LifeExtender+

Group #16
Report #1

github.com/SE2017/LifeExtenderPlus

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Individual Contribution Breakdown

*Empty boxes indicate no contribution

I.

Task	Trirmadura Ariyawansa	John Eng	Daniel Huang	Chris Kim	Kevin Lee	Kyungsuk Lee
Problem Statement (5)	33%				33%	33%
Glossary of Terms (4)	50%					50%
System Requirements (4)			100%			
On-Screen Appearance Requirements (2)		100%				
Project Management (10)				100%		

II.

Task	Trirmadura Ariyawansa	John Eng	Daniel Huang	Chris Kim	Kevin Lee	Kyungsuk Lee
Stakeholders (2)						100%
Actors and Goals (2)	80%					20%
Use Cases (23)			45%		55%	
System Sequence Diagrams (5)				100%		
Preliminary Design (11)		100%				
User Effort Information (4)	60%					40%

III.

Task	Trirmadura Ariyawansa	John Eng	Daniel Huang	Chris Kim	Kevin Lee	Kyungsuk Lee
Concepts (10)	80%					20%
Association Definitions (5)	20%			70%		10%
Attribute Definitions (5)						100%
System Operation Contracts (5)			80%		20%	
Mathematical Model			10%		90%	
Plan of Work (5)		100%				
References					80%	20%
Proofing		50%				50%

Point Distribution:

Trirmadura Ariyawansa:

5(0.33) + 4(0.50) + 2(0.80) + 4(0.60) + 10(0.80) + 5(0.20) = 16.65

John Eng:

2(1.00) + 11(1.00) + 5(1.00) = 18.00

Daniel Huang:

4(1.00) + 23(0.45) + 5(0.80) = 18.35

Chris Kim:

10(1.00) + 5(1.00) + 5(0.70) = 18.50

Kevin Lee:

5(0.33) + 23(0.55) + 5(0.20) = 15.30

Kyungsuk Lee:

5(0.33) + 4(0.50) + 2(1.00) + 2(0.20) + 4(0.40) + 10(0.20) + 5(0.10) + 5(1.00) + = 15.15

1. Customer Statement of Requirements (CSR)

a. Problem Statement

College can become a very turbulent period in one's life for those who do not manage their time well, as it comes with many responsibilities, ranging from attending class, completing coursework outside of class, and leaving time for leisure and socializing. However, one aspect that many people leave out of their schedule in college is time set aside for physical activity and sleep: both of which are critically important to a person's health. With only twenty-four hours in a day, finding a balance that facilitates managing a healthy lifestyle, time for studying and coursework, and a social life is a challenge for many. Unsurprisingly, unorganized people spend more time in one area, taking time from another. Even if students scheduled time for physical activity, they often do not have the motivation to be active. Although it may be beneficial to put more time into studying or hanging out with friends, it is ideal not to manage your time to the extent where it would be at the cost of one's health.

Background

The importance of health and time management cannot be understated, especially for college students. It is understood that a person who puts time into maintaining their health, eating and sleeping well, as well as exercising, will be able to better avoid a plethora of conditions such as high cholesterol, diabetes, heart disease, stroke, and obesity, which itself comes with a host of health problems. That being said, exercise also benefits those who partake in it in ways other than the prevention of the aforementioned ailments. For instance, those who spend time exercising feel less stressed, less anxious, have better self-esteem, and also feel reduced tension and fatigue. Even more important for college students, the benefits of exercise, as mentioned above, are not only appealing in general, but can also aid students in doing better in the other areas of their lives. Having better self-esteem will help one's social life, and a reduction in tension, stress, and anxiety can make coursework feel that much easier. By

these points alone, the importance of physical activity for young adults is very clear.

According to the Centers for Disease Control and Prevention, an adult needs at least “two hours and thirty minutes of moderate-intensity aerobic activity” and “two days a week of muscle-strengthening activities.” With seven days in a week, equating to 168 hours, two and a half hours equates to merely 1.49% of time in a week. That being said, finding time to fit the moderate-intensity aerobic activity into one’s schedule is not impossible, especially since it is not required for all of the two and a half hours to be done all at once. The time spent in between classes walking between classrooms fits into this category. As for muscle-strengthening activities, many if not all college campuses are equipped with gyms and facilities to meet that exact need. In the case where that is not true, many of these activities can be performed at home without equipment, such as push-ups, sit-ups, and yoga.

Furthermore, adequate sleep is another factor to consider for a healthy lifestyle. The National Sleep Foundation states that young adults should sleep between seven to nine hours each night. Too often, young adults may stay awake for too long, either working or hangout out hours into the night only to wake up for class the following morning with only five to six hours of sleep. Similar to experiencing lack of exercise, a lack of sleep can put young adults not only at the risk of sickness, but can also greatly diminish their overall performance throughout the day as well as cause a lack of smart judgement. On the other hand, getting adequate sleep is essential for people such as college students as it affects the ability to learn and retain information.

Even though most students understand the importance of physical activity and sleep, they do not have the motivation to take an initiative on bettering either facets. Motivation is defined as a natural “process that initiates, guides and maintains goal-oriented behaviors”. Motivation could be split into 3 components: Activation, Persistence and Intensity. Activation is the decision to initiate a goal. Persistence is the continued effort toward a goal. Lastly, Intensity is the concentration and vigor that goes into pursuing a goal. All 3 components are needed in order to succeed. There are 2 theories of motivation that explain why people consider a healthy lifestyle. The first one is the incentive theory. The incentive theory of motivation suggests that people are motivated to do certain task for external rewards like a trophy. The second theory is the expectancy theory. The expectancy theory of motivation suggests that people are motivated

to perform certain task because they expected good outcomes from doing it in the future. This ideology can be used to slowly persuade people into shifting into a healthier lifestyle

Taking into consideration all of these advantages of exercise and sleep and drawbacks with lack thereof, we reach the conclusion that it is imperative that not only college students, but all young adults in general should learn how to schedule physical activities and adequate sleep into their weekly lives. It is crucial that this audience is educated about the benefits of exercising to motivate themselves into improving all areas of their health. Our software aims to accomplish this exact function and much more.

Application

One of the main functions for our software is a scheduler/planner that will attempt to find a way to efficiently fit physical activities, and healthy amounts of sleep into the user's life based on their schedule of classes and work, while leaving enough time to study or participate in other forms of leisure. The application will first request for the user to submit information about their course schedule and/or work hours and the program will use the researched information to attempt to fit the recommended hours for exercise and sleep, while over time, taking into consideration average time spent walking between, for instance, classes on campus. It is our hope that the application will grant some guidance into proper time management that would be useful for people who use the application.

Furthermore, this software will also serve to educate its users on the benefits of a healthy lifestyle, and motivate them to exercise as they use the application. It will make recommendations as to what the user can do or should try in terms of workouts or fitness plans, using information on the user's physical activity that the application records or that the user submits.

The application will be designed to automatically record statistics about the user's daily physical activity patterns. Using GPS integration, the application will attempt to roughly estimate the distance walked or ran by periodically checking the position of the user. It will acquire a distance estimate by summing the distances between each point, but exclude instances where the difference in

distance between two measurements divided by time between the measurements would suggest a movement speed exceeding 15 kilometers per hour, as that may suggest that the user is in a motor vehicle. The application will attempt to estimate the time spent at a gym also by using the GPS. The application will have information on the locations of gyms or parks and will count the amount of time spent in that location or area. The application will remind them 10 minutes before their active period to be at the appropriate location. While the user is at the gym or a park, the application will recommend different activities or workout patterns for the user to try, based on how much time they have, which may gradually increase in intensity with the time the user spends using the application. Through these functions, the application will have a general idea of the user's pattern of physical activity and fulfill both the incentive and expectancy theory of motivation.

To help the user with their sleeping schedule, the application will use the schedule recommendations and will notify the user approximately 45 minutes before it their suggested bed-time, giving them ample time to set aside or save whatever it is they were doing. When the user decides to go to sleep, they may set an alarm to wake them up at the time they need to, defaulted at the recommended time from the schedule. The application will record the amount of time spent sleeping by recording the time between the alarm being set, and the alarm being turned off the following morning. During this time, GPS functionality will be turned off in the interest of preserving battery life.

As the user goes about his or her routine with the application, and as more information is collected, the application will return the collected statistics back to the user to show how his or her capacity changed over time, as well as estimated calories burned using the walking/running distance and time estimates. The application will also separately display the user's health index in order to help quantitatively visualize his or her progress. The health index will be colored according whether the index will drop, rise, or stay constant. For example, if a student has been going to his/her active periods but starts to miss them, the health index will be colored different hues of red/orange depending how likely the health index will drop. The health index will be green if, for example, the student increases his or her active period, showing that the health index can increase. The health index can be shared with other users in order to compare their individual physical health, which in turn increases motivation in the user.

Before the user is scheduled to sleep, the application will provide the highlights of their day which based off the daily information collected. This will motivate users to maintain their goal-oriented behavior for the next day.

b. Glossary of Terms

Active Period: A scheduled event that requires physical exercise in a certain location such as working out in the gym, running in the park,swimming in the local YMCA/gym,and etc.

Health Index: A qualitative number that indicates the individual's health. This number is based on collected information. It will be based on the estimated calories burned which is derived from walking/running distances,time spent in active period, sleeping time and etc.

Highlights: Outstanding daily statistics based off collected information.

2. System Requirements

a. Enumerated Functional Requirements:

ID	Priority Weight	Requirement
REQ - 1	**5**	**System should retrieve schedule from user input**
REQ - 2	**4**	**System should determine an ideal time for user to intake meals throughout the day**
REQ - 3	**4**	**System should utilize user's schedule in order to recommend optimal times to exercise**
REQ - 4	**2**	**System should monitor user's sleep schedule via manual input of how many hours the user sleeps**
REQ - 5	**3**	**System should determine the location of the user**
REQ - 6	**4**	**System should keep track of user's overall performance throughout the day and display it at the end of each day.**
REQ - 7	**4**	**System should log user's input and display graphs and statistics for each piece of information**

REQ - 8	**1**	**System should use the phone's built in GPS to track distance walked throughout the day**
REQ - 9	**5**	**System should allow user to add and take away from their schedule as needed**
REQ - 10	**2**	**System should receive user input for daily miscellaneous responsibilities and activities**
REQ - 11	**5**	**System should let users share their health index with others.**

b. Enumerated Nonfunctional Requirements

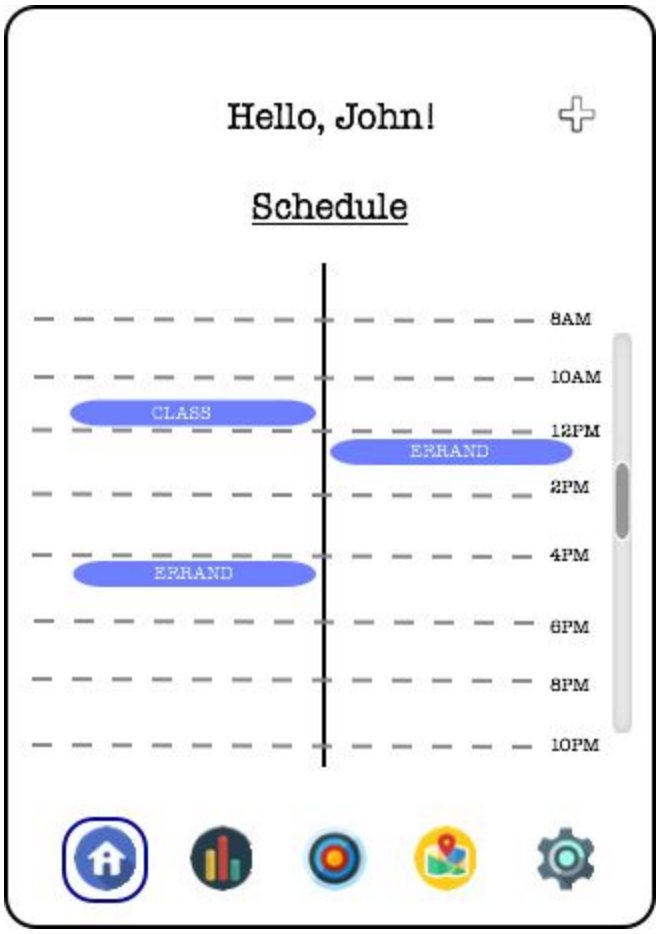
ID	Priority Weight	Requirement
REQ - 12	**2**	**System should use minimal processing power, in order to lengthen battery life.**
REQ - 13	**4**	**System should be easy to recover in case of data loss or change of phone.**
REQ - 14	**5**	**System should be secure in that only the user should be able to access their daily logs and personal info.**
REQ - 15	**5**	**System should be updated as new research is discovered about timing and stress management.**
REQ - 16	**3**	**System should be simple and elegantly designed.**

c. On-Screen Appearance Requirements

There are 5 tabs, that the user can swipe left and right to navigate around. The current tab will be delineated by a round blue rectangle surrounding the tab icon. The current sketches show the main functions of the app. The design takes a modern look.

