Smart Tracker

[CS350] 2021 Fall Team Project
Project #2. Software Requirements Specification

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Table of Contents

Introduction

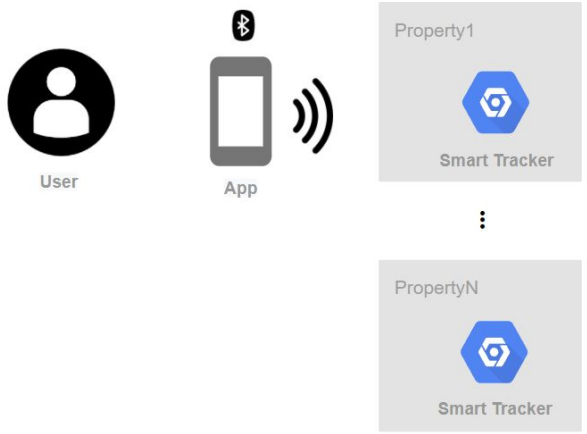
Smart Tracker is the product that prevents users from losing their important properties.

It is a small device that could be easily placed on user's belongings. The device communicates with user's smartphone application via bluetooth. So, whenever the distance between tracker and user gets out of range, user can be warned by the application.

Expected users are those who lose their possessions easily or have some important property

Product Perspective

The main context : **make our properties trackable**



<Figure 1> Major components of the overall system

Product Features

1. Whenever the distance between the smartphone and tracker gets far, the smartphone application alerts users.

2. User can manage/check status of the trackers via smartphone application.
   - Find the exact location of tracker on map
   - Make tracker buzz
   - Turn on/off trackers
   - Check the remaining battery
   - Change the alert condition

