CA326 Functional Specification

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1. Introduction

1.1 Overview

Our project is an all-in-one bike device and companion app that will allow users to keep their bikes secure. Users will be able to interact with our mobile app, which will enable them to connect to our device and easily access the range of features that we will provide. The user will have access to features such as NFC technology to enable navigation, GPS tracking technology to provide accurate real-time location information, an accelerometer for journey information and a social menu to keep track of friends.

1.2 Business Context

Our product, Venato, is designed with the goal of providing security and peace of mind to fellow cyclists. The users of Venato will therefore be cyclists who want to prevent any potential theft of their bikes. Venato will be of significant value to our users, as our product will allow users to know exactly where their bike is at any given time. Venato will establish a direct connection between our users and their bikes, which will provide users with a strong feeling of assurance and security, knowing that their bikes are safe.

1.3 Glossary

NFC - NearField Communication

2. General Description

2.1 Product / System Functions

Venato will serve a purpose for many useful functionalities. It will fall into the following categories and in each case, it will provide for different functionalities:

<u>Location</u>

- Venato will gather location data from the users, based on where hardware was enabled (through the NFC), to where it was disabled. With this information, Venato will allow users to see the mapping of where the bike has travelled too as well as provide statistics for that route such as the distance the user/device travelled and the time it took for the route.

<u>Tracking</u>

- The main feature, or in business terms, the “selling-point” of Venato will be the tracking. Venato will be represented mainly as a tracking app/device to our consumers. With this in mind, it will provide the features to track your bike live as

long as the device is enabled and positioned on the bike. The tracking feature will be displayed within a map with the use of GPS technology provided by an Arduino GSM Module. The tracking data will also be recorded in case a user wants to see where the bike was/travelled during a past route.

Security

- With the above point in mind regarding live tracking, the purpose of the tracking can be used as a security measure. For example, if you were cycling and your bike was stolen or lost, with the live tracking, users can log in to the Venato app and see where the bike is currently positioned within precise timing.

Social

- The Venato app will allow users to create an online profile where they can request other users to become friends within the app. Once two users are friends, they can request permission to see one another's current location on the map. This will be implemented to allow users to track one another to either meet-up, monitor their routes and aid the other user in searching for their lost bike.

2.2 User Characteristics and Objectives

Our product will have 2 main user classes: general users and administrators. Our general users will be cyclists who wish to track their bikes, whilst we (Aaron and Joao) will be the admins. Our product seeks to provide security to any and all cyclists, meaning that our target demographic will be the widest possible range of people. The key factor that determines whether a user will be able to use our product is digital literacy.

Digital literacy refers to the set of skills that enable you to function and participate in the digital world. Since we want to appeal to the widest possible demographic of users, our product is designed with the goal of minimising the level of digital literacy required in order to use it. As such, our users will only be expected to mount a tracking device onto their bike, and know how to use and interact with an app on their phone. The purpose of this design is to ensure that people of all ages can use our product.

In terms of the user perspective, our app will need to fulfil a number of requirements. Firstly, our app should have an easy login feature. Users will also need to be able to easily connect the app to the tracking device. A map that shows the live location of the bike must be displayed. Users will also want to take advantage of our social features through a social menu. All of these requirements are feasible and will be implemented in the final app.

2.3 Operational Scenarios

This section should describe a set of scenarios that illustrate, from the user's perspective, what will be experienced when utilizing the system under various situations.

In the article Inquiry-Based Requirements Analysis (IEEE Software, March 1994), scenarios are defined as follows:

In the broad sense, a scenario is simply a proposed specific use of the system. More specifically, a scenario is a description of one or more end-to-end transactions involving the required system and its environment. Scenarios can be documented in different ways, depending on the level of detail needed. The simplest form is a use case, which consists merely of a short description with a number attached. More detailed forms are called scripts.

2.4 Constraints

A constraint is a restriction or limitation that prevents something from occurring. Venato will have several potential constraints depending on how efficiently the development and testing phase is performed. The constraints will include:

- Platform - We will base the Venato application for IOS and Android users. Venato will be limited only to these user's which means a phone will be required. User's who prefer to use a web application will also be limited to the use of the application.
- Server load - Server causes server overload due to too many user's requesting data from the server and therefore the server failing to handle all the incoming requests.
- Response Time -
- Connectivity - Issue could occur with forming a connection between the hardware and the server. Connectivity constraints may arise due to poor wifi connectivity, server bugs, and hardware malfunction.
- Location - If a user goes out of a range, the device will not be able to perform a connection with the server. For example, if a user goes into a location where a wifi connection is not plausible, the device to server link will be restricted.
- Battery - If the GSM device dies from insufficient battery, Venato will be unable to provide any further live tracking or information.
- NFC - Potential sensory issues. NFC tag may undergo connectivity problems when trying to connect.
- Damage - For example, if a user crashes their bike and the hardware is damaged, the application will be unresponsive and repair will be potentially required

With these constraints and limitations in mind, as a team we will do our best to accommodate these constraints in order to ensure that Venato experiences the most success.