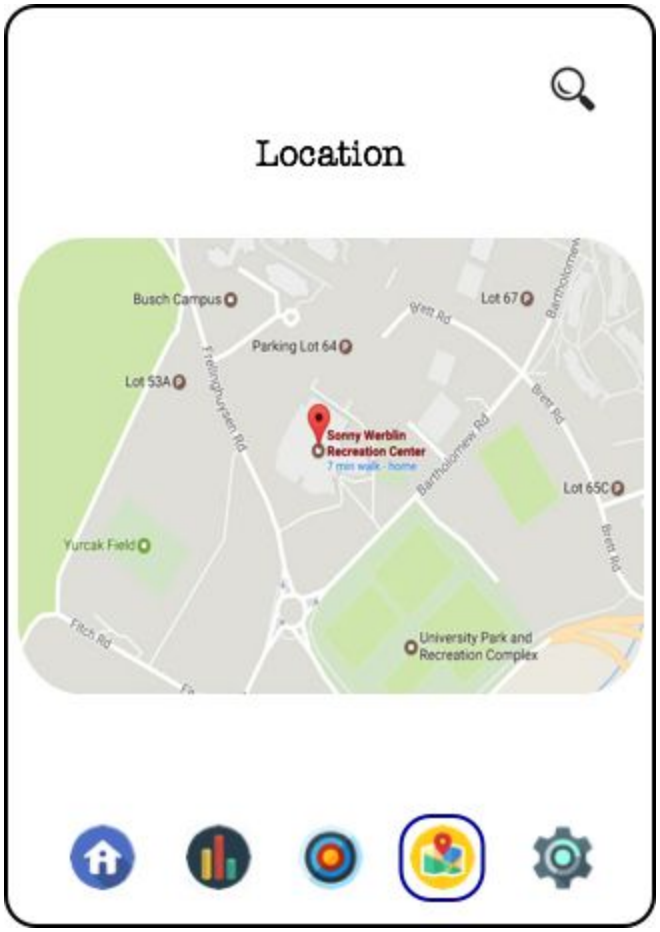
Opening Screen

Upon opening the app, a loading screen will appear with the logo of the app.



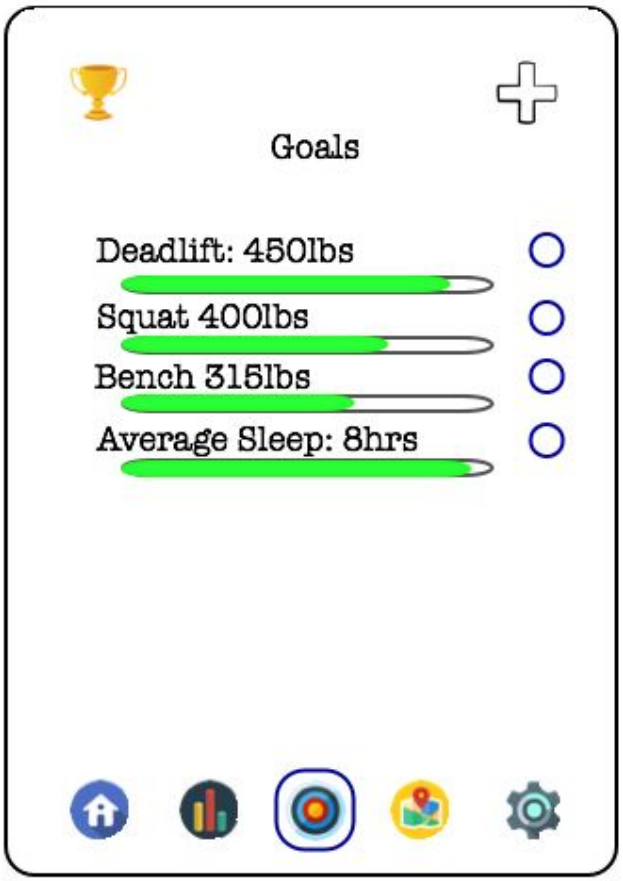
Home Tab

Upon opening the app, the home page will load (After the login page) showing the user's schedule for the day. On the top right, there is an add button to events in schedule or add friends.



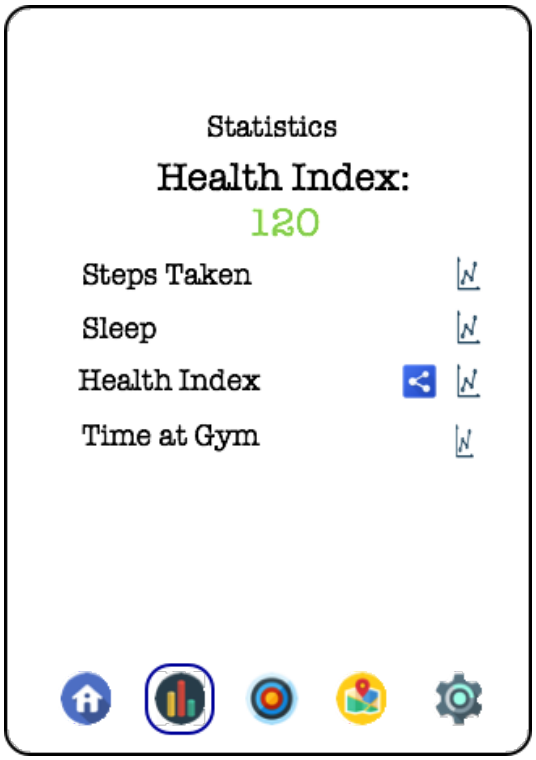
Location Tab

In the location tab, your current location is displayed with a search bar.



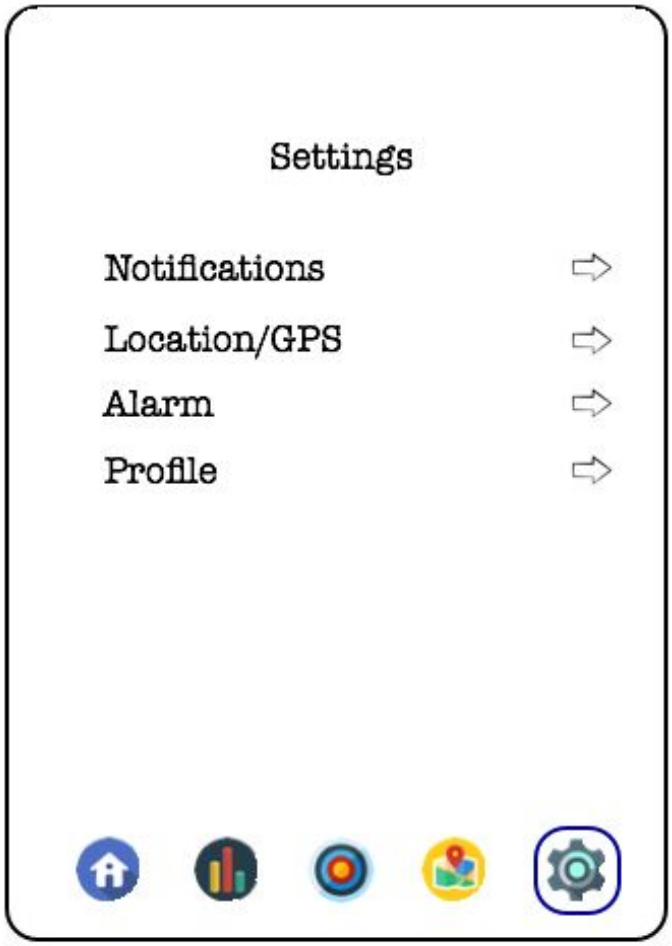
Goals Tab

In the goals tab, you are able to set/update goals, view your progress, and view your accomplished goals (top-left).



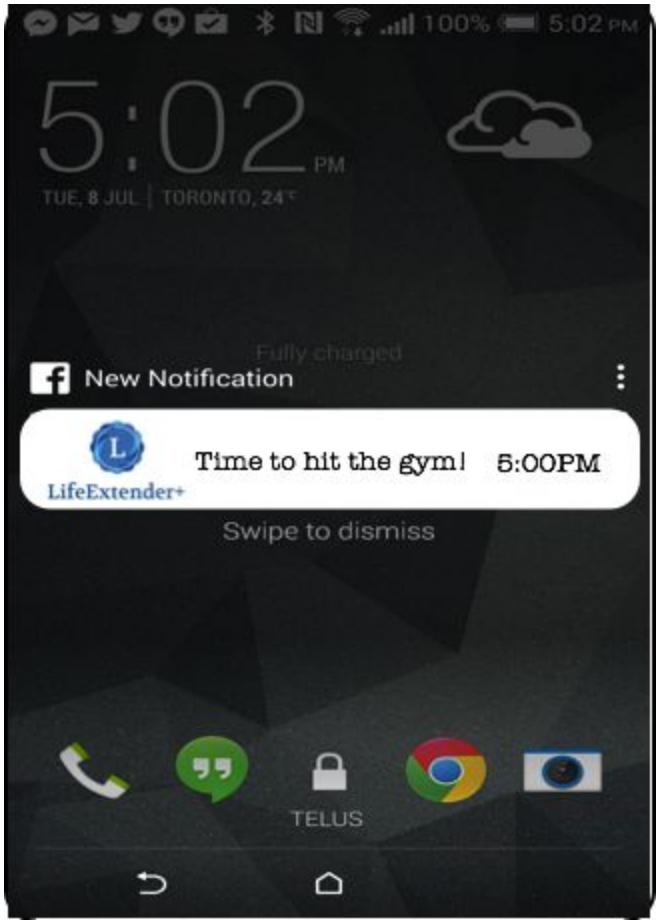
Statistics Tab

In the statistics tab, user will be able to see their health index, share their health index and view graphs of various statistics.



Settings Tab

In the settings tab, you will be able to customize the app to your preference. You will be able to choose what notifications to receive, how GPS is set, alarm settings, and a profile settings for whether you connect with Google Calendar or Facebook.



Notification Screen

A typical notification to be received at designed times.

3. Function Requirements Specifications

a. Stakeholders

Stakeholders are humans or human organizations that have an interest in the software. Since the application will be health related, our primary audience will be those who are affiliated with college and interested in exercise. Other proponents of the application may consist of those who are already versed in fitness. Possible stakeholders for this software are but not limited to:

1. College Students:
   Those who have trouble balancing a healthy life consisting of exercise, food, and sleep with school.

2. University Administration:
   Faculty and staff who are either also interested in balancing exercise, food, and staff with work or intent on improving the student body in health and academics

3. Fitness Centers and Gyms:
   Gyms that are represented in nearby locations that want to promote health and/or their business

4. Exercise and Sports Stores:
   Establishments that want to promote their fitness related equipment, apparel, accessories, etc.

5. Fitness Industry:
   Professional athletes, bodybuilders, and fitness celebrities who want to promote health and/or seek sponsorships

b. Actors and Goals

1. User: a registered user
2. Friend: a special case of the actor "User," related to User
3. Database: records the Users' performance such health index, and other statistics

Actors:	**Goals:**	**Use Case:**
User, Database	To view users' own health index from the database	Gethealthindex (UC-1)
User, Friend, database	To share users' own health index with friend from the database	ShareHealthIndex (UC-2)
User, Database	To view friends' health index from the database	ViewOtherIndex (UC-3)
User, Database	To register users' schedule and other user info into the database by making an account	Register (UC-4)
User, Database	To view statistics and graphs about users' performance in various time intervals	ViewStatistics (UC-5)
User, Database	To login into users' account on the database so the system can track his or her performance	Login (UC-6)
User, Database	To change certain settings like location services and save settings to the database	ChangeSettings (UC-7)
User, Database	To add objectives that the user wants to accomplish	SetGoals (UC-8)
User, Database	To add or delete events or tasks into users' schedule	QuickChange (UC-9)

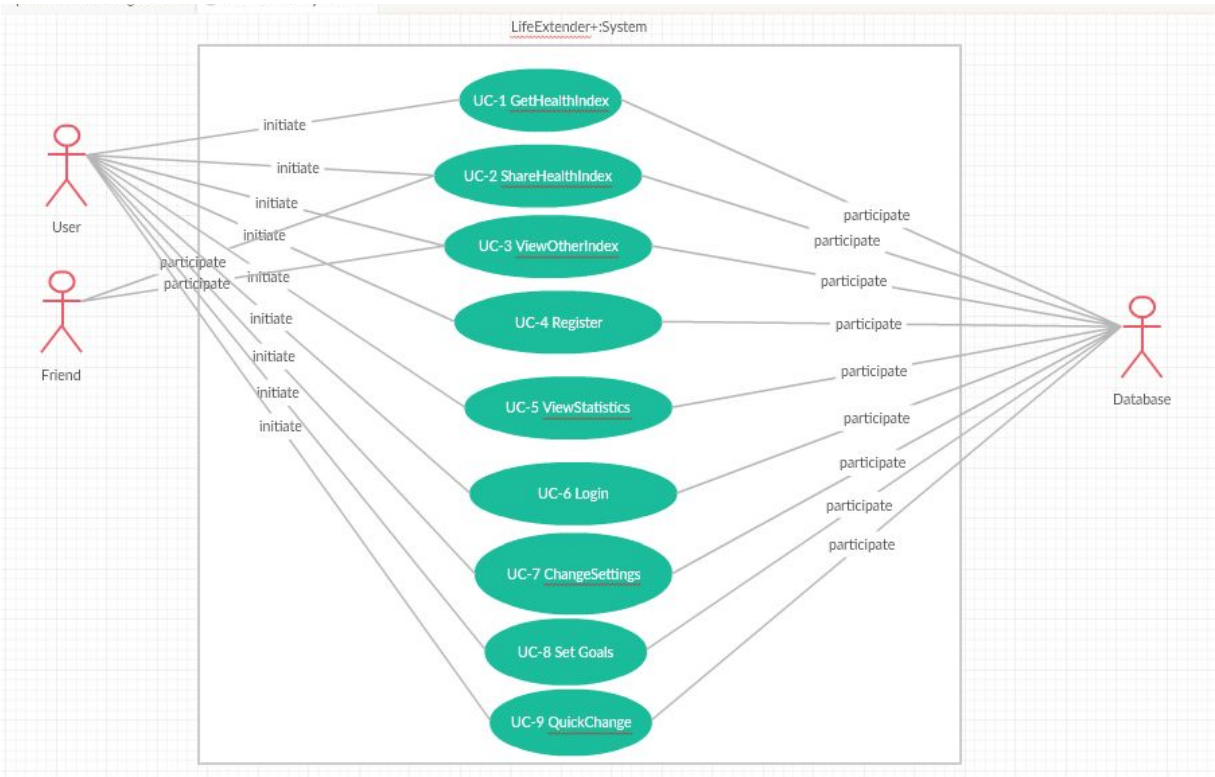
c. Use Cases

i. Casual Description:

