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BUMPY

for the Cycling Advocacy of the Zagreb Cyclists' Union

Acceptance Test Plan

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1. Introduction

1.1 Purpose of the Document

The purpose of this document is to describe the test procedures for Cycling Advocacy project. The goal of Acceptance Test Plan is to verify that the implemented application satisfies all of the functional requirements written in the Requirements Definition Document. It describes how to properly use both Android and Web applications.

1.2 Document Organization

- Section 1, *Introduction*, describes the contents of this guide, used documentation during the developing process, etc
- Section 2, *Background*, provides the project background information as well as a high-level description of the domain and problem
- Section 3, *Overview of the testing process*, describes how system is tested
- Section 4, *Test*, contains a list of test cases for Android and Web applications.

1.3 Intended Audience

- The customer
- The project's team
- Project supervisors
- All other project stakeholders

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1.4 Definition and Acronyms

1.4.1 Definitions

Keyword	Definition
Collected data	Data collected by Android during cycling, consists of Location and Motion data.
Location data	Location data collected by Android. Each GNSS point has a timestamp, latitude, longitude, elevation, speed and accuracy.
Motion data	Sensors data collected by Android. Each motion data acquisition consists of a timestamp, and three floats (one per each axis) for each sensor (accelerometer, magnetometer and gyroscope).
Trip	All the synthetic information about a trip (including path and issues).
Road Quality	It is a signed float measuring the quality of the road. It can be assigned both to segments and bumpy issues.
Road Quality Map	It is a collection of paths and represents all the roads which have been ridden by the users. It can be plotted over a world map (e.g. OpenStreetMap).
FixMyStreet	An external platform for reporting road issues to authorities
FixMyStreet Issue	An issue pointed out by users. For example, a tree that fell over a street or a damaged semaphore.
Bumpy Issue	An issue automatically detected by the system. Only hard bumps can be identified at the moment.
Heat Map	A map plotting different level of colours (green to red) over a city map to indicate the road quality

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1.4.2 Acronyms and Abbreviations

Acronym or Abbreviation	Definition
POLIMI	Politecnico di Milano (Polytechnic University of Milan)
FER	Fakultet Elektrotehnike i Računarstva (Faculty of Electrical Engineering and Computing)
UUID	Universally Unique Identifier
UI	User interface
REST	Representational State Transfer
API	Application Program Interface
ID	Identifier
GNSS	Global Navigation Satellite System
CSV	Comma Separated Values (file format)
AT	Android Test
WT	Web Test

1.5 References

Cyclist's Union: <http://sindikاتبiciklista.hr/en/>

Fakultet elektrotehnike i računarstva: <https://www.fer.unizg.hr/en>

Politecnico di Milano: <https://www.polimi.it/en/>

FixMyStreet: <https://www.fixmystreet.org/>

Web application: <http://161.53.67.132:3000/>

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2. Background

The customer of the project is the Cyclist's Union, a volunteer association founded in 2011 and located in Zagreb, Croatia. Their goal is to promote cycling as an efficient, sustainable and healthy way of transport in order to have a clean, safe and pleasant green cities.

In accordance with their goal of getting more people to use cycling as a means of transportation, the Cyclist's Union wishes to develop a technological solution for the reporting of road conditions with the goal of monitoring and improvement. More specifically, the solution should be able to detect rough roads and road bumps, collect that information and visualize it. The basic idea is to rely on today's widespread usage of smartphones, namely Android phones, and utilize their various sensors to obtain road surface data. The data obtained by such means can then be analyzed by some algorithm in order to identify road issues like bumps and abrupt breaks, and then used to visualize and locate all potential road issues and encourage local administrations to intervene, which in turn will result in better road conditions that will incentivize people to turn to cycling.

The project team consists of four students from FER and four students from POLIMI, with one supervisor from each university.

3. Overview of testing process

The following tests are performed by a user using mobile or web application. Tests cover most of the system requirements and are focused on frontend. On the other hand, backend performs Unit tests. These tests are useful to test single functionalities like methods or classes. Unit tests will not be covered in this document.

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4. Tests

4.1 Android application

ID	AT-1
Name	Generating User Identifier
Tested Requirements	CFR-1, CFR-2
Preconditions	-
Procedure	User opens the application for the first time
Expected result	Random UUID is generated and can be checked in settings.

