Project 1 : CoPilot drive statistics

Project plan

December 11, 2016

Contents

1 Introduction

For this project, we have the opportunity to work for the company Volvo Construction Equipment. They want us to implement an Android application for their CoPilot that is an Android based tablet which has the ability to receive information from the actual machine (speed, direction, ...). This application should measure some parameters from their different machines and then calculate an eco-driving score. This score will be displayed in a high score list on a web portal that we have to develop.

This project plan will give you a general overview and a basic understanding of the project. Moreover, it will present the group members, the client and the timeplan and organization for the project. An initial backlog containing the basic functionality of the product will also be presented.

2 Project organization

2.1 Project group

The group consists of 7 members:

- Leslie Dahlberg (*ldg14001@student.mdh.se*) - Tools/environments management

- Eric Engtorp (*eep13001@student.mdh.se*)

- Fredrik Frenning (*ffg12002@student.mdh.se*) - Room booker

- Pooria Ghavamian (*pgn16007@student.mdh.se*) - Contact

- Léa Brunschwig (*lbg16006@student.mdh.se*) - Documentation

- Vladimir Djukanovic (*vdc16001@student.mdh.se*)

- Hamza Sabljakovic (*hsc16001@student.mdh.se*) - Project manager

2.2 Organization and communication

The group will meet at least once a week before and after the meeting with the steering group to plan and discuss the weeks work. Slack is used for general communication needs during the week and as an easy way to document all interactions and share files and links. Trello will be used to coordinate work activities and manage effort and worked hours. A GitHub repository will be used for hosting the project and reporting results to the steering group.

2.3 Planned effort

This section shows the planned effort per member for each week in the project by a table. Each member has chosen his hours for a total of 150 hours per person. These hours include all project work like the scheduled presentations or the meetings. This table shows also the absences approved by the group.

Member/Week	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	Total
Leslie Dahlberg	15	20	20	20	20	20	15	0	10	10	150
Pooria Ghavamian	15	20	20	20	20	20	15	0	10	10	150
Léa Brunschwig	15	15	0(L)	25	25	25	10	10	15	10	150
Hamza Sabljakovic	15	15	20	20	25	20	15	0	10	10	150
Fredrik Frenning	15	20	20	20	20	20	15	0	10	10	150
Vladimir Djukanovic	15	15	20	20	25	20	15	0	10	10	150
Eric Engtorp	15	20	20	20	20	20	15	0	10	10	150
Total	105	125	120	145	155	145	100	10	75	70	1050

Legend: L = on leave (approved by the group)

2.4 Deliverables, deadlines and milestones

This section presents deadline table which includes external and internal (deadlines we defined as a team) deadlines, deliverables for the client and steering group. It also includes all activities we have identified. These activities are related to initial meetings with the client and steering group, reports, presentation, documentation, requirements and so forth. Also, each activity has effort value assigned to it.

2.4.1   Deadline Table

Id	Milestone Description	Responsible	Finished by	Remark
1	Project Plan	Léa	17/11/2016	Should include requirements specification, deadline tables, activities, deliverables etc.
2	Design Description (First version)	Eric	01/12/2016	Should capture important design decisions made in the project, and should provide a good basis for understanding the implementation
3	Testing	Fredrik	01/12/2016	
4	Product (First version)	Pooria	01/12/2016	Set up application and web project. (design, database, hosting service)
5	Design Description (Final version)	Hamza	12/01/2017	Should capture important design decisions made in the project, and should provide a good basis for understanding the implementation
6	Testing	Fredrik	12/01/2017	
7	Product (Final version)	Hamza	12/01/2017	Complete functionality covered by design and requirements specification
8	Project report	Léa	12/01/2017	Should summarize the outcomes of the project, both in terms of results produced and experiences from the project work

2.4.2   Deliverables for client (Volvo)

ID	Description	Remark	Deadline
1	3 concepts for Co Pilot application and web portal	Should include 3 sketches for both Co Pilot application and web portal	16/11/2016
2	Concepts presentation (report)	Description of presented concepts and covered functionality	16/11/2016
3	Final product	Must include eco driving algorithm, APK, web portal	12/01/2017
4	Final Report	Should include product description (implemented features and possible improvements for application that may not be implemented)	12/01/2017