Use Case	Use Case Name	Description
UC-1	GetHealthIndex	The user wants to see a public health index based on daily, monthly, and yearly data that is calculated by the system. The system will display the user's health index number compared to previous dates by aggregating weekly, monthly, and yearly data
UC-2	ShareHealthIndex	Allows users to export their health index number to share with others. Only the aggregated number would be shared in order to easily compare standings
UC-3	ViewOtherIndex	User can import other user's health index data from their exported data. It will only include information that the sharing user opts to share, and will only be general information.
UC-4	Register	The user can register events, classes, work hours, errands, etc… into their schedule, and link it to a new or existing account that stores index data
UC-5	ViewStatistics	The user can display statistics of their own physical activity while using this app, and as well as information about their health and health index.
UC-6	Login	On opening the app, the user is prompted with a login screen, where they must input their username and password to access their data and use the functions in the app.
UC-7	ChangeSettings	The user will be able to adjust settings such as GPS update frequency, notification settings, desired time between events (for more customized scheduling), privacy settings, alarms, and change their password. Here the user will also be able to restore data in case of data loss or

		if they change their phone.
UC-8	SetGoals	The user will be able to open a prompt and set goals for themselves such as average sleep, calories burned through walking, weight loss goals, or specific goals based on various exercises.
UC-9	QuickChange	User would be able to add or delete an event to their schedule in case of unpredictable schedule. The system would automatically adjust schedule accordingly.

ii. Use Case Diagram:



iii. Traceability Matrix:

	UC-1	UC-2	UC-3	UC-4	UC-5	UC-6	UC-7	UC-8	UC-9
REQ-1				X					X
REQ-2				X					X
REQ-3				X			X	X	X
REQ-4	X								
REQ-5							X		
REQ-6	X				X				
REQ-7	X							X	
REQ-8	X						X	X	
REQ-9	X				X				
REQ-10	X							X	X
REQ-11		X	X				X		

iv. Fully- Dressed Description:

Use Case UC-1: Get Health Index
● **Related Requirements:** REQ-4, REQ-6, REQ-7, REQ-8, REQ-9, REQ-10, REQ-11 ● **Initiating Actor:** User ● **Actor's Goal:** To receive a health index number ● **Participating Actors:** Database ● **Preconditions:** User is on the homepage of the application ● **Postconditions:** User is shown their health index number according to day, month, and year.
Flow of Events for Main Success Scenario: 1. -> User selects the button for health index 2. <- System retrieves health index number from database based on user input and activity 3. -> User waits for system to update 4. <- System shows user's health index, and an option to share the number with friends **Flow of Events for Alternate Success Scenario:** 1. -> User selects the button for health index 2. <- System tries to retrieve health index number but cannot due to no data 3. -> User waits for system to update 4. <- System displays the error message: "Insufficient data for health index number!"

Use Case UC-4: Register
● **Related Requirements:** REQ-1 ● **Initiating Actor:** User ● **Actor's Goal:** To add a new event to their schedule. ● **Participating Actors:** Database ● **Preconditions:** ● **Postconditions:** A new event, class, or work hours object is added to the user's schedule.

Flow of Events for Main Success Scenario:

1. -> The user selects the Register tab
2. <- The system displays a prompt for information about the event, including start time, ending time (or duration of event), name of the event, recurring or nonrecurring, if the user would like a notification before the event, etc...
3. -> The user will enter all the relevant data and hit submit.
4. <- System will add the new event to the database and the user's schedule and it can be viewed from the schedule window. If the event overlaps with a suggested Meal Time, Gym Time, or Sleep Time, those events may be rescheduled.

Flow of Events for Extensions:

1. -> The user selects the Register tab
2. <- The system displays a prompt for information about the event, including start time, ending time (or duration of event), name of event, recurring or nonrecurring, if the user would like a notification before the event, etc…
3. -> The user will enter all the relevant data and hit submit.
4. <- The system will notify the user that they have entered an event that overlaps with a previously entered event.
5. -> The user can choose to discard one of the two events, or to allow the two events to overlap.
6. <- The system will act accordingly with the user's choice, and update the database with the new event. It will also reschedule any suggested Meal Time, Gym Time, or Sleep Time, should those events also pose a conflict.

Use Case UC-5: View Statistics

- **Related Requirements:** REQ-6, REQ-10
- **Initiating Actor:** User
- **Actor's Goal:** To view personal information from the system, including location history and caloric intake
- **Participating Actors:** Database
- **Preconditions:** User is on the home screen
- **Postconditions:** User is shown personal information for the day

Flow of Events:

1. -> User selects View Statistics button
2. <- System displays multiple options for the user to access, including calorie count and time spent at the gym
3. -> User selects which options they want to see
4. <- System displays the day statistics stored locally for the option selected, in the form of numbers and line graphs, and prompts user for options for weekly or monthly data

5. -> User can choose to display weekly, monthly, or cancel

Flow of Events for Extensions:

1. -> User selects View Statistics button
2. <- System displays multiple options for the user to access, including calorie count and time spent at the gym
3. -> User selects which options they want to see
4. <- System accesses the database to try to find the data necessary
5. -> User waits
6. <- System displays, “Cannot find data needed!”

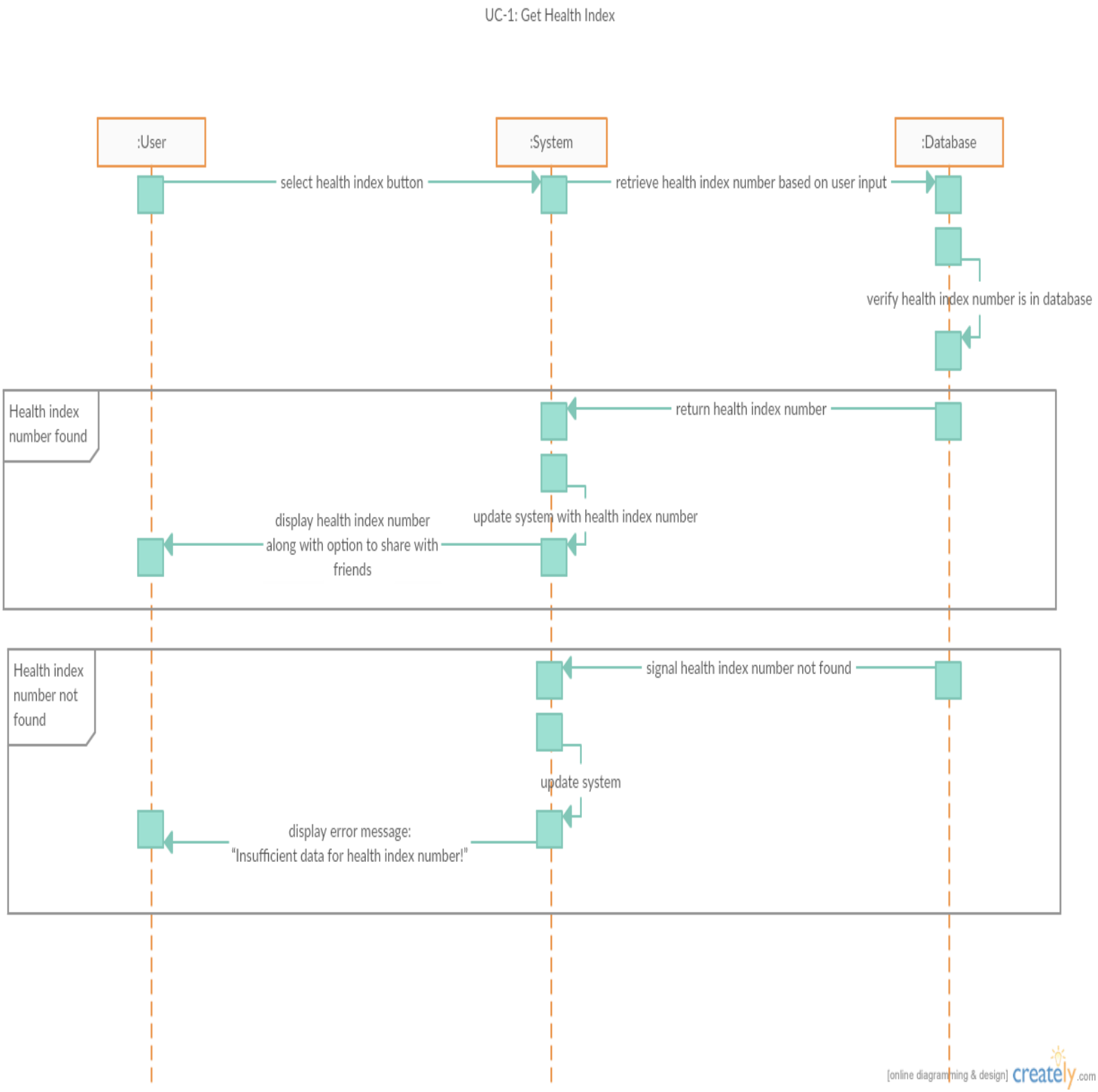
Use Case UC-7: Change Settings

- **Related Requirements:** REQ-3, REQ-5, REQ-9, REQ-12, REQ-13, REQ-14
- **Initiating Actor:** User
- **Actor’s Goal:** To change settings for the app to personalize their usage of the app, or to change the way the app functions to meet the needs of the user.
- **Participating Actors:** Database, GPS
- **Preconditions:** None worth mentioning
- **Postconditions:** All of the changes requested by the user are saved and the application’s function is updated accordingly.

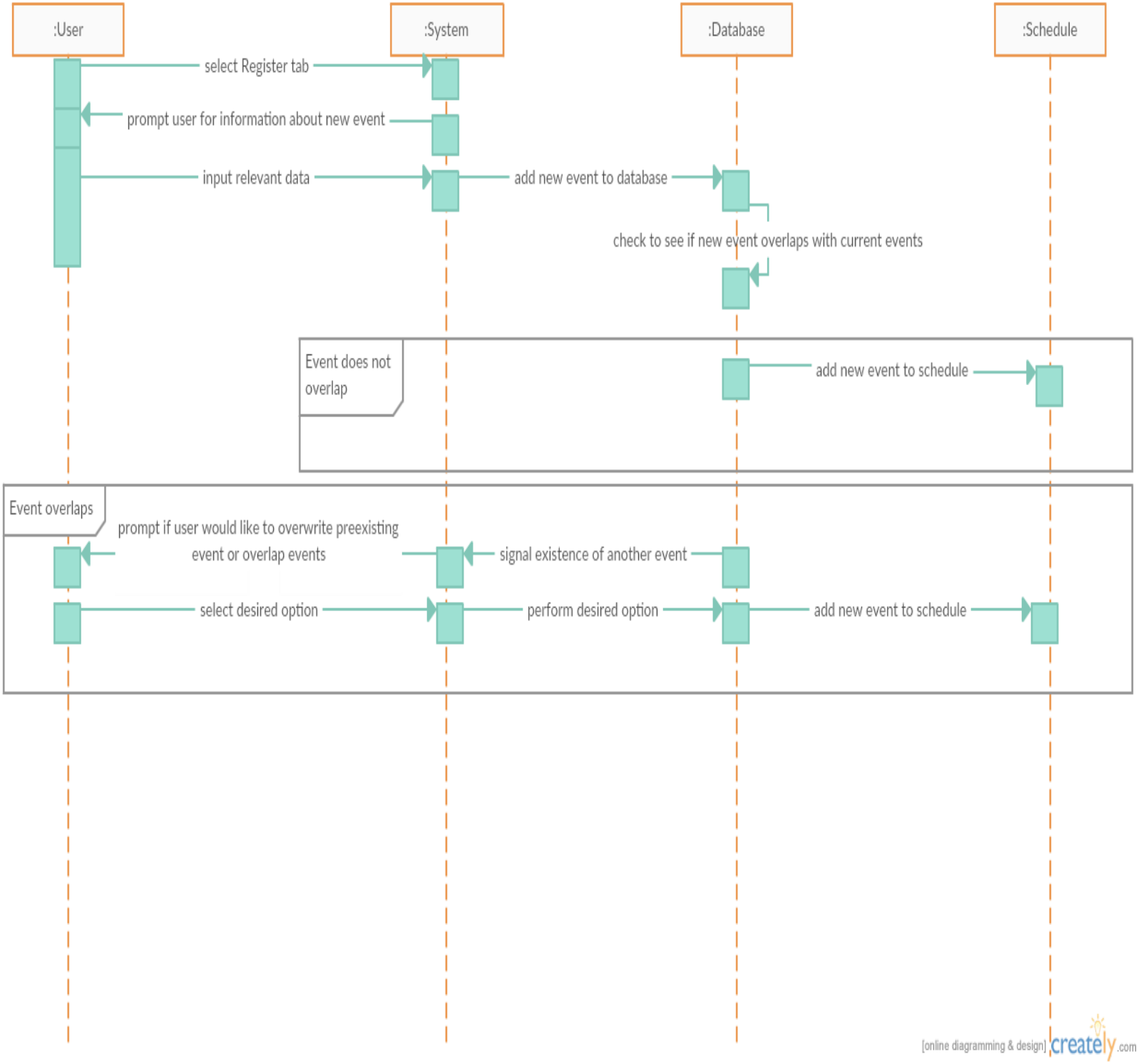
Flow of Events:

1. -> The user opens the settings menu
2. <- The system displays the available options. These settings include notifications, which the user can turn on and off, GPS polling frequency, which the user can increase for walking distance accuracy, or decrease in the interest of battery life, desired time between events (for example, how much time does the user need between events to travel, get ready/dressed, etc…), and the option to change their password.
3. -> The user may go through each option, and make changes as he or she sees fit. The user will then hit save.
4. <- The system will read the updated setting as requested by the user and will change the functionality of the application accordingly.