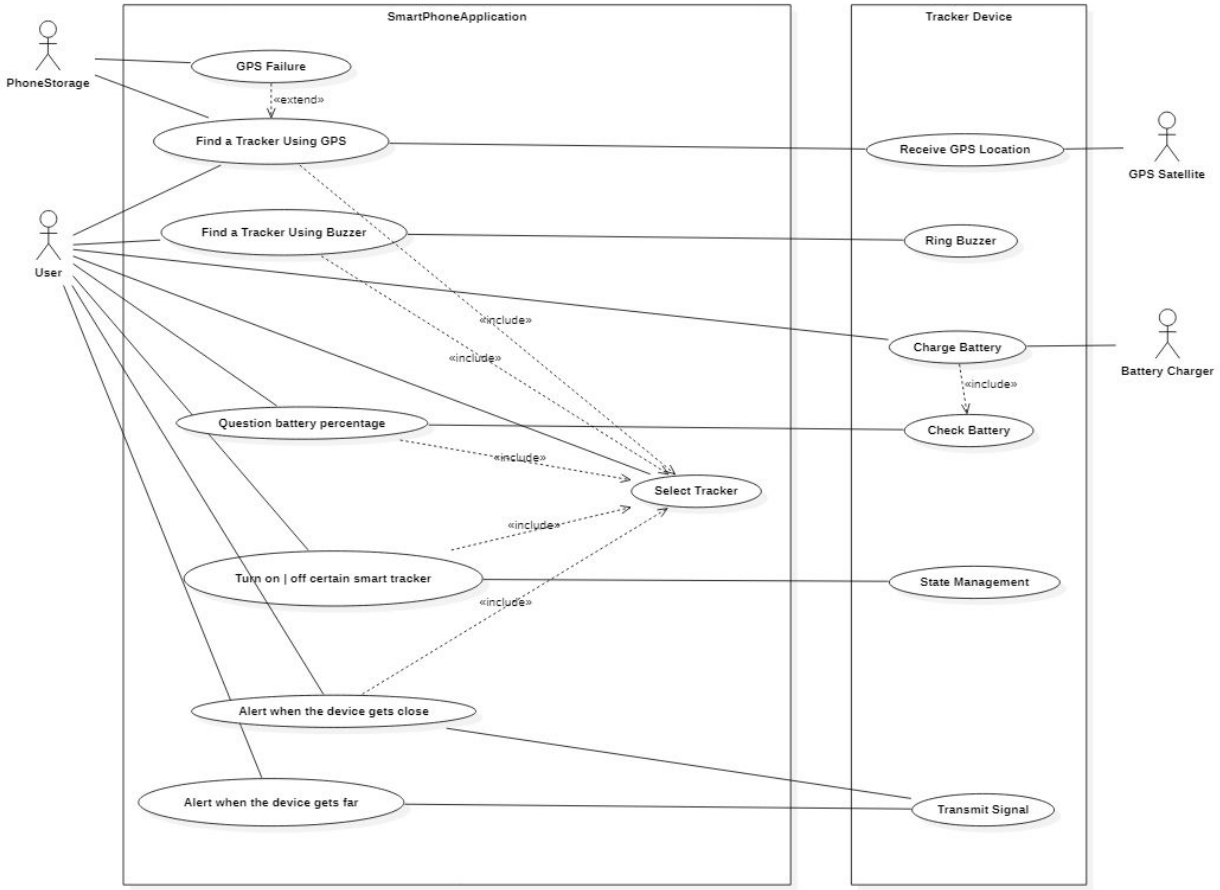
Functional Requirements

Hierarchy	Requirement ID	Requirement Description	Actors	Priority
Communication Management	A_1	Bluetooth connection between tracker and smartphone application.	None	Critical
Communication Management	A_2	A smartphone application should always run in the background and should receive a strength signal from the tracker device for distance measurement.	None	Critical
Battery Management	B_1	Users can charge the device by connecting the charging port with the C-type charger.	User, Battery Charger	Critical
Tracking Management	C_1	Users can make the tracker's buzzer ring for exact positioning.	User	Trivial
Tracking Management	C_2	Users can use the smartphone application to find the exact position of the tracker.	User, GPS satellite	Critical