2.4.3 Deliverables for steering group

ID	Description	Remark	Deadline
1	Project plan	Should include requirements specification, deadline tables, team structure, activities, deliverables etc.	17/11/2016
2	Design description (First Version)	Should capture important design decisions made in the project, and should provide a good basis for understanding the implementation	01/12/2016
3	Product (First Version)	Should solve practical issues	01/12/2016
4	Design description (Final Version)	Should capture important design decisions we have made in the project, and should provide a good basis for understanding the implementation	12/01/2017
5	Product (Final Version)	Should include complete functionality covered by design and requirements specification	12/01/2017
6	Project report	Should summarize the outcomes of the project, both in terms of results produced and experiences from the project work	12/01/2017

2.4.4 Activities

ID	Description	Remark	Effort (Person hours)
1	Meet client for requirements	Establish details about software to be developed	20
2	Draft requirements specification	Specification of requirements that will be implemented in software solution	14
3	Sketch UI: Android App	Design 3 sketch concepts for android application solution	28
4	Sketch UI: Web App	Design 3 sketch concepts for web application solution	15
5	Write project plan	Establish plan for system that will be developed (includes)	56
6	Write design document (first version)	Establish important design decisions made in the project, and provide a good basis for understanding the implementation	74
7	Initial implementation of android application	Implementation activities with goal to solve primary practical issues in concern with android application	94
8	Initial implementation of web application	Implementation activities with goal to solve practical issues in concern with web application	62
9	Testing	Execute test cases and methods to establish confidence in implemented functionality	40
10	Write design document (final version)	Establish important design decisions made in the project, and provide a good basis for understanding the implementation	78
11	Further implementation of android application	Implementation activities with goal to establish complete required functionality	100
12	Further implementation of web application	Implementation activities with goal to establish complete required functionality	71
13	Testing	Execute test cases and methods to establish confidence in implemented functionality	60
14	Write final report	Summarize the outcomes of the project, both in terms of results produced and experiences from the project work	56

2.5 Quality assurance

We will elicit our requirements and do at least three design concepts based on Volvo Construction Equipments demands and we will maintain contact with Volvo regularly so that the validity of our work can be assured. We will visit Volvo CEs office and test the real hardware in its working environment.

The client and supervisors will have access to our product and documentation and can at any moment see if we stray from the original idea. There are set deadlines that will demand our work to be presented in forms of deliverables. Before each deliverable we will do requirement and/or code reviews to see if any flaws or changes can be detected.

During the process of developing the application we have been granted access to simulators that will provide raw data close to reality. Testing with simulators will be performed as early in the process as we are able and our initial thought is that we can isolate small parts of the implementation and perform unit testing on it. Towards the end of the project we will strive towards doing more extensive unit testing so we can achieve some sort of test coverage.

3 Description of the system to be developped

3.1 High level description of the domain problem and description of existing systems

Volvo Construction Equipment utilizes customized Android tablets in their equipment (excavators, wheel-loaders, etc.). These tablets come with a set of pre-installed apps which help the machine-operators perform simple construction and logistics tasks. It is our responsibility to design and implement an app which will help the operators to drive more fuel-efficiently, this concept is also popularly called eco-driving. Our app will utilize some concepts from gamification and upload highscores to a web-portal which will rank the 20 best drivers.

Our app will capture data from the equipment's can busses through a pre-existing API which Volvo will provide us with. The CAN bus is the cable we have, and it gives us info like speed, altitude, latitude, fuel etc.