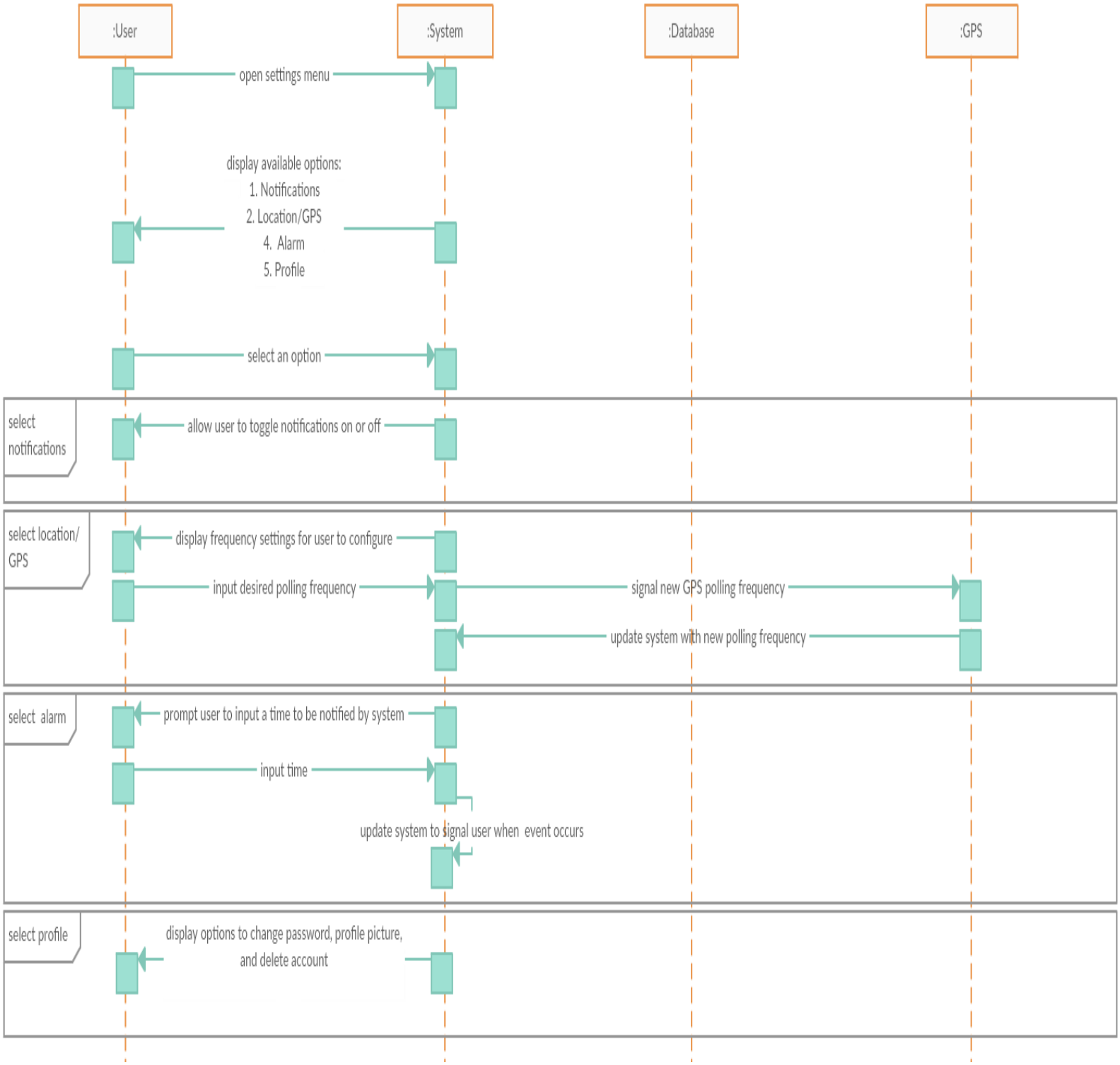
d. System Sequence Diagrams



UC-4: REGISTER



UC-7: Change Settings

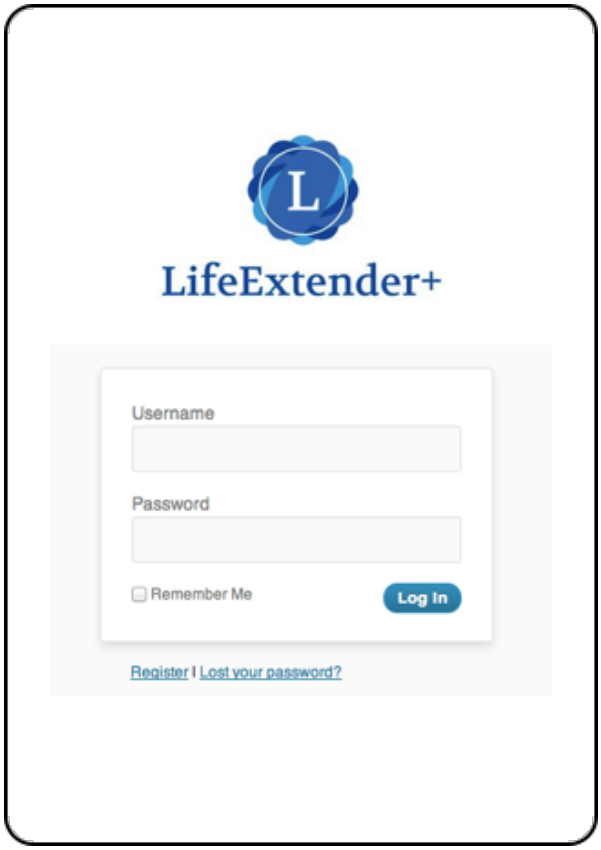


4. User Interface Specifications

a. Preliminary Designs

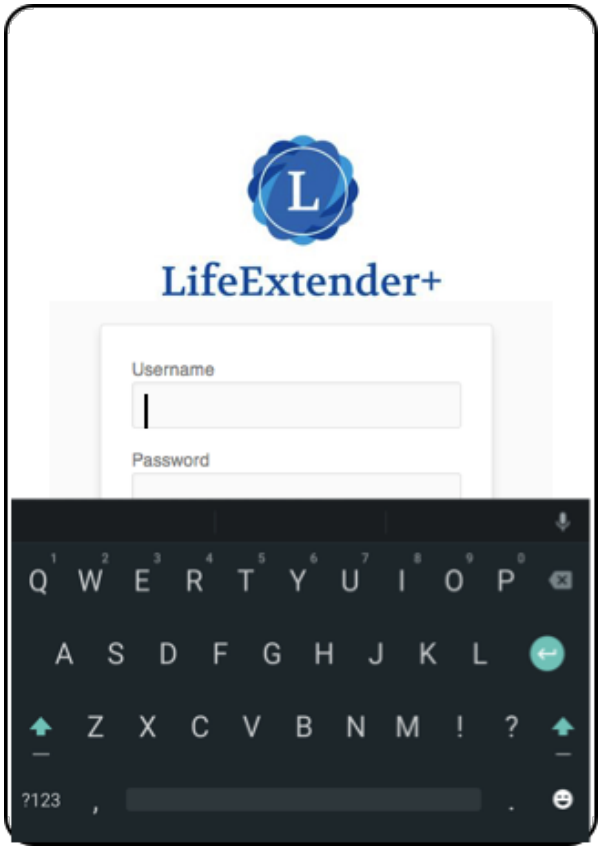
In this section, there will be 6 main sections: login, home, statistics, goals, maps, and settings that will showcase their navigation.

Registration



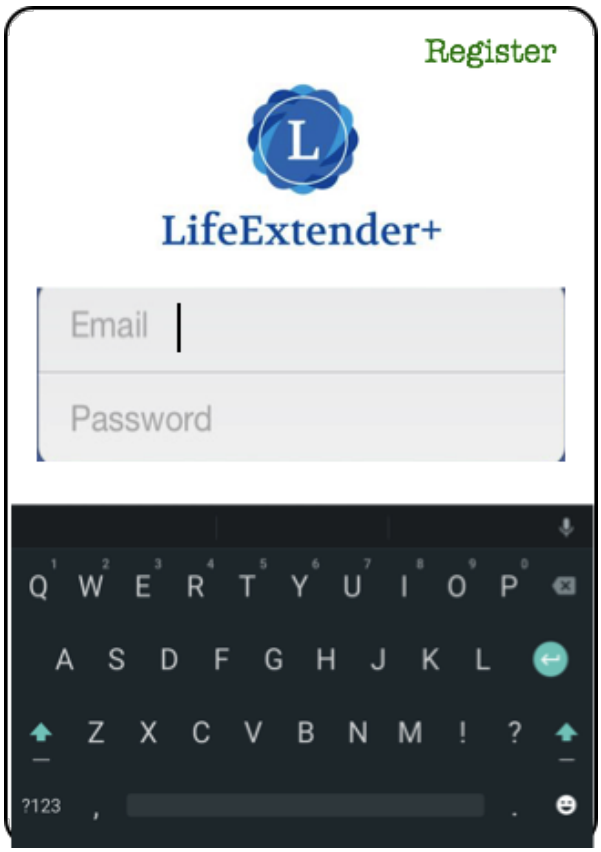
Step 1

Login screen, where user will enter their username (email address) and password. If they do not have an account they, can tap the “Register”.



Step 2

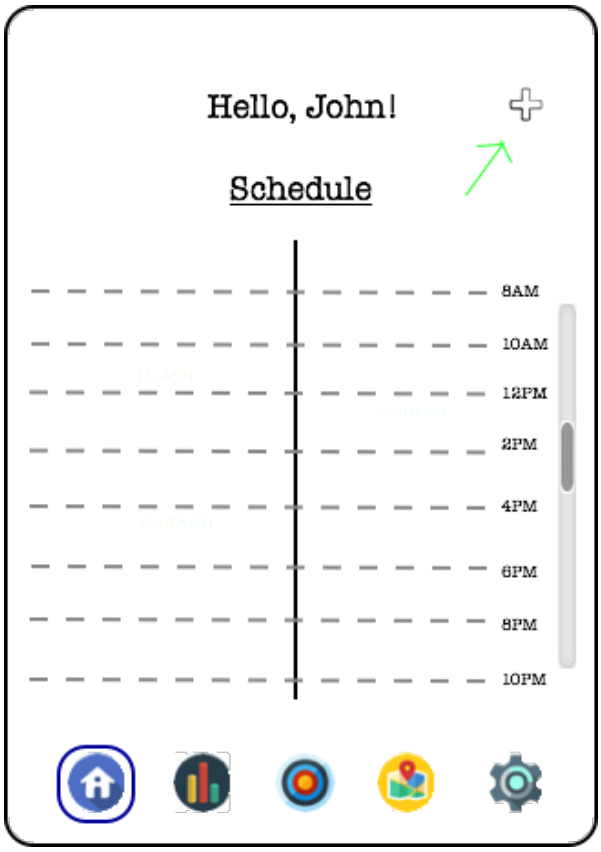
After tapping on the username box, a blinking cursor will appear in the box as well as a keyboard. When finished, tap outside. The same process is repeated for the password box. Then, the Log In button is tapped to finish the process.