ID	AT-2
Name	Display map with road quality
Tested Requirements	CFR-4
Preconditions	-
Procedure	User opens the application
Expected result	User sees interactive map with lines indicating the road quality.

ID	AT-3
Name	Display current location on map (Fine location)
Tested Requirements	CFR-4
Preconditions	User turned on location on phone and application has permission to access device's location.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User clicks on target image button
Expected result	User sees a pin on a map with his location. The pin positioning is precise.

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ID	AT-4
Name	Display current location on map (Coarse location)
Tested Requirements	CFR-4
Preconditions	User turned on the Internet on phone and application has permission to access device's network state.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User clicks on target image button
Expected result	User sees a pin on a map with his location. The pin positioning in close to user's real location, but not precise.

ID	AT-5
Name	Turn on Location
Tested Requirements	-
Preconditions	Application has permission to access device's location.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User clicks on GPS Switch
Expected result	Location is on.

ID	AT-6
Name	Starting a trip
Tested Requirements	CFR-9
Preconditions	Application can access location and motion sensors.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User clicks "Start Trip" button
Expected result	Trip is started.

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ID	AT-7
Name	Displaying trip statistics
Tested Requirements	CFR-11
Preconditions	User started a trip. User enabled keeping screen on in settings.
Procedure	Trip is in progress
Expected result	User sees a dashboard with speed, distance, duration and vibration measurements. The screen is kept awake.

ID	AT-8
Name	Hiding trip statistics
Tested Requirements	NCFR-1, NCFR-9
Preconditions	User started a trip. User disabled keeping screen on in settings.
Procedure	Trip is in progress
Expected result	Dashboard with speed, distance, duration and vibration measurement is shown for a while until the application does not go to background and screen is turned off. Data is still collected even if application is in the background.

ID	AT-9
Name	Collecting data during trip
Tested Requirements	CFR-7, NCFR-2, NCFR-3, NCFR-4, NCFR-5, NCFR-6
Preconditions	User started a trip.
Procedure	Trip is in progress
Expected result	Location data are collected every 3 seconds (approximately). Motion data are collected at a frequency of 50Hz (approximately) and write in CSV file with title equal to trip id. Format of collected data is as specified in Requirements. Collected data are used to show trip's statistics.

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ID	AT-10
Name	Ending trip
Tested Requirements	CFR-10
Preconditions	User started a trip.
Procedure	User clicks on "End Trip" button
Expected result	Trip is ended. User is returned to the previous screen (the one with map). Trip can be checked in "Past Trips" screen.

ID	AT-11
Name	Sending collected data (WiFi connection)
Tested Requirements	CFR-8, NCFR-7
Preconditions	User ended trip. User is connected to WiFi.
Procedure	-
Expected result	Collected data are sent immediately. CSV file regarding motion data is deleted from a device.

ID	AT-12
Name	Sending collected data (Mobile data connection)
Tested Requirements	CFR-8, NCFR-7
Preconditions	User ended trip. User enabled option to use mobile data to send collected data (it can be found in settings). User is using mobile data.
Procedure	-
Expected result	Collected data are sent immediately. CSV file regarding motion data is deleted from a device.

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ID	AT-13
Name	Sending collected data is pending
Tested Requirements	NCFR-8
Preconditions	User ended trip. User disabled option to use mobile data to send collected data (it can be found in settings). User is using mobile data.
Procedure	-
Expected result	Collected location data are stored in device database. There is a sync icon next to trip title in "Past Trips" screen.

ID	AT-14
Name	Sending pending collected data.
Tested Requirements	CFR-15
Preconditions	User has one or more trips whose collected data aren't sent.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to the "Past Trips" screen 3. User clicks on sync icon next to trip
Expected result	Collected data are sent immediately. CSV file regarding motion data is deleted from a device.

ID	AT-15
Name	Reviewing past trips
Tested Requirements	CFR-12
Preconditions	-
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to "Past Trips" screen
Expected result	If user hasn't yet performed a trip there is text indicating that there are no trips. Otherwise there is a list of trips, sorted by trip's start time.

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ID	AT-16
Name	Reviewing specific past trip
Tested Requirements	CFR-13
Preconditions	User previously performed at least one trip.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to "Past Trips" screen 3. User clicks on one of the trips in list
Expected result	New screen is opened showing more details about the selected trip. This includes distance, duration, start and end time, max speed, average speed, elevation details, vibration and cycling route display on a map.

