

POLITECNICO DI MILANO



Academic Year 2019/2020

RASD

Requirements Analysis and Specification Document

version 1.0 – 10/11/2019

Computer Science and Engineering
Software Engineering 2

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1 Introduction

1.1 Purpose

1.1.1 Project Description

SafeStreets wants to develop a software-based service that allows individual users to report traffic violation. Those data consist in pictures of violation, type of violation, date, time and position. When a picture is upload, the system runs an algorithm in order to read the license plate. Finally, all those data are store in SafeStreets' databases.

The system allows also authorities registration, who can receive notifications about new violations in a certain area. When a notification occurs, an authority can reserve it taking charge of that violation.

Both users and authorities can access to collected data in order to analyze the streets and the relative safeness. However, a user can only access to anonymized data clusters, that give an idea of how many violations occur in each area; whereas authorities can also access to specific anonymized data.

Another service that SafeStreets wants to develop, in partnership with the municipalities, is an algorithm that can cross-reference data provided by the users with the accidents data provided by the municipalities, in order to identify unsafe areas and suggest possible interventions.

1.1.2 Goals

Users:

[G.U1] Users can report traffic violations.

[G.U2] Users can view a data clustering about violations that had occurred.

Authorities:

[G.A1] Authorities should choose to receive anonymous notifications in real time about new violations.

[G.A2] Authorities should reserve a violation.

[G.A3] Authorities can view both data clustering and specific data about violations that had occurred.

Municipalities:

[G.M1] Municipalities can identify potential unsafe zone and receive suggestions about possible solutions.

1.2 Scope

1.2.1 World

There are three main types of actors in our world: users, authorities and municipalities. Users are interested in reporting traffic violations and receiving information about violations in certain areas, authorities and municipalities are interested in exploiting the data gathered from the users: the firsts want to get notified when new violations occur in order to generate traffic tickets, the seconds want to identify unsafe zones and to receive possible solution.

SafeStreets is the service that acts as a bridge between these actors' needs.

system ← da definire meglio

1.2.2 Phenomena

Phenomena that occur in the world and that are related to the system application domain are:

- Traffic violations occur in a city;
- An authority makes traffic tickets;
- Authorities, users and municipalities are interested in analyzing violation data;
- Municipality wants to reduce the number of accidents.

The system shares also some events with the world in order to communicate with it. The phenomena that occur in the world and are observed by the machine are:

- Login and registration ???
- A user fills and sends a new violation;
- An authority activates notifications;
- An authority searches a violation (on a list);
- An authority reserves a violation;
- User/authority filters mined data;
- User/authority views mined data ???
- Municipality views the unsafe zones;
- Municipality views suggestion for reducing accidents

On the other hand, the aspects generated by the machine and observed by the world are:

- The system localizes users/authorities on the map;
- The system receives and confirms some data (report, login etc.);
- The system generates a notification about new violations;
- The system creates suggestion for reducing accidents;
- The system renders mined data graphically.

1.3 Definitions, acronyms, abbreviations

1.3.1 Definitions

<i>Users</i>	Citizen who can report a traffic violation and view a data clustering about violations that had occurred.
<i>Authority</i>	Recognized entity which can empower the law (ex. local police).
<i>Municipality</i>	Authority recognized by the State who hold the government in an area.
<i>Data clustering</i>	A set of anonymous data about violations group by location and type.
<i>Specific violation / violation data</i>	Information about a violation. Contains: photos, location, type of violation, license plate, date and time.
<i>Traffic violation</i>	Illegal action performs by any vehicle (ex. double parking, stopped on zebra cross).
<i>Accident</i>	Traffic violation result in an injury for at least one person.
<i>Unsafe zone</i>	Area of the city where accidents happens frequently.

1.3.2 Acronyms

<i>API</i>	Application Programming Interface
<i>GPS</i>	Global Positioning System
<i>S2B</i>	Software to Be
<i>UI</i>	User Interface
<i>IEEE</i>	Institute of Electrical and Electronics Engineers
<i>DB</i>	Database

1.3.3 Abbreviations

- $[G.U_n]$ Users' n^{th} goal;
- $[G.A_n]$ Authorities' n^{th} goal;

[G.M_n] Municipalities' nth goal;

[D.n] Nth domain assumption;

[R.n] Nth requirement;

[R.M_n] Municipalities' nth requirement;

1.4 Reference Documents

Specification document: "SafeStreets Mandatory Project Assignment"

IEEE 830-1993 - IEEE Recommended Practice for Software Requirements Specifications

1.5 Document Structure

According to the IEEE standards for requirement analysis documents, this document is composed into 5 sections, organised as follow:

Section 1 gives a short introduction to the project; giving a clear idea of who are the actors and what are the goals of the S2B;

Section 2 defines the main functions of the project, analysing the constraints and declaring the assumptions;

Section 3 is the most important part of the RASD: it

Sez 1. → Breve riassunto del progetto da sviluppare. Fornisce un'idea chiara degli attori, dei goal da raggiungere.