Step 3

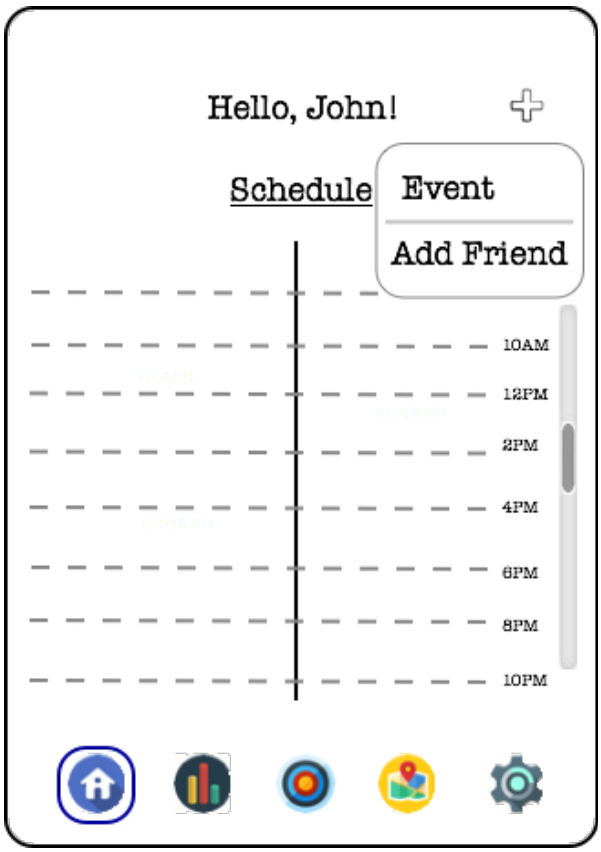
After tapping Register, the registration screen will appear displaying the email and password required to register. Email will automatically display with a blinking cursor and a keyboard. After tapping and enter the password, tap Register on the top right to finish. The user will then be redirected to the Login Screen.

Home Tab Navigation



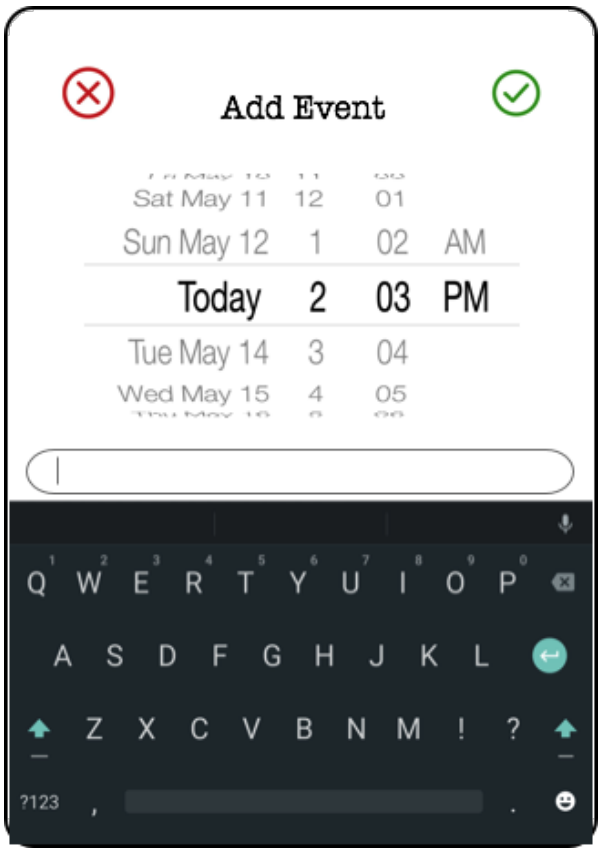
Step 1

Tap the plus button indicated by the green arrow to add a new event (scheduling), food, or gym workout.



Step 2

A dropdown menu will appear to allow user to add an event or add a friend. Tapping outside of dropdown menu will cancel action. Adding a Friend will drop down a keyboard and textbox to input their phone number.



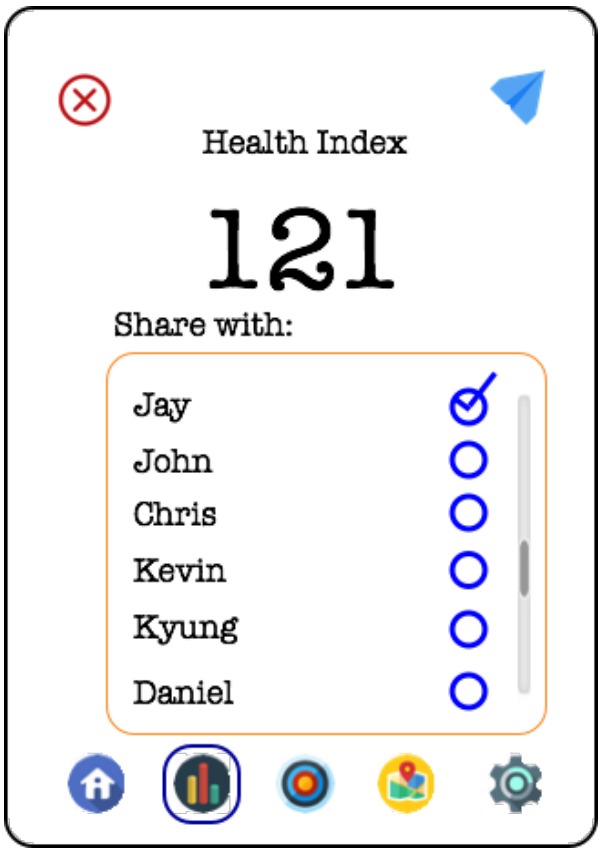
Step 3

After tapping “Event”, a scrolling date-time bar will show up. Date/Time of event can be changed by dragging finger up and down. A rounded box with a blinking cursor and a keyboard will also appear to name the event. Once finished, tap the green check mark or cancel with the red x-mark.

Statistics Tab Navigation

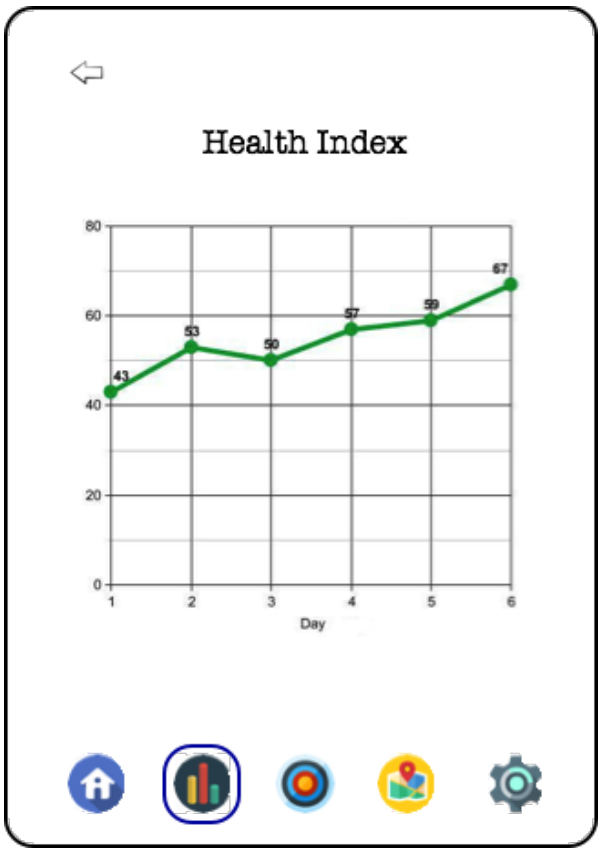
Step 1

By tapping the graph icon indicated by the blue arrow, a user will be able to view the associated graph with category. By tapping the share button next to “Health Index” users can share their health index.



Step 2

After tapping the share button, you will be brought into a new screen with your list of friends with an option to tap on their name to select them. To deselect, tap again. To share, the user will tap on the blue airplane on the top right and cancel with the red x-mark on the top left, returning to the original tab.



Step 3

By tapping the line graph icon, a graph of respective category will be displayed. By tapping the left arrow on the top-left, the user will be redirected to the original tab.

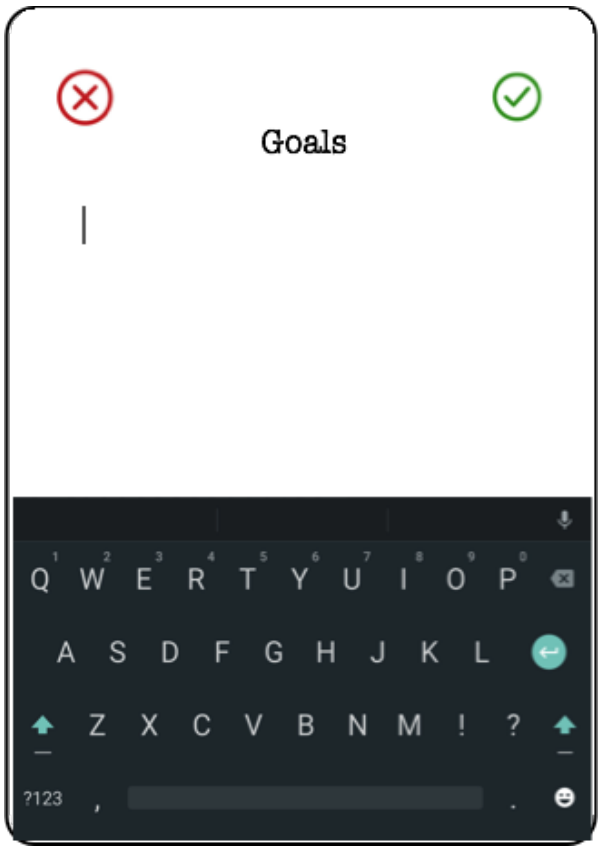
Goals Tab Navigation

Step 1

Tap the plus button indicated by the green arrow to add a new goal or to update a current goal.

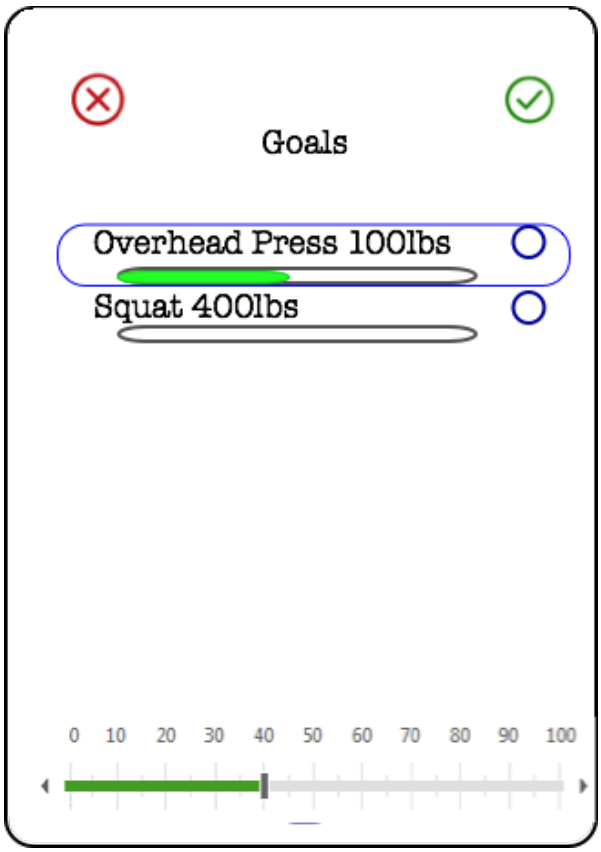
Step 2

A dropdown menu will appear with two options. Tapping “New Goal” will bring the user to step 3. Tapping “Update Goal will bring the user to Step 4. Tapping outside anywhere will close the dropdown menu.



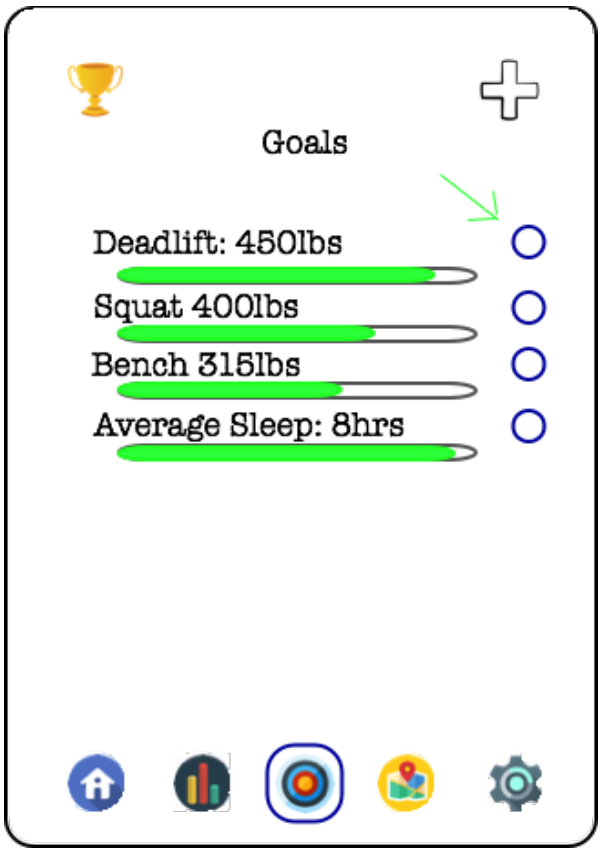
Step 3

A blinking cursor and a keyboard will appear to allow user to type. On the top left and right, the icons have changed to cancel/confirm. Once done, the screen will return to original state.



