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Software Engineering 2 Project

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1 Introduction

1.1 Purpose

The purpose of this project is to build a system, called Data4Help, that allows third parties to monitor the position and health status of users. The data are collected by TrackMe, the company that wants to develop Data4Help, and are shared with other companies which are interested in those data. Furthermore, TrackMe wants to develop AutomatedSOS, a system build on top of Data4Help. AutomatedSOS is a service designed for elderly people, it is able to intervene by calling an ambulance if the health parameters of the user are below some fixed thresholds.

1.2 Scope

1.2.1 Description of the given problem

TrackMe is a company that wants to develop a software-based service allowing third parties to monitor the location and health status of users. This service is called Data4Help. The service supports the registration of the visitors who, by registering, allow TrackMe to acquire their data. Also it supports the registration of third parties. After registration, these third parties can request:

- Access to the data of some specific user.
- Access to anonymized data of groups of users.

TrackMe also wants to develop a non-intrusive SOS service for elderly people, called AutomatedSOS. AutomatedSOS is build on top of Data4Help. This service is designed to monitor health status of users and to send an ambulance to the location of the user if some parameters are below some specified thresholds.

1.2.2 Goals

- [G1] Visitor can become User after providing credentials.
- [G2] User can be recognized providing a username and a password.
- [G3] User can accept or reject the request of access to his data formulated by companies.
- [G4] If user's parameters are below specified thresholds, an ambulance is called within 5 seconds.
  - [G4.1] Ambulance is required at current user's location.
- [G5] Company can become a User after providing credentials.
- [G6] Company can be recognized providing a username and a password.

- [G7] Company can formulate a request to see anonymized data of a group of users.
- [G8] Company can formulate a request to see data of a specific user providing his SSN.
- [G9] Company can see anonymized data of a group of users.
- [G10] Company can see data of a specific user providing his SSN.
- [G11] Company can subscribe to users' new data.
- [G12] TrackMe can anonymize data.
- [G13] TrackMe can show users' requested data to companies.
- [G14] TrackMe can forward companies' requests to users.
- [G15] TrackMe can sign a user as follow-able by a specific company.
- [G16] ??? TrackMe able to withdraw a comapny ????

1.3 Definitions, Acronyms, Abbreviations

1.3.1 Definitions

- **Visitor:** a person who still has to register to Data4Help and AutomatedSOS.
- **User:** a person who is registered to Data4Help and AutomatedSOS.
- **Third Parties / Companies:**
- **Data:** User's monitored data: location + heart rate + calories burned + time spent exercising + step walked
- **Threshold:** Flexible value related to the biomedical data acquired by the wearable device in which the system is installed. This value is computed by well-known equation that operate with user's data. It also depends from the kind of activity that a user is doing.
- **Request:** Formal request that a company issue to TrackMe in order to access data of a single user or a group of users.
- **Subscribe to data:** A company which is subscribed to user's data or to group's data, receives the requested data as soon as they are produced.
- **Pendent user:** A user that a company want to follow but has not answered to the following request yet.

1.3.2 Acronyms

- RASD - Required Analysis and Specification Document
- GPS - Global Positioning System
- SSN - Social Security Number

1.3.3 Abbreviations

- [Gn]: n-th goal
- [Dn]: n-th domain assumption
- [Rn]: n-th functional requirement

1.4 Document structure

Introduction gives an introduction to the problem and describe the purpose of Data4Help and AutomatedSOS. It also contains the goals that these systems must be able to deliver to users and third party companies.

Overall Description

Specific Requirements

Formal Analysis Using Alloy includes the Alloy model and the discussion of its purpose. Also, a world generated by this model is shown.

Effort Spent shows the effort spent by each group member while working on this project.

Resources includes the reference documents.

