PowerEnJoy
Software Engineering II

Requirements Analysis and Specification Document

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Contents

Section 1

Introduction

1.1 Purpose

The Requirement Analysis and Specification Document for the *PowerEnJoy* digital management system is intended to describe the system itself, the functional and non-functional requirements, its components as well as its constraints and the relationship with the real world and the users by providing several use cases and scenarios. Furthermore part of the documentation makes use of Alloy, a language for describing structures and a tool for exploring them, and gives a formal specification of some features of the system to be.

This document establishes some baselines for the project planning, its estimation and evaluation and it may be legally binding; it is mainly addressed to developers and programmers, who have to implement the requirements, testers, who have to determine whether the requirements have been met, project managers, who control the development process and - last but not least - users, who validate the system goals.

1.2 Scope

The product is a digital management system to support a car-sharing service that exclusively employs electric cars.

The system consists of a back-end server application that manages rental requests remotely and two front-end applications, a web-based one to provide the final user with a friendly interface to take advantage of the services of *PowerEnJoy* and the one that runs on embedded on-board computers of each vehicle, used to interact with the car itself, unlock it and access a personalized GPS/sat-nav service. Moreover, the system will include a mobile application

that allows the user to easily access the service anywhere he/she needs to.

The system is intended for only one type of user: drivers, who should be allowed to register and access the system via username and password, in order to make the renting and payment processes easier and quicker to carry out. Moreover, the system aids the users by locating nearby available vehicles and keeps track of the distance driven, all while notifying them about the amount of money they are being charged. Predefined safe parking areas are signaled by an on-board computer.

Lastly, the system aims to motivate drivers to maintain a virtuous behavior providing discounts when it detects signs of responsible and ecologic actions.

In further detail, the goals of *PowerEnJoy* are the following:

1. Let the user register to the service and login via the provided credentials;
2. Let the driver find the location of nearby available cars;
3. Let him/her reserve a chosen car up to an hour before picking it up;
4. Improve the efficiency of the service by assuring that no car stays reserved if not actually in use;
5. Allow the user to easily access the cars by unlocking them once the driver is in proximity;
6. Actively keep track of the driver's current charges, continuously notifying it;
7. Let the user know which and where the pre-defined parking spots are, showing the nearest ones;
8. Incentivize responsible behaviors, providing discounts for the worthiest users.

1.3 Definitions, Acronyms and Abbreviations

Back-end application: any computer program that remains in the background and offers application logic and communication interfaces to work with the front-end counterpart. It does not involve any graphical user interface, but it can provide a data access layer.

Driver: See **User**.

Front-end application: any application the users interact with directly. It provides the so called presentation layer.

RASD: Requirements Analysis and Specification Document.

System: The software system-to-be, in all of its entirety.

User: Any person subscribed to the service who rents a car using *PowerEnJoy*.

1.4 References

This document follows the guidelines provided by ISO/IEC/IEEE 29148:2011 [1] and IEEE 830-1998 [2] respectively related to the requirements engineering for systems and software products and the recommended practice for software requirements specifications.

Moreover it is strictly based on the specifications concerning the RASD assignment [3] for the Software Engineering II project, part of the course held by professors Luca Mottola and Elisabetta Di Nitto at the Politecnico di Milano, A.Y. 2016/17.

1.5 Overview

This document consists of three chapters:

Section 1: Introduction. A general introduction and overview of the system-to-be purpose, scope and goals, along with some important information about this document.

Section 2: Overall description.

Section 3: Specific Requirements.

At the end of the document are an **Appendix** and a **Bibliography**, providing additional information about the sections listed above.

Section 2

Overall Description

2.1 Product Perspective

2.1.1 User interfaces

The users have two ways to access the system: a web application can be executed on any personal computer while a mobile application provides flexibility, portability and can be used literally everywhere. Despite the fact that the hardware interfaces running the application are rather different, a unified and common user interface is provided. It should be user friendly and very intuitive to allow everyone to easily use it without any specific knowledge.

Moreover the users have to interact with the on-board computer installed on each electric vehicle, therefore it should offer an interface as straightforward as the one implemented by the web and mobile applications.

Appendix A

Appendix

A.1 Software and tools used

- LaTeX used as typesetting system to build this document.

Bibliography

[1] ISO/IEC/IEEE 29148:2011 *Systems and software engineering - Life cycle processes - Requirements engineering*

[2] IEEE 830:1998 *Recommended Practice for Software Requirements Specifications*

[3] AA 2016/2017 Software Engineering 2 - *Project goal, schedule and rules*