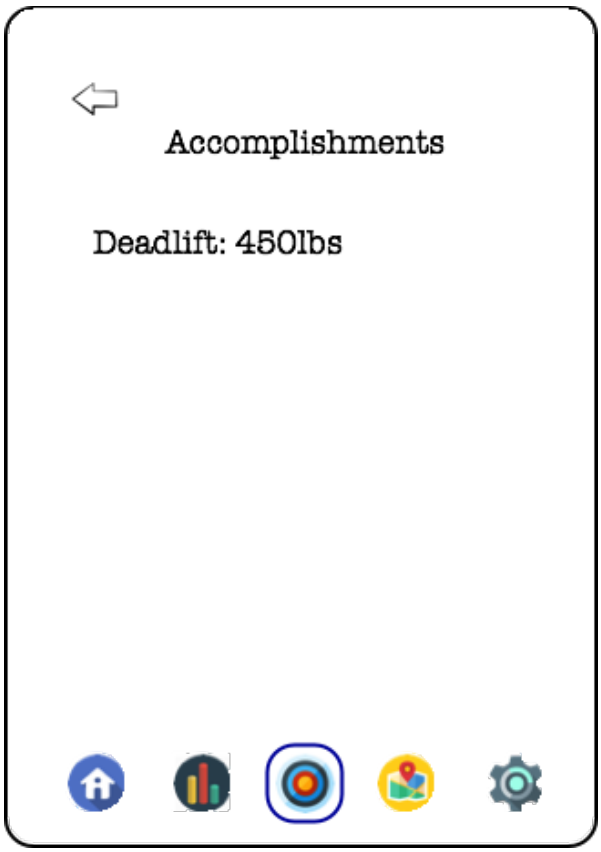
Step 4

After tapping “Update Goal” in step 2, the first goal is encased in a blue round-rectangle. By tapping the goal, the goal will switch. On the bottom, there will be a slider with intervals (if the goal is number based). To finished editing, tap on the check mark. To cancel, tap on the x-mark. Cancelling will not reverse changes.



Step 5

By tapping the blue circle indicated by the green arrow, the “goal” will move over to accomplishments. This can only be done once the green progress bar is full (tapping when not full does not do anything).



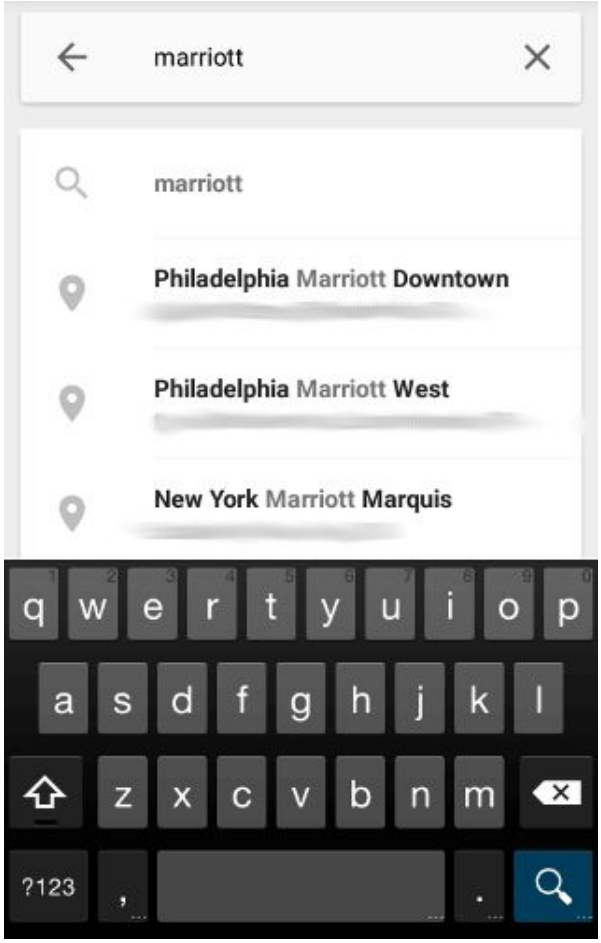
Step 6

Accomplishments will be shown here. Tap on the back arrow will return to “Goals”.

Map Tab Navigation

Step 1

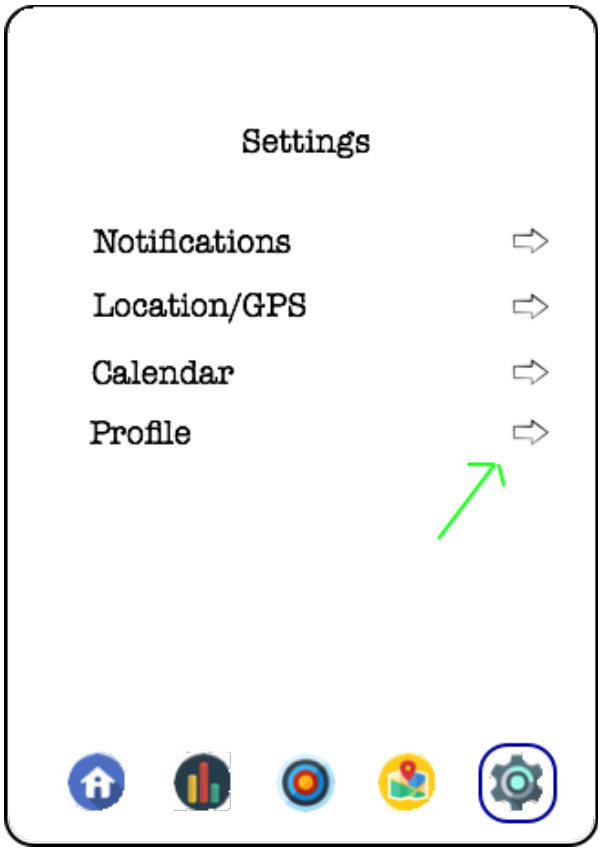
The map can be zoomed in and out and recentered using the buttons indicated by the blue arrow. The search function will allow a user to find a location in the world. This functionality uses the Google Maps API and thus, has its functions.



Step 2

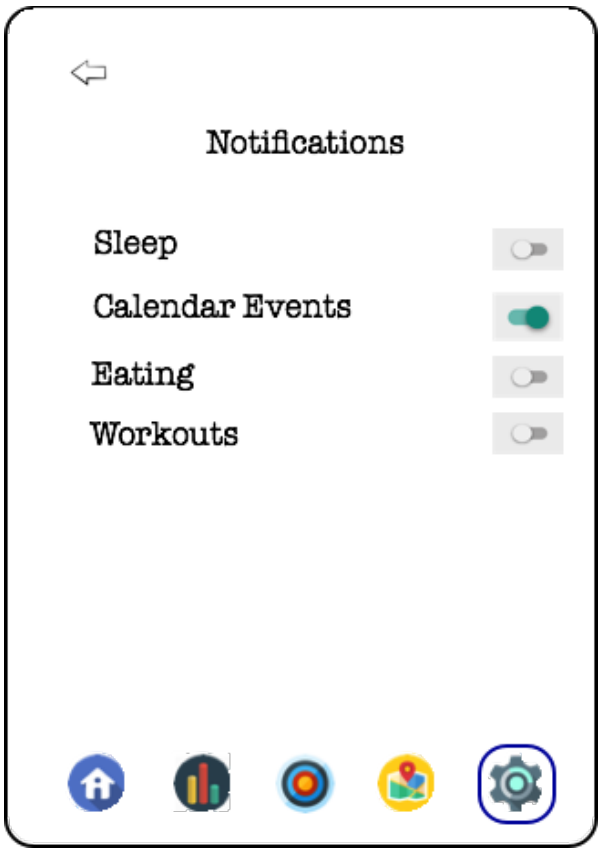
After tapping the search button, the interface will change to adaptive searching (recommendations change to user input).

Settings Tab Navigation



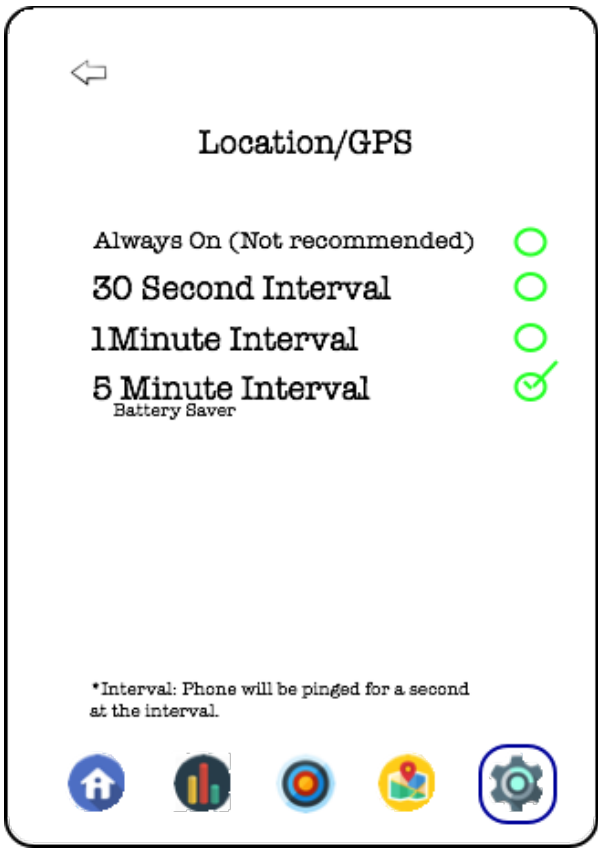
Step 1

In the settings tab, the user can change the options in several categories. By tapping the arrow for the respective category, the specific options for each will be shown.



Step 2

After tapping the arrow for Notifications, the options will be shown will toggle button (tap to enable/disable). Tapping the left arrow in the top-left will return to the original page.

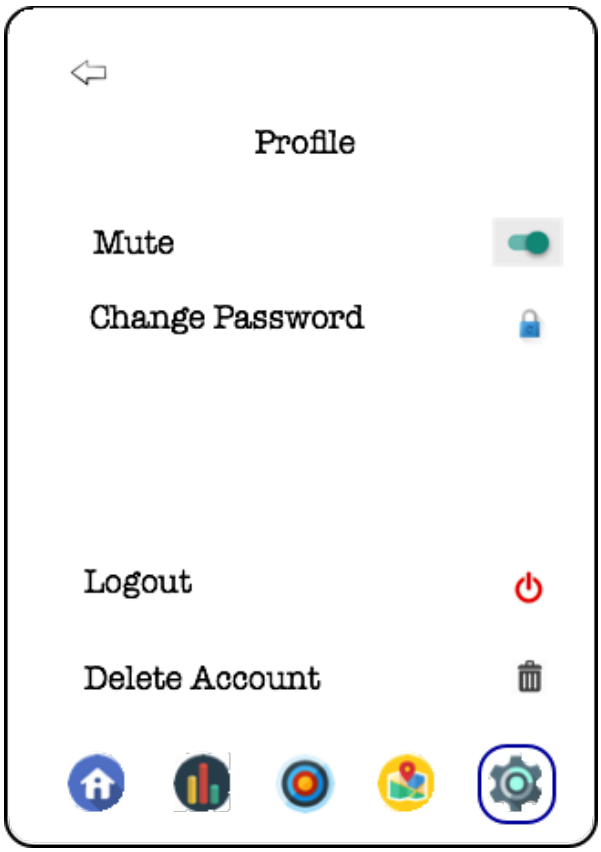


Step 3

After tapping the Location/GPS arrow, there will be 4 options on the setting for the rate that GPS pings the phone. Only one option can be selected (by tapping) at a time. Tapping the left arrow in the top-left will return to the original page.

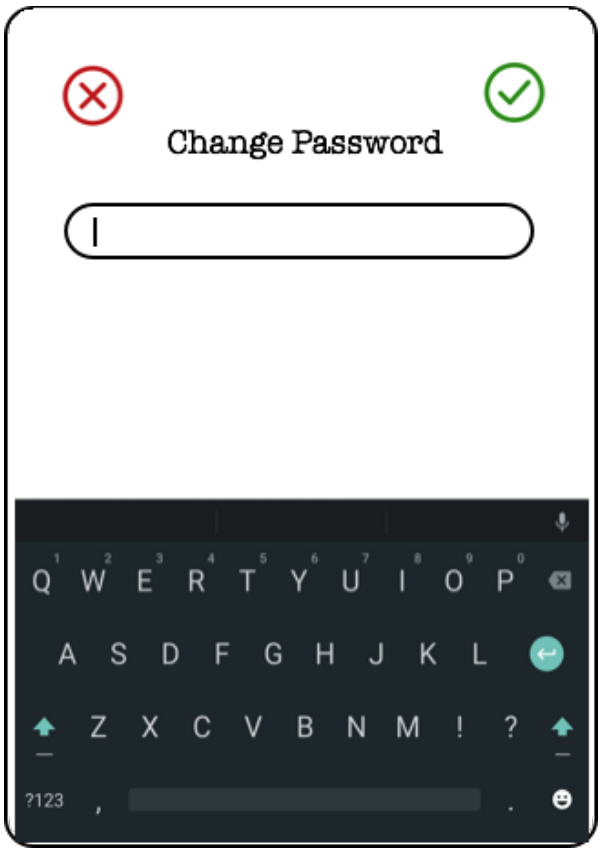
Step 4

After tapping the Calendar arrow, a menu of the options will appear with adjustable times. Tap (and hold to speed-up) on the + or - to increase/decrease time. This is meant for the calendar's algorithm to help a user schedule. Tapping the left arrow in the top-left will return to the original page.