Sez 2. → Definisce le funzioni principali del progetto, I suoi vincoli (limitazioni fisiche o di progettazione), le assunzioni fatte

Sez 3. → Analisi di requisiti, scenari,

Sez 4. → Modello alloy sviluppato per provare la correttezza del progetto

Sez 5. → Tempo speso da ciascun partecipante

2 Overall Description

2.1 Assumption, dependences, constrains

2.1.1 Domain Assumption

- [D.1] All traffic violations data are correctly encoded.
- [D.2] Every license plate is unique and identify uniquely a vehicle.
- [D.3] Every authority's personal ID is unique and identify uniquely an authority.
- [D.4] An authority reserving a violation will take care of it.
- [D.5] The image scanning algorithm can always read the license plate.
- [D.6] Municipality has a digital database about accidents.
- [D.7] Accident data are provided by location.
- [D.8] Users will only send pictures about violations.

2.1.2 Dependences

SafeStreets relies on:

- Geo-location services, to access users' location.
- Image scanning algorithm, for read data from violation's photos.
- Municipality's API, in order to access accident's DB.

2.1.3 Constrains

Regulation policies

SafeStreets allow users to report independently traffic violations, so SafeStreets assumes no responsibility in event of wrong violation.

SafeStreets provide only suggestion to municipality in order to reduce accidents and violations, so SafeStreets doesn't ensure the efficacy.

The system will have to ask for users' permission in order to retrieve and use their positions without storing them.

Email addresses won't be used for commercial uses.

Hardware limitation

In order to work properly the system requires:

- EDGE/3G/4G/5G connection
- iOS or Android smartphone
- GPS/Glonass/Galileo service

Municipalities also require:

- Modern browser, we recommend Chrome

Requirements: **IN GIALLO QUELLI DA RIFARE**

- [R.1] The system shall allow user registration.
- [R.2] The system shall allow authority registration.
- [R.3] The system shall distinguish users and authorities accounts.
- [R.4] The system shall guarantee unique account for the same login credentials.
- [R.5] The system shall allow users, authorities and municipality to access their account only if they provide correct username and password.
- [R.6] The system shall allow users, authorities and municipalities to access SafeStreets' functionalities only after the login.
- [R.7] The system shall allow a user to upload violation data.**
- [R.8] The system shall read automatically the license plate from the photos uploaded.
- [R.9] The system shall add automatically the location of a new report through the GPS information.
- [R.10] The system shall store internally the data.
- [R.11] Once data is store, the system shall not erase it.
- [R.12] When a violation is reported, the system shall be able to generate a real time push notification to all authorities which have enable them in the area where the violation occurred.
- [R.13] The system shall never show the user who report a particular violation.
- [R.14] The system shall allow authority to choose to receive push notifications regarding new violations affecting a given geographical area.**
- [R.15] The system shall allow an authority to access all the details about a violation.**
- [R.16] The system shall not allow a user to access all the details about a violation.
- [R.17] The system shall allow an authority to reserve a violation.**
- [R.18] The system shall allow authorities to know which violations have been reserved.

[R.19] The system shall be able to mine data, clustering them according to different parameter, like geographical area or violation type.

[R.20] The system shall provide to users and authorities an interface able to render mined data graphically, allowing filter like geographical area or violation type.

[R.21] The system shall provide to authorities an interface where are listed all the violation.

Municipality requirements:

[R.M1] The system shall allow municipalities to contact SafeStreets in order to make a partnership.

[R.M2] The system shall be able to access to accident data of the municipality using the API provided.

[R.M3] The system shall be able to integrate accident data of the municipality with SafeStreets' DB matching the location.

[R.M4] The system shall be able to mine the integrated data in order to find the unsafe zone.

[R.M5] The system shall be able to find correlation between accidents and violations.

[R.M6] The system shall provide to municipality an interface able to render mined data graphically in order to highlight the unsafe zones.

[R.M7] The system shall be able to generate suggestions to reduce the correlation between accidents and violations.

Date	Falconi	Galli	Theme
23/10	1	2	Problem analysis
24/10	3	1.5	Goals and definitions
25/10	3	1.5	UI Design 2.4 paragraph
26/10	3	3	UI Design Requirement