Tracking Management	C_3	Smartphone application saves the most recent position of the tracker periodically	Smartphone storage	Critical

Functional Requirements

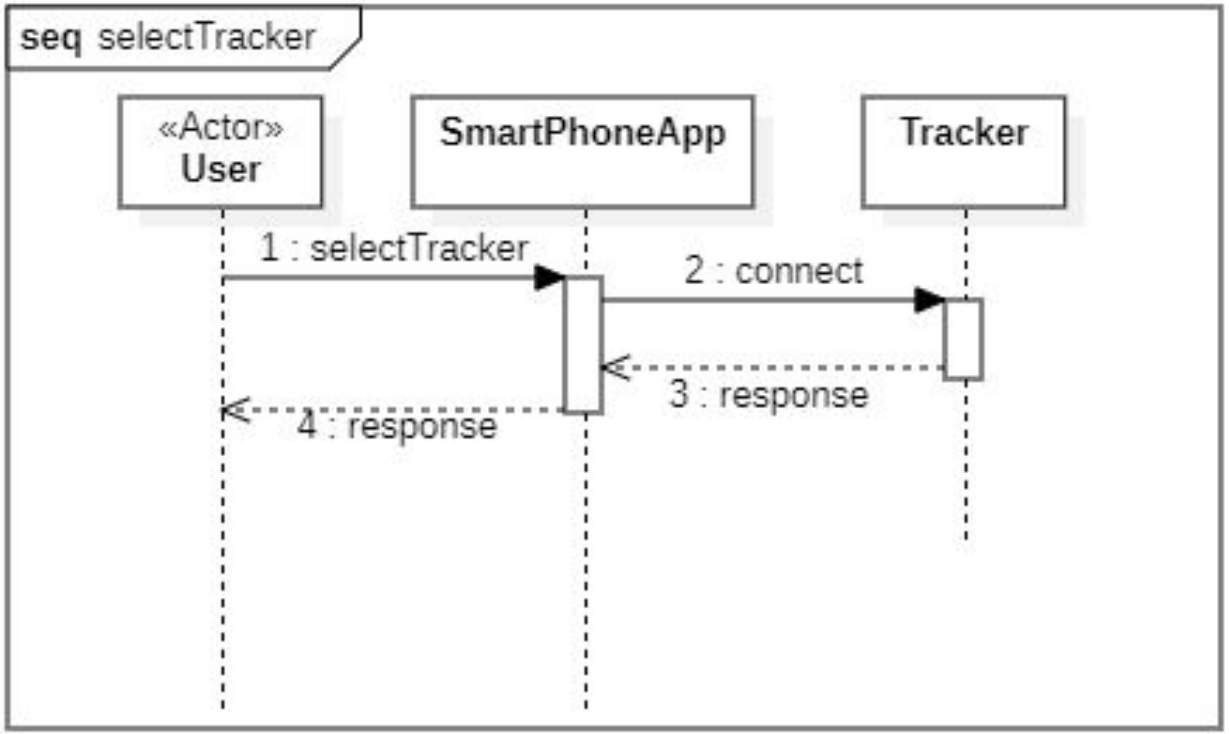
Hierarchy	Requirement ID	Requirement Description	Actors	Priority
Device Management	D_1	Users can check the battery status of the trackers using the smartphone application.	User	Trivial
Device Management	D_2	Users can use smartphone application to turn on/off devices	User	Critical
Usability Management	E_1	Users can easily attach or remove the tracker from their property by utilizing tag or ring form.	User	Trivial
Security Management	F_1	Tracker device remembers the first paired smart phone application and only communicates with it.	User	Critical