Step 5

After tapping the Profile arrow, options will appear to change the password, delete the account, and to mute the app. Each option is accessed by tapping the icon next to it.



Step 6

After tapping the lock icon to change password, the screen will change to have a blink cursor in a box for the new password and a keyboard. When done tap the green check mark on the top right or tap the red x-mark to cancel on the top-left.

b. User Effort Estimation

i.

Event: Login into LifeExtender+ with an existing account (Username: userexample, Password:expassword)

Navigation: *1 touch strokes*

--after completing data entry--

a. Touch "log in" button to finish

Data Entry: *2 touch strokes and 21 keystrokes*

a. Touch on "username" text box
b. Type out appropriate username (userexample)
c. Touch on "password" text box
d. Type out appropriate password (expassword)

ii.

Event: Add an active period event called GYM to schedule

Navigation: *2 touch strokes*

a. Touch the plus button in the top right corner of the home screen
b. Touch the "Event" button in the drop down menu from the plus button
c. *--after data entry---*
d. Touch the add button to finish

Data Entry: *4 touch strokes and 3 keystrokes*

a. Swipe up and down for the appropriate date and time
b. Type out "GYM" for the name of the event

iii.

Event: Share health index with your friend, James

Navigation: *3 touch strokes*

a. Touch the graph icon on navigation bar
b. Touch the "share" button
c. *--after data entry--*
d. Touch the "okay" button

Data Entry: *1 touch stroke*

a. Select James from friends list

iv.

Event: Add a new goal to “run a mile”

Navigation: *4 touch strokes*

a. Touch the bullseye icon which brings up the goal tab
b. Touch the plus button
c. Touch the "New Goal" option
d. *--after data entry--*
e. Touch the green checkmark button

Data Entry: *8 keystrokes*

a. Type out "run a mile"

v.

Event: Delete an active event called GYM from schedule

Navigation: *2 touch strokes*

a. Touch the event on the schedule on the home screen
b. Touch the “Delete?” button next to the event

Data Entry:

N/A

vi.

Event: Change location/GPS settings settings to 1 minute

Navigation: *3 touch strokes*

a. Touch the gear icon which brings up the settings tab
b. Touch the arrow next to Location/GPS
c. --*data entry*--

Data Entry:

a. Touch the interval option “1 Minute Interval”

vii.

Event: Update the goal “run a mile” to “run a half-mile”

Navigation: *4 touch strokes*

a. Touch the bullseye icon which brings up the goal tab
b. Touch the plus button
c. Touch the “Update Goal” option
d. --*after data entry*--
e. Touch the green checkmark button

Data Entry: *1 touch stroke and 5 keystrokes*

a. Touch the goal “run a mile”
b. Type out “half-”

5. Domain Analysis

a. Domain Model

i. Concept Definitions:

Responsibility	**Type (*D for doing; K for knowing)***	**Concept**
R1. To display all user data and info and receive input from the user	D	Interface
R2. Calculates the user's health index using data from AnalyaticDataGoals	D	HealthIndexCalculator
R3. Stores all friends' and user's health index	K	HealthIndexStorage
R4. Creates lines graphs of user's health data such as total hours of active period, change in health index, walking distance in various time spans (yearly, monthly,daily)	D	GraphMaker
R5. Stores user's health information such as total hours of active period, change in health index, walking distance, and user's goals	K	AnalyticDataGoals
R6. Creates the user's schedule with suggested active periods based off of	D	ScheduleMaker

user's input		
R7. Coordinate actions of concepts associated with use case	D	Controller
R8. Lets user change settings and preferences and retrieves user settings from database	D/K	Settings
R9. User inputs login information	D	LoginEntry
R10. Display status of login	D	StatusDisplay
R11. Checks whether user inputted a valid login	D	LoginChecker
R12. Retrieves and stores schedule from database	K	ScheduleStored
R13. Stores location data like active period location and walking location	K	LocationStorage
R14. Analyzes user's health data and chooses the most impressive stat for the day	D	HighlightMaker
R15. Register user's info and other new user info and sends it into the database	D	Register
R16. Sends user's friend request and receives response	D	FriendRequest

ii. Association Definitions

Concept Pair	Association Description	Association Name
Controller ↔ Interface	Controller will receive requests from the interface and the controller will send information to interface to display.	Provides data
HealthIndexCalculator ↔ HealthIndexStorage	Healthindexcalculator sends the calculated health index to HealthIndexStorage	Provides Data
Controller ↔ FriendRequest	Controller will send user's requested friend info to FriendRequest	Provides data, Convey Request
Controller ↔ ScheduleMaker	Controller will send user's inputted scheduled to ScheduleMaker and ScheduleMaker will send a recommended schedule with active periods	Provides data
Controller ↔ AnalyticDataGoals	Controller request analytical data from AnalyticDataGoals and AnalyticDataGoals will send it.	Conveys request
AnalyticDataGoals ↔	AnalyticDataGoals will	Conveys Request

HealthIndexCalculator	send user's health information to HealthIndexCalculator to calculate the health index	
Controller ↔ HighlightMaker	Controller sends highlights of user's performance to HighlightMaker	Provides data
HighlightMaker ↔ AnalyticDataGoals	HighlightMaker utilizes data from Controller and sends it to AnalyticDataGoals	Provides data
Controller ↔ LocationStorage	Controller will convey a request for location information from LocationStorage and also provide user inputted location data (for designated active period location) to LocationStorage	Provides data/ Convey request
LocationStorage ↔ AnalyticDataGoals	LocationStorage sends AnalyticDataGoals information on user's walking distance and amount of time in certain active period locations	Provides data
Controller ↔ ScheduleStored	Controller sends ScheduleStored the user's inputted schedule	Provides data
Controller ↔ Settings	Controller requests Settings to save certain parameters of the application dependent on the user	Requests save

Controller ↔ LoginChecker	Controller provides LoginChecker with user login information to be verified	Provides data
Controller ↔ LoginEntry	Controller requests for user login information	Conveys request
GraphMaker ↔ AnalyticDataGoals	GraphMaker sends AnalyticDataGoals the graph of all analytics	Provides data
Controller ↔ StatusDisplay	Controller generates what needs to be displayed on the login screen	Generates

iii. Attribute Definitions

Concept	**Attribute**	**Attribute Description**
LoginEntry	Number of Login Tries	Used to ask for information
LoginChecker	Retrieve Login Data	Used to retrieve information
FriendRequest	Send Request, Receive Response	Used to ask for information
LocationStorage	Time in Active Period's Location	Used to store how long user was in active period's location
HealthIndexStorage	User's Health index Friend's Health Index	Used to store friend's health index and user's.
HealthIndexCalculator	Health index equation	Used to calculate user's Health Index information

AnalyticDataGoals	Goals, Time at Active Period, Sleeping Time, distance walking	Used to ask for short/long term goals, stores information, and saves to display
ScheduleMaker	User inputed Schedule, Generated Schedule with active periods	Used to store user's generated schedule and generated schedule with active periods
HighlightMaker	Highlights, Stats	Used to send info on generated highlights and store user's health information
GraphMaker	Stats,Graph	Used to take in user's analytics, shows generated visual
ScheduleStored	Schedule	Used to store info from database

iv. Traceability Matrix:

		Domain Concept	--------	--------	------	----------	--------	--------	-------
Use Case	PW	Interface	Health Index Calculator	Health Index Storage	Graph Maker	AnalyticData Goals	Schedule Maker	Controller	Settings
UC-1		x	x			x		x	
UC-2		x		x		x		x	
UC-3		x				x			
UC-4		x						x	
UC-5		x			x	x		x	
UC-6		x						x	
UC-7		x						x	x
UC-8		x				x		x	
UC-9		x					x	x	

		Domain Concept	--------	--------	--------	----------	----------	----------
Use Case	PW	LoginEntry	Status Display	Login Checker	Schedule Stored	Highlight Maker	Register	Friend Request
UC-1			x					
UC-2								
UC-3			x					x
UC-4					x		x	
UC-5			x					
UC-6		x	x	x				
UC-7								
UC-8			x			x		
UC-9			x		x			

b. System Operation Contracts

<u>OC-1: Get Health Index</u>

Precondition: User is on the Statistics Tab

Postcondition: User is shown their Health Index

<u>OC-2: Share Health Index</u>

Precondition: User is on the Statistics Tab

Postcondition: User is shown their Health Index, and is shown a friends list with options to share with each individual.

<u>OC-3: View Other Index</u>

Precondition: User is on the Home Tab of the app

Postcondition: User is shown a list of their friends, along with each friend's health index

<u>OC-4: Register</u>

Precondition: User is using the app for the first time, or had logged out previously.

Postcondition: User on the login screen, ready to log in with their newly created profile.

OC-5: View Statistics

Precondition: User is on Statistics tab of the App

Postcondition: User is shown a list of statistics that they can view as a line graph.

OC-6: Login

Precondition: User has logged out of the app previously, or is using the app from a phone that is not their own

Postcondition: User is in the Home Tab, with their profile and info loaded

OC-7: Change Settings

Precondition: User is on any tab of the app

Postcondition: User is on the Settings page with their desired setting changed.

OC-8: Set Goals

Precondition: User is on the Goals Tab of the app

Postcondition: User is shown a list of their goals, including the one they just added.

OC-9: Quick Change

Precondition: User is on the Home Tab of the app

Postcondition: User is shown their updated schedule

c. Mathematical Model

The health index of our application is determined by a fairly simple formula, based on the amount of hours reported by the user for their sleep, along with the amount of hours spent at the gym, and the time the user spends walking or running during the day.

The score is 200 by default, which represents the standards put out by the CDC, as mentioned in the CSR. These include two instances of muscle strengthening activities per week (what we will identify as time spent at the gym), 150 minutes of walking per week, which divides down to roughly 20 minutes of walking per day, and seven hours of sleep.

Time spent walking and time spent sleeping will have an equivalent impact on the user's score, at a default 50 points each. These scores will fluctuate daily with the user's activity.

$Walking\ Score = X * 2.5$ [maximum of 75 total points]
$Sleeping\ Score = Y * 0.12$ [maximum of 65 total points]

Where X and Y are time in minutes

What this entails is that if the user walks twenty minutes in a day, they will meet the full score of 50, and any additional walking they do will add to their score. Similarly, if the user gets seven hours of sleep, or 420 minutes, they will achieve the full score of 50. Should the user fail to meet these standards in any given day, their score will be adjusted accordingly.

For instance, if the user gets only six hours of sleep, but walks for 30 minutes that day, the score will be calculated as follows:

$$WS = 30 * 2.5 = 75$$
$$SS = 360 * 0.12 = 43.2$$
$$Total\ (WS + SS) = 75 + 43.2 = 118.2$$

Should the user decide not to use the alarm function, or self report their sleep time, the score will just be defaulted to 45 for that day.

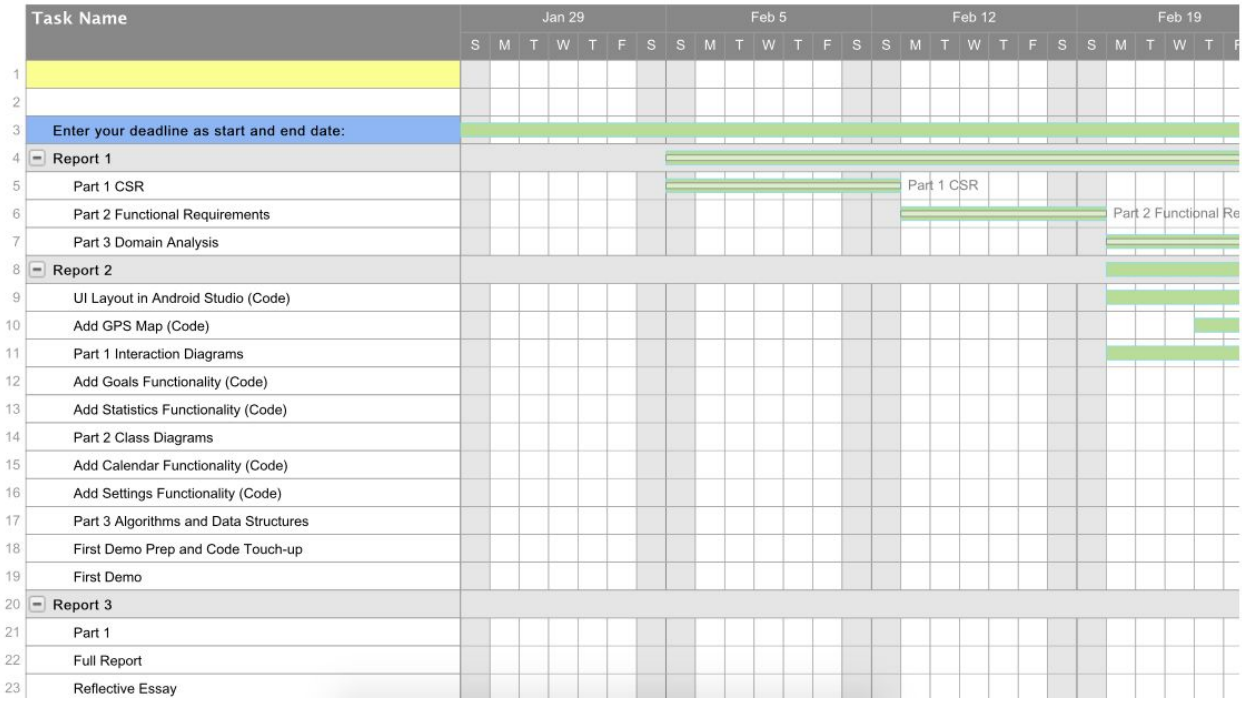
As for muscle strengthening activities, that score will be 100 by default, and will be adjusted weekly, in accordance with the CDC's recommendation of at least 2 instances per week, and will be automatically calculated based on time spent physically active (or can be self reported if the user exercises at home)