ID	AT-17
Name	Export trip data
Tested Requirements	CFR-16
Preconditions	User previously performed at least one trip.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to "Past Trips" screen 3. User clicks on one of the trips in list 4. User clicks on export button
Expected result	Trip data are successfully exported. Location data are exported in TXT file in JSON format. Motion data are exported in CSV file. Both file names are trip id. Exact location of exported files is displayed on screen.

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ID	AT-18
Name	Delete trip
Tested Requirements	CFR-17
Preconditions	User previously performed at least one trip.
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to "Past Trips" screen 3. User clicks on one of the trips in list 4. User clicks on the delete button
Expected result	Trip is deleted and is not visible to user anymore.

ID	AT-19
Name	Reviewing Achievements
Tested Requirements	OFR-2
Preconditions	-
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to the "Achievements" screen
Expected result	List of achievements is displayed with title and description. Completed achievements have trophy icon next to it, while uncompleted achievements are dimmed.

ID	AT-20
Name	Completing Achievement
Tested Requirements	OFR-1
Preconditions	User ended a trip that matches conditions of achievement.
Procedure	-
Expected result	New screen is shown with a message about achievement. Trophy icon is added to the newly completed achievement in "Achievements" screen.

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ID	AT-21
Name	Reporting issue
Tested Requirements	OFR-3
Preconditions	-
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to "Report Issue" screen 3. User fills needed information 4. User clicks on "Submit" button
Expected result	Issue is reported. Message is shown, indicating that issue reporting was successful.

ID	AT-22
Name	Enabling/Disabling usage of mobile data to send collected data
Tested Requirements	NCFR-7
Preconditions	-
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to "Settings" screen 3. User clicks on switch "Use Mobile data"
Expected result	Mobile data for sending collected data is enabled/disabled.

ID	AT-23
Name	Enabling/Disabling keeping screen awake while cycling
Tested Requirements	NCFR-9
Preconditions	-
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User navigates to "Settings" screen 3. User clicks on switch "Keep screen awake"
Expected result	Keep screen awake option is enabled/disabled

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4.2 Web application

ID	WT-1
Name	Display map with road quality
Tested Requirements	CFR-4
Preconditions	-
Procedure	User opens the application
Expected result	User sees interactive map with lines indicating the road quality.

ID	WT-2
Name	Entering User identifier
Tested Requirements	CFR-1
Preconditions	-
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User clicks on "Trips" in navigation bar 3. User clicks on "Enter User Identifier" button
Expected result	Modal is shown with one form field for entering user identifier.

ID	WT-3
Name	Reviewing past trips
Tested Requirements	CFR-12
Preconditions	User entered identifier
Procedure	-
Expected result	Table with past trips is shown. Data in table can be sorted and filtered. If there are no trips for given user, message is shown indicating that there is no data.

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ID	WT-4
Name	Reviewing specific past trip
Tested Requirements	CFR-13
Preconditions	User previously performed at least one trip. User entered identifier.
Procedure	User clicks on one of the trips in table
Expected result	New page is opened showing more details about the selected trip. This includes distance, duration, start and end time, max speed, average speed, elevation details, vibration and cycling route display on a map.

ID	WT-5
Name	Export trip data
Tested Requirements	CFR-16
Preconditions	User previously performed at least one trip. User entered identifier.
Procedure	<ol style="list-style-type: none"> 1. User clicks on one of the trips in table 2. User clicks on export button
Expected result	Trip data are successfully exported and downloaded. Location data are exported in TXT file in JSON format. Motion data are exported in CSV file. Both file names are trip id.

ID	WT-6
Name	Delete trip
Tested Requirements	CFR-17
Preconditions	User previously performed at least one trip. User entered ID.
Procedure	<ol style="list-style-type: none"> 1. User clicks on one of the trips in table 2. User clicks on the delete button
Expected result	Trip is deleted and is not visible to user anymore.

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ID	WT-7
Name	Reporting issue
Tested Requirements	OFR-3
Preconditions	-
Procedure	<ol style="list-style-type: none"> 1. User opens the application 2. User clicks on "Report Issue" in navigation bar
Expected result	FixMyStreet page is opened, where user can report issue.

End of document