3. Functional Requirements

Name	Tracking the bike
Description	The microcontroller module must be able to accurately track the real-time location of the bike.
Criticality	High
Technical Issues	GPS tracking may have potential issues.
Dependencies With Other Requirements	N/A

Name	Displaying the location
Description	Our app must display the real-time location of the bike.
Criticality	High
Technical Issues	Potential issues with receiving data from the microcontroller module.
Dependencies With Other Requirements	Depends on the microcontroller being able to track the location.

Name	User registration
Description	Each user must register and create their account.
Criticality	High
Technical Issues	N/A
Dependencies With Other Requirements	N/A

Name	User login
Description	Allows each user to log in and access their account.

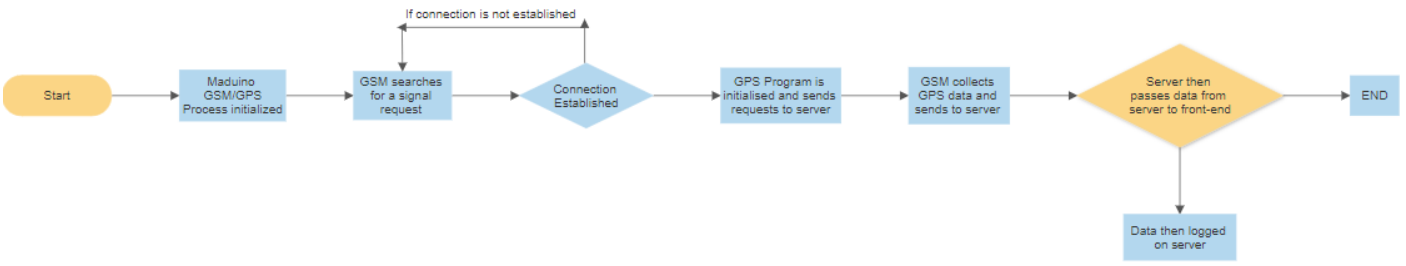
Criticality	High
Technical Issues	N/A
Dependencies With Other Requirements	Depends on each user having already registered.

Name	Social menu
Description	A social menu that allows users to track their friends' bikes.
Criticality	Medium
Technical Issues	Potential GPS tracking issues.
Dependencies With Other Requirements	Depends on each user having already registered, also depends on the GPS tracking of their bikes.

4. System Architecture

This section describes a high-level overview of the anticipated system architecture showing the distribution functions across (potential) system modules. Architectural components that are reused or 3rd party should be highlighted.

5. High-Level Design



6. Preliminary Schedule

Venato Bike Tracker
PROJECT NAME

03-Dec-21
START DATE

10-Mar-22
END DATE

Task ID	Task Name	Start Date	End Date	06/12/2021	13/12/2021	20/12/2021	27/12/2021	03/01/2022	10/01/2022	17/01/2022	24/01/2022	31/01/2022	07/02/2022	14/02/2022	21/02/2022	28/02/2022	07/03/2022
1	Research on Project Idea	03/12/2021	06/12/2021														
2	Git Repo Setup	06/12/2021	07/12/2021														
3	Functional Specification	06/12/2021	10/12/2021														
4	Order/Receive Hardware	10/12/2021	20/12/2021														
5	React Native Research	20/12/2021	23/12/2021														
6	Frontend (App Development)	23/12/2021	09/01/2022														
7	Backend (Server Development)	10/01/2022	23/01/2022														
8	Forming GPS Connection Between Server and Frontend	23/01/2022	30/01/2022														
9	Data Testing	30/01/2022	08/02/2022														
10	User and Functionality Testing	08/02/2022	18/02/2022														
11	Changes With Testing	18/02/2022	25/02/2022														
12	Documentation	25/02/2022	28/02/2022														
13	Preparation of Project Presentation	28/02/2022	05/03/2022														
14	Deliver Presentation	28/02/2022	10/03/2022														

7. Appendices

Specifies other useful information for understanding the requirements.