Use-Case Diagram



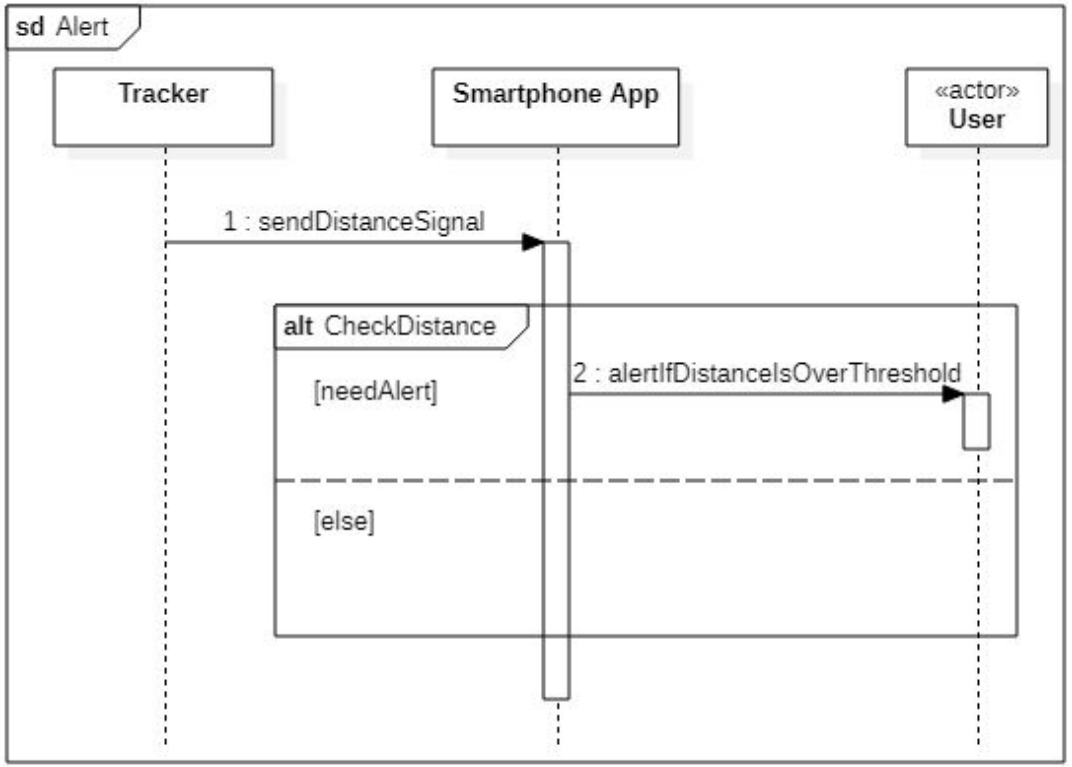
Sequence Diagrams

Select Tracker



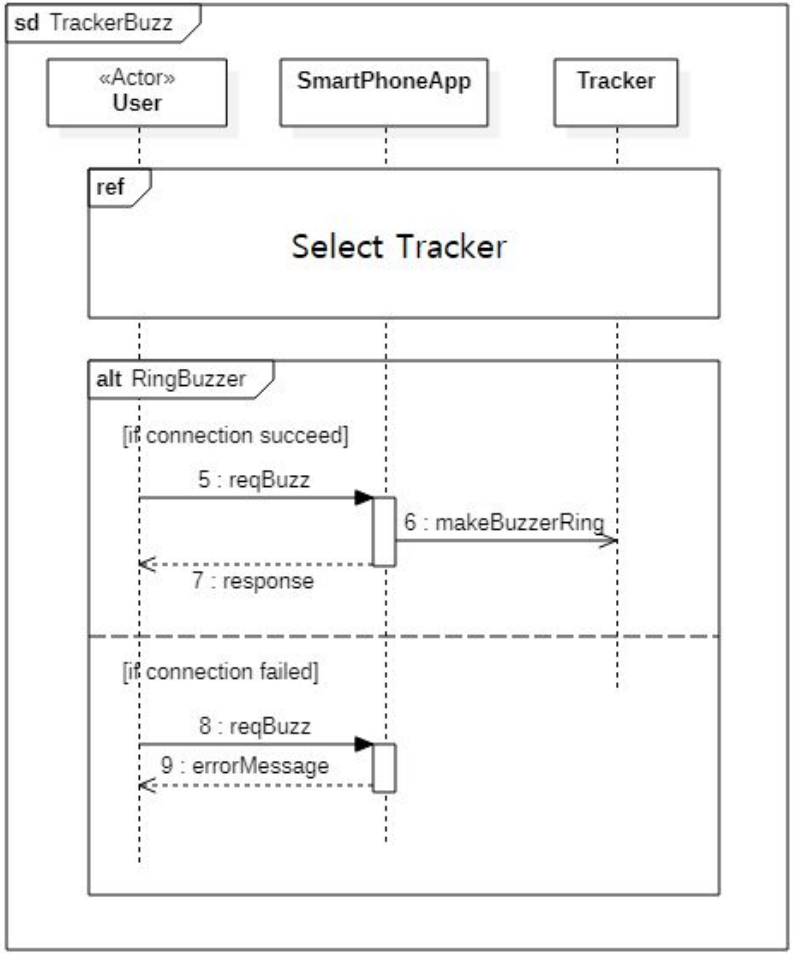
Sequence Diagrams

Alert when Tracker Gets Further



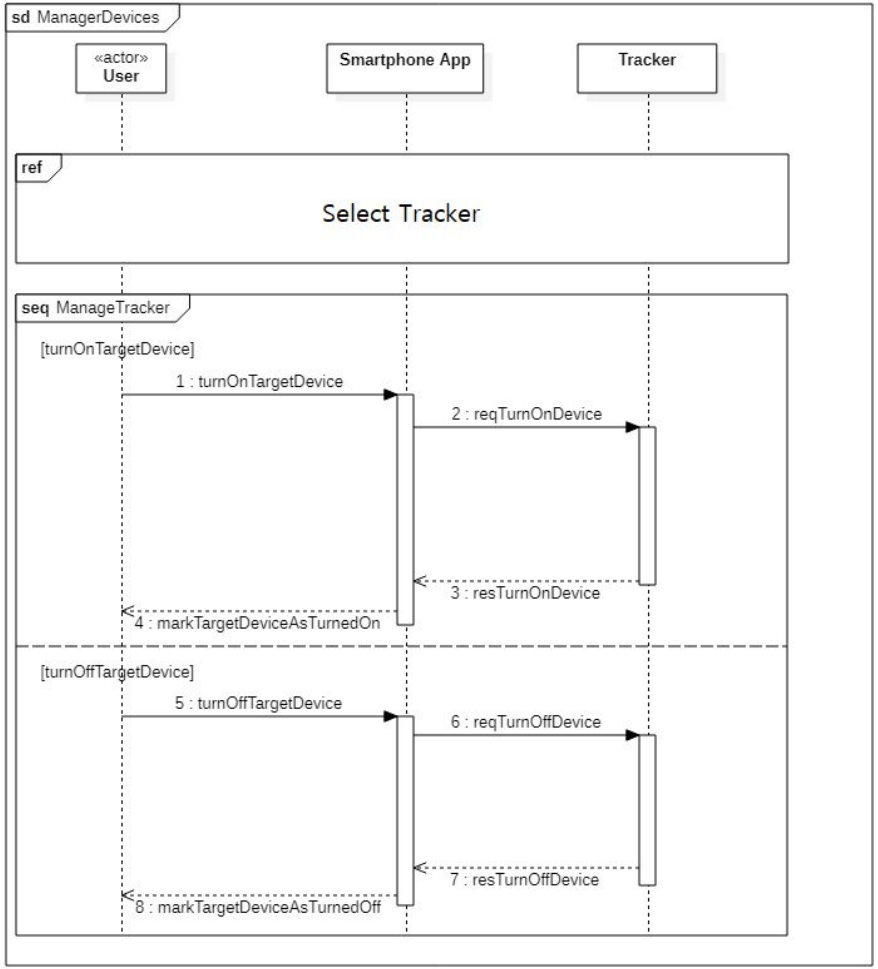
Sequence Diagrams

Find Tracker Using Buzzer



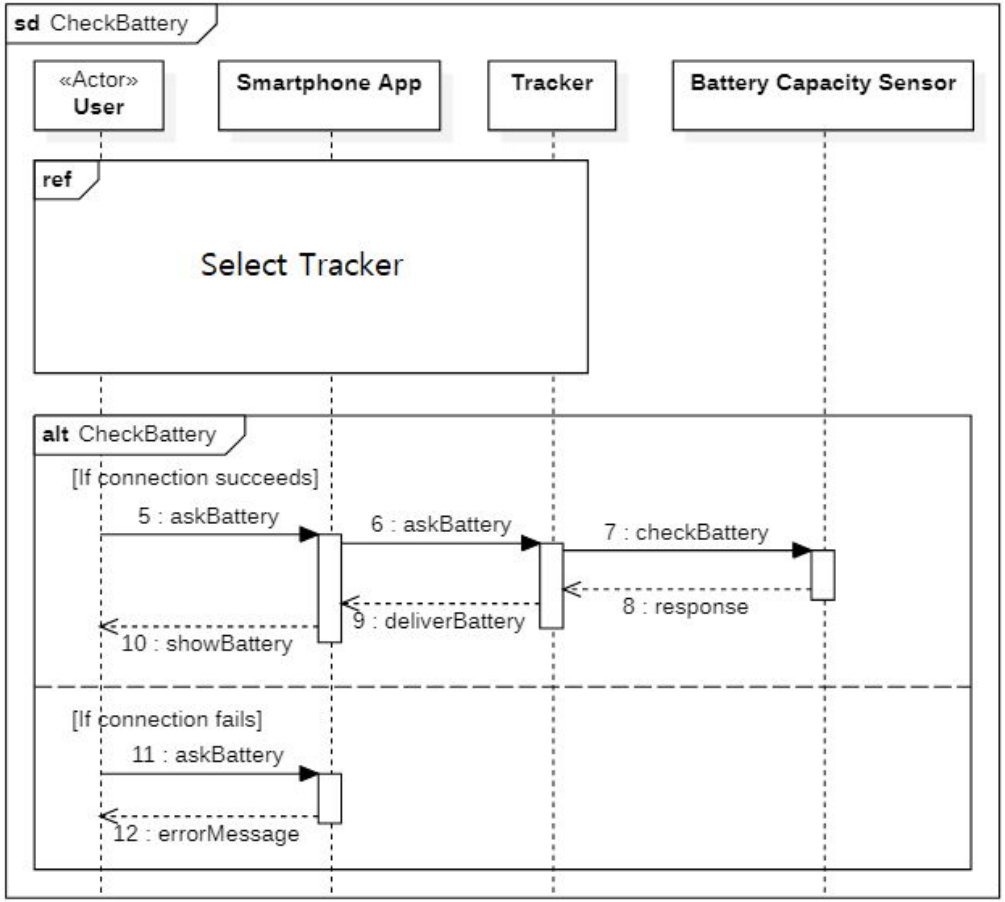
Sequence Diagrams

Turn On/Off Tracker



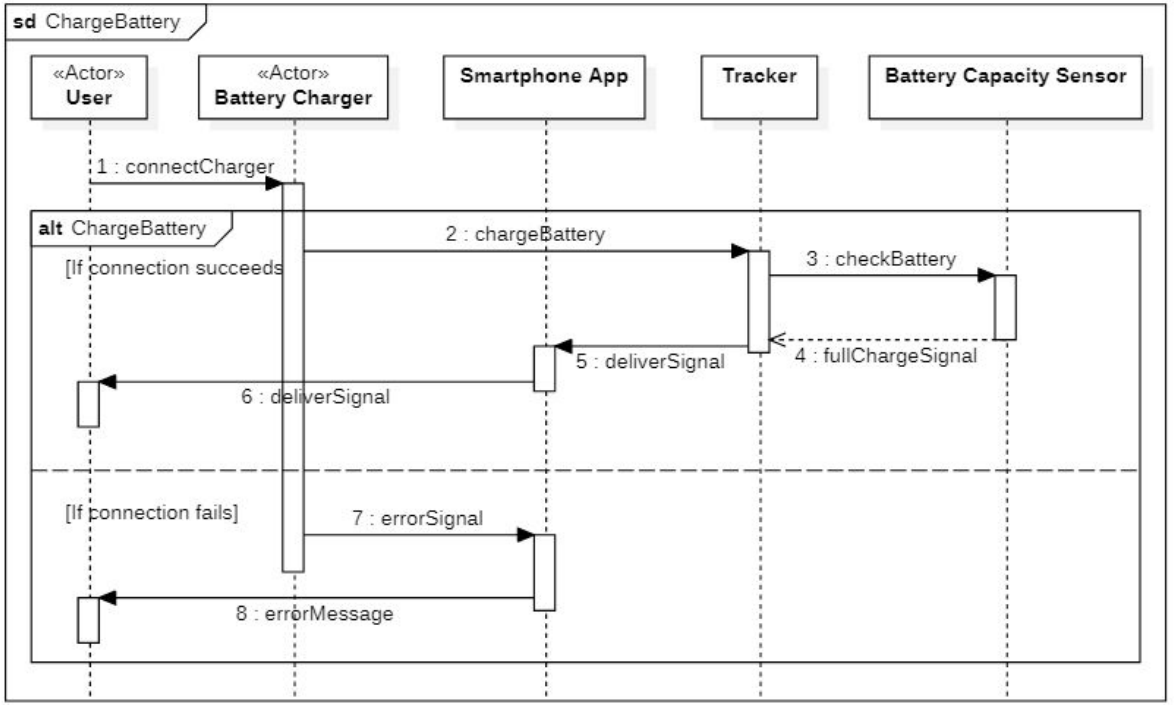
Sequence Diagrams

Check Remaining Battery



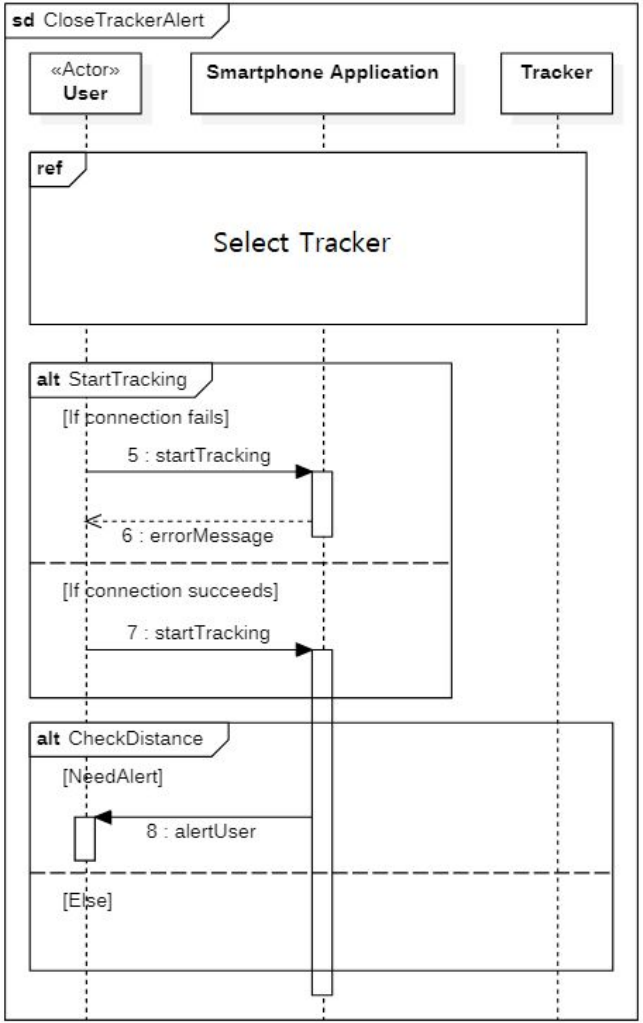
Sequence Diagrams

Charging Battery



Sequence Diagrams

Alert when Tracker Gets Close



Quality Attributes - User Interface and Human Factors

Expected User Types

- Users who frequently forget their belongings
- Users who use smartphones and usually bring their smartphones
- Users don’t have to be familiar with smartphone apps, but should have no restriction for installing smartphone apps.

Available Input/Output Devices

- Smartphone device (application should be installed)