2 Overall Description

2.1 Product perspective

2.2 Product functions

2.3 User characteristics

2.4 Assumption, dependencies and constraints

2.4.1 Domain assumptions

- [D1] The user's email is already known by TrackMe.
- [D2] The user's registration process is carried out through a survey that is sent to the user by an external survey service.

- [D3] A safe user has heartbeat between values x and y depending on his current state (rest, running ecc...).
- [D4] 5 seconds are necessary to send user location and call an ambulance when parameters are below the threshold.
- [D5] Usernames used in the system are unique.
- [D6] Users position is determined by using the GPS inside the smartwatch.
- [D7] When the system shows the position of a user it means that the user is actually there.
- [D8] During the registration process the user inserts his main physical data (height, weight, ...).
- [D9] The user has the physical characteristics that he inserted in the system.
- [D10]
- [D11]

3 Specific Requirements

3.1 External interface requirements

3.1.1 User interfaces

3.1.2 Hardware interfaces

- GPS
- Bluetooth
- Internet Connection
- Photoplethysmography (PPG)
- Accelerometer

3.1.3 Software interfaces

- Google Maps
- Ambulance Service

3.1.4 Communication interfaces

3.2 Scenarios

3.3 Functional requirements

- Ambulance Service

3.3.1 Use case diagram

Name	Visitor sing up.
Actors	User
Goals	[G1]
Input Conditions	There are no entry conditions.
Event Flow	1. The user on the home page clicks on the sign in button to start the registration process. 2. The user fills all the mandatory fills. 3. The user clicks on the confirm button. 4. The system saves the data.
Output Conditions	The user successfully ends the registration process. From now on he can log into the application, providing his credentials and start using Data4Help.
Exceptions	1. The user is already registered. 2. The user inserts no valid information in one or more mandatory fills. 3. The user chooses a username that has already been taken. 4. The user chooses an email that his associated with another user. All the exceptions are handled notifying the issues to the user and taking back the event flow to point 2.

Name	User login.
Actors	User
Goals	[G2]
Input Conditions	There user is already in the homepage.
Event Flow	1. The user inserts is credentials in to the username and password fills. 2. The user clicks on the login button in order to access. 3. The system redirects the user to his profile.
Output Conditions	The user his successfully redirects to his profile.
Exceptions	1. The user insert a not valid username. 2. The user insert a not valid password. All the exceptions are handled notifying the issues to the user and taking back the event flow to point 1.

Name	User accept or reject third party requests.
Actors	User
Goals	[G3]
Input Conditions	There user is already logged.
Event Flow	1. The user picks up a request. 2. The user decides whether accepting it or not. 3. The request is withdrawn from the list of requests. 4. The user is successfully redirect to his home page.
Output Conditions	The user is notified to have actually accepted/reject the request. The third part is notified that a request has been accepted/rejected.
Exceptions	-

Name	Third part sign up.
Actors	Third part
Goals	[G5]
Input Conditions	There are no entry conditions.
Event Flow	1. The third part on the home page clicks on the sign in button to start the registration process. 2. The third part fills all the mandatory fills. 3. The third part clicks on the confirm button. 4. The system saves the data.
Output Conditions	The third part successfully ends the registration process. From now on it can log into the application, providing his credentials and start using Data4Help.
Exceptions	1. The third part is already registered. 2. The third part inserters no valid informations in one or more mandatory fills. 3. The third part chooses a username that has already been taken. 4. The third part chooses an email that his associated with another third part. All the exceptions are handled notifying the issues to the third part and taking back the event flow to point 2.

Name	Third part login.
Actors	Third part
Goals	[G6]
Input Conditions	There third part is already in the homepage.
Event Flow	1. The third part inserts is credentials in to the username and password fills. 2. The third part clicks on the login button in order to access. 3. The system redirects the third part to his profile.
Output Conditions	The third part his successfully redirects to his profile.
Exceptions	1. The third part insert a not valide username. 2. The third part insert a not valid password. All the exceptions are handled notifying the issues to the user and taking back the event flow to point 1.