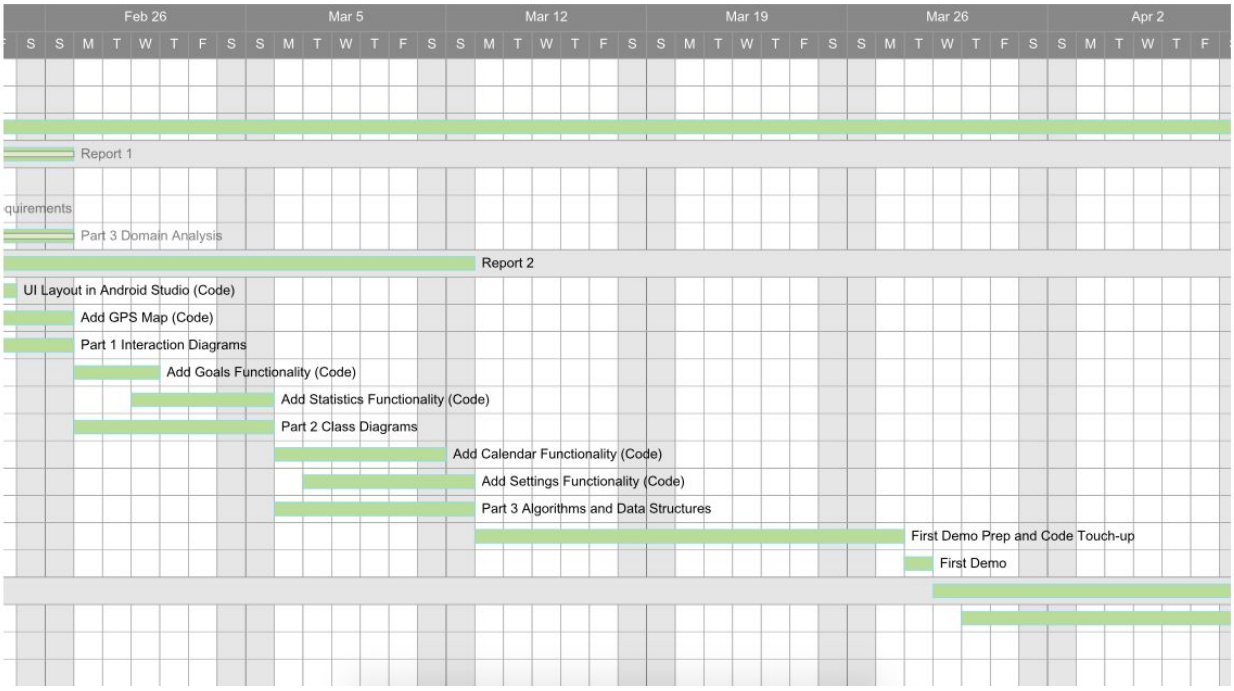
- If the user spends 45 minutes physically active less than twice in a week, their score will decrease by 10.
- If the user spends 45 minutes physically active twice in a week, their score will increase by 10.
- If the user spends 45 minutes physically active 3+ times in a week, their score will increase by 15.

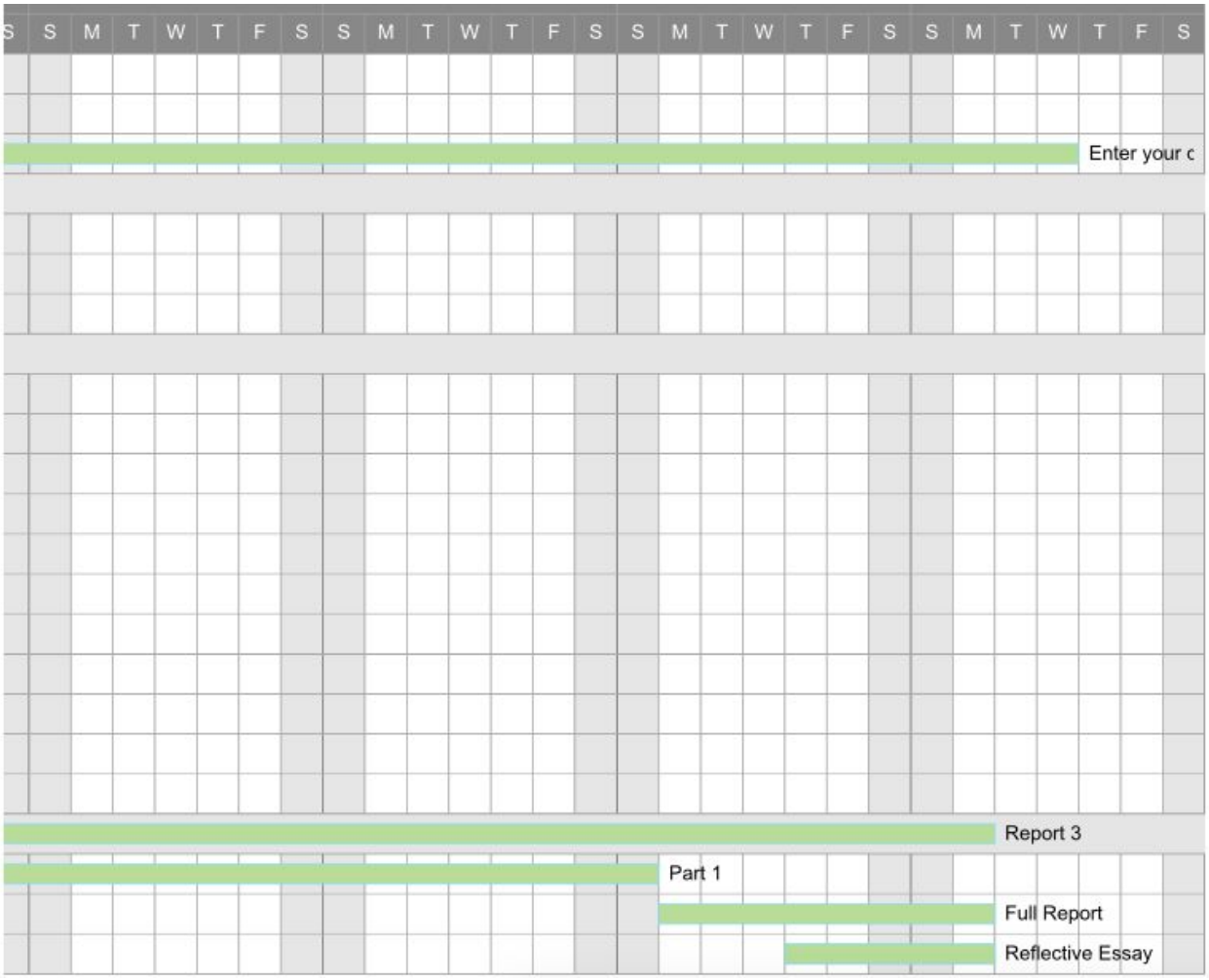
More weight is given to time spent doing muscle strengthening activities and gym time because it is these activities that have the most impact on any user's health.

6. Plan of Work

The Gantt Diagram below shows milestones for how the project will move forward and projected milestones. The distribution of work as of 2/19 will be shown in the Individual Contribution Breakdown above. Future distribution of work is adaptive to current roles (John who did the On-Screen Mockups will naturally do the UI design/coding.) The distribution of work is tentative (as the project develops, wiser distributions can be made and the workload will equalize among teammates). Coding will be done concurrently with parts of Report 2. The basic UI design and simpler functions will be done prior to Report 2 part 3, so that the addition of algorithms and adjustments can be made efficiently and so that the algorithm and UI can be abstracted and split between people. (Gantt Diagram is done in SmartSheet).




Feb 26
Mar 5
Mar 12
Mar 19
Mar 26
Apr 2
Report 1
quirements
Part 3 Domain Analysis
Report 2
UI Layout in Android Studio (Code)
Add GPS Map (Code)
Part 1 Interaction Diagrams
Add Goals Functionality (Code)
Add Statistics Functionality (Code)
Part 2 Class Diagrams
Add Calendar Functionality (Code)
Add Settings Functionality (Code)
Part 3 Algorithms and Data Structures
First Demo Prep and Code Touch-up
First Demo



Task Name	Start Date	End Date	Assigned To	Status	Duration	% Complete
Enter your deadline as start and end date:	**01/29/17**	**05/03/17**			**69d**	
Report 1	**02/05/17**	**02/26/17**	**ALL**		**21d**	**100%**
Part 1 CSR	02/05/17	02/12/17	ALL	Complete	7d	100%
Part 2 Functional Requirements	02/13/17	02/19/17	ALL	Complete	7d	100%
Part 3 Domain Analysis	02/20/17	02/26/17	ALL	Complete	7d	100%
Report 2	**02/20/17**	**03/12/17**	**ALL**	**Not Started**	**21d**	**0%**
UI Layout in Android Studio (Code)	02/20/17	02/24/17	John	Not Started	4d	0%
Add GPS Map (Code)	02/23/17	02/26/17	Trirmadura	Not Started	3d	0%
Part 1 Interaction Diagrams	02/20/17	02/26/17	ALL	Not Started	7d	0%
Add Goals Functionality (Code)	02/27/17	03/01/17	Dan	Not Started	3d	0%
Add Statistics Functionality (Code)	03/01/17	03/05/17	Kyung, Chris	Not Started	4d	0%
Part 2 Class Diagrams	02/27/17	03/05/17	ALL	Not Started	7d	0%
Add Calendar Functionality (Code)	03/06/17	03/11/17	Chris, Kevin, Dan	Not Started	5d	0%
Add Settings Functionality (Code)	03/07/17	03/12/17	John, Kyung, Trirmadura	Not Started	4d	0%
Part 3 Algorithms and Data Structures	03/06/17	03/12/17	ALL	Not Started	7d	0%
First Demo Prep and Code Touch-up	03/13/17	03/27/17	ALL	Not Started		0%
First Demo	03/28/17	03/28/17	ALL	Not Started	1d	0%
Report 3	**03/29/17**	**05/01/17**	**ALL**	**Not Started**	**7d**	**0%**
Part 1	03/30/17	04/23/17	ALL	Not Started	7d	0%
Full Report	04/24/17	05/01/17	ALL	Not Started	7d	0%
Reflective Essay	04/27/17	05/01/17	ALL	Not Started	4d	0%

Excel Format of Gantt Diagram with Work Distribution

Project Management

Product Ownership:

a. Functionality

Calendar*: (Kyung, John, Kevin)*

- Log of users' given information (classes, work, leisure, and sleep)
- Calendar will optimize schedule for user based on inputs
- Notification system

GPS*: (Trirmadura, Chris)*

- Tracks distance traveled
- Tracks steps

Progress Tracker*: (Daniel)*

- Relays highlights of the day/week/month
- Logs time spent at the gym, distance traveled, steps taken,

b. Qualitative Property

- **John:** Settings to enable/disable a choice of notifications to fit user preferences.
- **Kyungsuk:** Option for real-time/batched enumeration and locating method (GPS and/or Wi-Fi and/or mobile networks) to conserve battery usage.
- **Trirmadura:** Option to add local gym and location for certain notifications.
- **Daniel:** Notifications at the end of the day showing the user their progress for the day, in order to motivate the user and reward them for a job well done.
- **Chris:** An award system based on a points metric that will further encourage the user to stay motivated.
- **Kevin:** Design for the user interface, where the user can access settings, input scheduling information, and view their history and statistics.

7. References

1. Exercise and Psychological Health. 2017. Exercise and Psychological Health. [ONLINE] Available at: https://www.unm.edu/~lkravitz/Article%20folder/exandpsychological2.html [Accessed 04 February 2017].
2. CDC.gov. 2017. How much physical activity do adults need? | Physical Activity | CDC . [ONLINE] Available at: https://www.cdc.gov/physicalactivity/basics/adults/. [Accessed 04 February 2017].
3. How Much Sleep Do We Really Need? 3 - National Sleep Foundation. 2017. How Much Sleep Do We Really Need? 3 - National Sleep Foundation. [ONLINE] Available at: https://sleepfoundation.org/how-sleep-works/how-much-sleep-do-we-really-need/page/0/2. [Accessed 04 February 2017].
4. Consequences of Insufficient Sleep | Healthy Sleep. 2017. Consequences of Insufficient Sleep | Healthy Sleep. [ONLINE] Available at: http://healthysleep.med.harvard.edu/healthy/matters/consequences. [Accessed 04 February 2017].
5. Cherry, Kendra. "6 Key Theories of Motivation." *Verywell*. N.p., 14 June 2016. Web. 04 Feb. 2017. <https://www.verywell.com/theories-of-motivation-2795720>.