- Tracker device

Requirements

- Tracker device attaching process should be simple so users can easily attach/detach tracker devices to their belongings.
- GUIs should be intuitive so that they are easily understandable for users.
- All critical errors should be notified to users well, so that users can recognize and deal with errors (try again).

Quality Attributes - Documentation

- Documentation for tracker device attaching/detaching process.
- Smartphone application installation guide should be given so that users can easily find and install the designated application from the app store.
- A documentation for registering their designated tracker device in their smartphone application.
- A list of the system’s functions (alert, device management, GPS) and their processes.

Quality Attributes - HW Considerations

Tracker Device Hardware Requirements

- Size should be small enough so that they will not border users when they are attached to belongings.
- Batteries should last at least several hours when they are fully charged.
- Devices should not be easily broken.

Smartphone Application Hardware Requirements

- Bluetooth communication.
- Enough storage for the designated smartphone application.
- Enough storage for storing the most recent GPS position of tracker devices.

Quality Attributes - Performance Characteristics

- Bluetooth communication should be available at distance

Quality Attributes - Error Handling and Extreme Conditions

- All fatal errors and their suggested handling procedure should be notified to a user in a proper language through a smartphone application message so that the user can easily figure out how to deal with errors or try again.

Expected Error Situations

- Bluetooth connection lost

Quality Attributes - System Interfacing

User - App interface

- Graphic user interface

App - Tracker device interface

- Bluetooth communication

Tracker device - GPS interface

- GPS communication

Quality Attributes - Quality Issues

- Should be compatible with major smartphone OSs (iOS, AOS)
- Periodically update tracker devices’ state in a acceptable period

Quality Attributes - System Modifications

- Smartphone applications can be modified in GUI or efficiency updates
- The system can be further modified to deal with an unstable communication environment.

Quality Attributes - Physical Environment

- The system should work in an environment where wireless connection is stable.

Quality Attributes - Security Issues

- Smartphone applications should not track or manage unregistered tracker devices.
- Tracker devices should not receive messages from unregistered smartphone applications.
- The GPS positions of tracker devices should be stored periodically for the case of a tracker device becoming disconnected.

Quality Attributes - Resources and Management Issues

- Mobile application development skills.
- Mobile GPS api application skills.
- Hardware engineer

Thank you