the users and the authorities. Furthermore, the system will put e ort in keeping the live data services (such as highlighting the streets with the highest frequency of violations or the vehicles that commit the most violation) always online.

3.5.6 Portability

Portability of user data from a device to another is possible by entering personal login data. Also the application will be able to run for devices with different operating systems.

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