Name	Third part formulate a request to access anonymized data of a group of users.
Actors	Third part
Goals	[G7]
Input Conditions	The third part is already logged in into the system.
Event Flow	1. The third part selects the form for a group request. 2. The request is filled using drop-down menu. Each drop-down menu is linked to a type of filter. By selecting a filter the company is able to better specify the composition of the group it is interested in. 3. The request is sent to TrackMe by clicking on Send button.
Output Conditions	The request is sent to TrackMe and a message for the correct sending of the request is presented to the company.
Exceptions	-

Name	Third part formulate a request to access data of a specific user through is SSN.
Actors	Third part
Goals	[G8]
Input Conditions	The third part is already logged in into the system.
Event Flow	1. The third part selects the form for a specific user request. 2. The request is filled with the user's SSN. 3. The request is sent to TrackMe by clicking on Send button.
Output Conditions	The request is sent to TrackMe and a message for the correct sending of the request is presented to the company.
Exceptions	-

Name	Third part can access anonymized data of a group of users.
Actors	Third part
Goals	[G9]
Input Conditions	There third part is already logged into the system.
Event Flow	1. The third part accesses the approved group requests section. 2. The third part selects an approved group request. 3. The system redirects the third part to the request result.
Output Conditions	The data requested by the third part are shown.
Exceptions	1. The data requested aren't anonymous since the outcome of the request concerns less than 1000 users. 2. The request was not approved by more than 1000 users belonging to the specific group. All the exceptions are handled notifying the issues to the third part and taking back the event flow to point 1.

Name	Third part can access data of a specific user through his SSN.
Actors	Third part
Goals	[G10]
Input Conditions	There third part is already logged into the system.
Event Flow	1. The third part accesses the approved single user requests section. 2. The third part selects an approved single user request. 3. The system redirects the third part to the request result.
Output Conditions	The data requested by the third part are shown.
Exceptions	1. The user didn't approve the request. All the exceptions are handled notifying the issues to the third part and taking back the event flow to point 1.

Name	TrackMe can anonymise data.
Actors	TrackMe
Goals	[G12]
Input Conditions	Third part has requested data of a group of users.
Event Flow	1. The third part has requested data of a group of users. 2. TrackMe performs the research among the matching users. 3. TrackMe anonymize the data of the selected users.
Output Conditions	The data requested from the third part are anonymized.
Exceptions	1. The data requested aren't anonymous since the outcome of the request concerns less than 1000 users. 2. The request was not approved by more than 1000 users belonging to the specific group. All the exceptions are handled notifying the issues to the third part and taking back the event flow to point 1.

Name	TrackMe can show anonymized data related to a group of users to third parties.
Actors	TrackMe
Goals	[G13]
Input Conditions	Third part has requested data of a group of users OR Third part has requested data of a single user.
Event Flow	TrackMe sends the result of the research to the third part.
Output Conditions	The data requested from the third part are sent.
Exceptions	-

Name	TrackMe can forward third parties requests to users.
Actors	TrackMe
Goals	[G14]
Input Conditions	Third part has requested data of a group of users OR Third part has requested data of a single user.
Event Flow	1. TrackMe sends forward the request of being observed by a specific company to the user. 2. TrackMe marks the user as pendent user.
Output Conditions	The request of being followed by a company is sent to the user.
Exceptions	-

Name	TrackMe can sign a user as follow-able.
Actors	TrackMe
Goals	[G15]
Input Conditions	TrackMe is notified that a user has answered to a following request.
Event Flow	1. TrackMe accesses the profile relative to the specific user. 2. TrackMe reset the state of the user. The user is not pendent anymore.
Output Conditions	The company that issued the request is notified
Exceptions	TrackMe receives a notification by a user that is not pendent. The notification is ignored by TrackMe.

3.3.2 Sequence diagram

3.4 Performance requirements

- AutomatedSOS answers within 5 seconds.