3.2 High-level description of the desired functionality
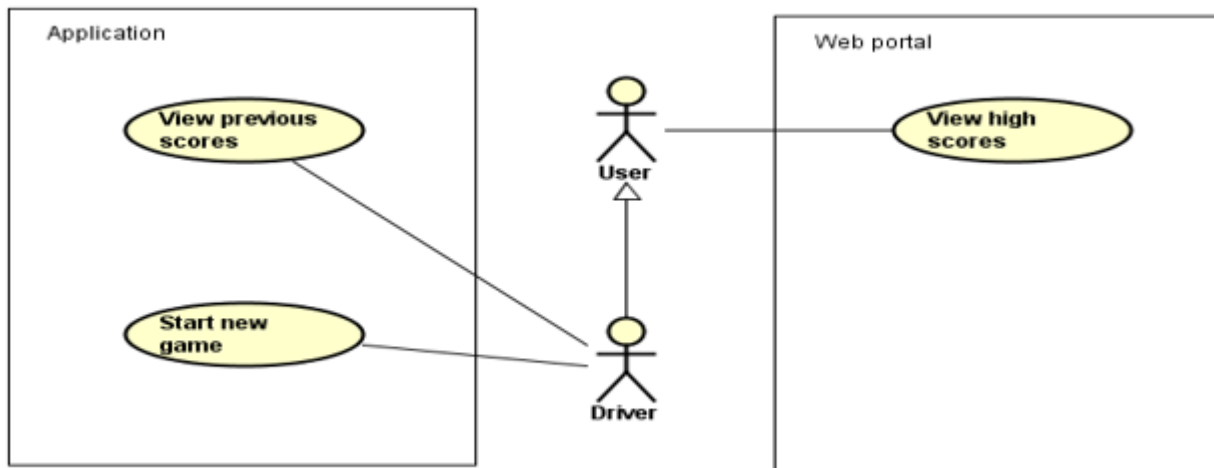
The app must have two use-cases:

1. The driver should be able to view previous scores and results to be able to learn from past experiences. This could be presented as a list.

2. The driver should be able to start a new game

   a. First the driver must select an alias

b. Then the driver must select a time interval to play the game

c. Then the driver is presented with a screen showing live data about the driving a efficiency including an overall score

d. The driver should be provided with some sort of instant feedback

e. When the time runs out or the user manually interrupts the game the score is uploaded to a web-portal

The web-portal must have one use case:

1. Any user visiting the website should be able to view the 20 best results and details about those results.

3.3 Functional or non-functional requirements

In this section we will list the requirements elicited from our meetings with the client to two categories of functional and non-functional. Functional requirements will focus more on what they want the program to do, whereas, non-functional requirements will focus on how it will behave.

Functional

- User Interface design of Android app
- Choose Alias/Name
- Choose "Driving Period"
- Choose machine (optional)
- Algorithm to calculate score from sensor input
- User Interface displays current data/score
- Feedback within cycle
- Should work on one type of machine
- After cycle finishes, upload score to web portal
- Achievements feedback (optional)
- Need to be able to stop at any time
- View past scores (History/High score)
- Circular buffer of the high score (The 20 highest)
- Database design implementation
- User Interface design of Web portal
- API calls/design

Non-functional

- Every second the feedback must be shown up
- Landscape and portrait mode needs to be supported

4 Initial project backlog

The table below showcases initial backlog ideas along with their corresponding user stories, effort estimations and priorities.

ID	Description	User Story	Effort Estimation (Person days)	Priority
1	Android app: High Score Algorithm	As driver, I want a high score so that I can assess my performance.	15	High
2	Android app: Instant data display	As driver, I want instant feedback about my score so that I can change my performance accordingly.	40	High
3	Android app: Uploading score to web portal	As driver, I want my score to be uploaded to a web so that I can view my score on leaderboard.	30	High
4	Web Portal: Circular buffer of the past 20 highest scores (sorting)	As user, I want to view the top 20 drivers and their attributes.	60	High
5	Web Portal: Database (storing)	As user, I want to have scores stored as persistent data.	80	High
6	Android app: Login	As driver, I want to enter the system using an alias.	15	Medium
7	Android app: Driving timer	As driver, I want to set a driving time period.	15	Medium
8	Android app: Gamer history	As driver, I want to view my past history, so that I can monitor improvements/setbacks.	35	Medium
9	Android app: Choosing machine	As driver, I want to be able to choose a machine.	15	Low