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BSc (Hons) in Computing (Cyber Security)

Mobile application to Improve Mental Health(Self-Care) (BeWell)

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1 Executive Summary

The main objective of this project addresses the highly important area of mental health with a view to using the technology which is becoming ubiquitous in our lives to assist those with mental health issues through simple lifestyle intervention. This work was based around implementing a mobile application to encourage one or more of the "little things that make a big different to how we feel" as identified and advertise in the recent Irish government campaign.

BeWell allows users with mental health difficulties to improve well-being with three approaches: access relaxation sound recordings, access workout programs and track their physical activities, and log and monitor calorie intake to improve nutrition.

The application will be able to help and improve general health and wellbeing also through this intention by focusing on this key aspect:

- **Improving sleep:** Implemented a sector that will help improve client sleeping. This will involve mediation and breathing patterns technique audios. Science of psychoacoustics will be used to explores sound perception. Also planning to store the data of the sleep to help users how they can sleep better.

- **Encouraging increased movement:** Implemented a sector that will help client with physical exercise. This will include image/video of exercise activities and workout that will help clients with physical and mental state.

- **Encouraging healthy eating:** Implemented calorie Counter that calculate client Total Daily Energy Expenditure (TDEE). (TDEE) is an estimation of how many calories you burn per day when exercise is considered. It is calculated by first figuring out your Basal Metabolic Rate, then multiplying that value by an activity multiplier (Calculator, 2015 - 2018). This section will show the client daily intake by input their food intake every day. Through analyzing the data. The application should let the client know the healthy food intake they are taking in daily.

- **Help Contact:** This section was implemented to let the user know their different help contact they can call or go to. The client can call direct from the app. Also, videos of people encouragement for client to get help.

- **Quiz**: The last sector that was implemented is a quiz sector where user can test themselves to find out how much they know about mental health. This is a fun and engaging way to challenge the user of the application.

2 Introduction

2.1 Background and Research

The reasoning for this project, as a Fitness instructor, Youth Leader as well as the Head Coach for Sport Against Racism Ireland Limited. Working with youth, migrates and refugees in order to help them in different ways. Currently working on two projects 'Hijabs and Hat-Tricks' participants programme to encourage Muslim woman to get involved in physical activities and improve their wellbeing and 'Soccernite' free coaching to boys from disadvantaged areas in the Dublin inner city to help with their mental health and wellbeing. Personally, working with youths that has mental health issues, the area of mental health is always a big interest of mine.

As I mention in my summary the project idea came of Irish government campaign LittleThings campaign with deals with improvement people with mental states. From doing a user online survey and interviews some of the people I work with, there was a big interest from potential users the application.

There are increasing in mobile apps for mental health problems. Also, approximately 80 – 90% of smartphone have sensors such as camera, light sensors etc. It's becoming easy to use the feature to implement it to your application and use it to understand our body and help to improves our lives.

Sleeping is a must in your life and essential. People gain weight, stress out or you can develop major diseases (Diabetes) if you don't get sufficient sleep. We need to sleep to relax the brain and to process all the experiences we had gathered throughout the day. One of my aim is to Rem sleep (Improve sleep).

To mention, smartphone applications wouldn't be able to give deep detail extensive sleep study but capturing sleep data from different patients can help sleep researchers with a low cost and benefit (Mohr, 2015).

The LittleThings campaign leaders designed some posters to remind people of the little things that make a big difference to how we feel. To share them with friends and family (Health, 2017).

In recently research carried out by J Med Internet Res (JMIR), Over 15,000 mobile apps are out in the market for health care and 29% intended for mental health. The apps have different functions to deal with different issues that is related to mental health e.g. symptom assessment, practicing skills learning in therapy, physical exercises etc (Rebecca Grist, 2017).

According to The World Health Organization (WHO), almost 3.2miliion deaths every year due to lack of physical exercise and 31% of adult population inactive.

"Report from WHO also shows 86% of deaths, 77% of the loss of years of healthy life and 75% of healthcare costs in Europe are caused by certain diseases (cardiovascular diseases, cancers, diabetes mellitus, chronic respiratory diseases, mental health

problems and muscular-skeletal disorders) that have in common modifiable risk factors, such as smoking tobacco, excessive weight and obesity, alcohol abuse, the low consumption of fruit and vegetables, physical inactivity, excess fat in the blood and high blood pressure. These risk factors, alone, are responsible for 60% of the loss of years of healthy life in Europe." (Giovanna Sannino, 2017).

To help with sleeping science of psychoacoustics will be used to explore sound perception.

According to Jue Zhang, Ph.D, professor at Chinas Peking University (Heid, 2012)."Pink noise" is one of the sounds that help with deep sleep, a mix of high and low frequencies that sounds balance and natural (Heid, 2012) (MacMillan, 2017).

The application will focus on mental state, nutrition and sleep disorders side of mental health.

The application will focus on improving mental state, nutrition and try improving sleep through audio, that will be the three area BeWell application will try tackle.

2.2 Aims

The aim is to develop a mobile app with a variety of features and functions that a user can easily use to try improving their wellbeing. The "BeWell" is an android based mobile application which helps people with mental health problem through simple lifestyle intervention.

The application will be able to help and improve general health and wellbeing by focusing on some specifications like sleeping improvement, exercise, meal counter and a reminder notification and more. The application should be free to download from a mobile app store or comparable services (Sarah Geagea, 2010).

The application is to help users to achieve a great state of mind when going to sleep, improve general wellbeing through workout and food intake. The application allows user to tap into viewing their status and achievement with workout and view their food intake to help improve health eating.

BeWell System features:

BeWell will allow user to choose what they need to improve:

- Improve sleep
- Improve movement
- Improve eating

BeWell will contain of the following features:

- BeWell will use science of psychoacoustics to explore sound perception to help user sleep well and monitor user sleep
- User will have the opportunity to create a workout, vary their level of workout and track their progression.
- The user will be able to view their analysis of their meal intake.

- User should be able to get notification for a reminder for workout.
- User will be able to test their knowledge through a fun and engagement mental health(Self-care) quiz

2.3 Technologies

The build for my project will be comprised of various technologies, some of which are, Android Studio platform, JAVA, external storage (Google Firebase) and SQLite database for locally storage. Additional technologies that are featured within the application will be consist of Google, YouTube and USDA API and Android wearable.

- **Android Studio:** Android Studio is Android's official IDE. It is purpose built for Android to accelerate your development and help you build the highest-quality apps for every Android device. (Studio, 2017). Android libraries will be used to product the application.
  It offers tools custom-tailored for Android developers, including rich code editing, debugging, testing, and profiling tools

- **Java:** Android app is specified by XML files and the back end uses java code.

- **API:** Android provides different application framework that allows you to provide unique resources for different device.

- **Firebase:** Firebase API is a cloud backend as a service which is a tech start-up firm acquired by Google. It offers all Google APIs packaged into one single SDK. The services contain, authentication, Realtime database, cloud messaging platform, storage, test lab and crash reporting.
  The application will use authentication, real-time database and crash analytics functionality.

  "Firebase is a scalable, real-time cloud data service. It is designed for building real-time, collaborative applications. Data in Firebase is standard JSON, and developers can access it using a client library or the REST API. When accessed through a client library, changes to data are synchronized in real-time to clients within milliseconds." (Consulting, 2016)

  For all user authentication firebase was used to store user data securely.

- **YouTube API:**
  "The YouTube Android Player API enables you to incorporate video playback functionality into your Android applications. The API defines methods for loading and playing YouTube videos (and playlists) and for customizing and controlling the video playback experience." (YouTube, 2018)
  All of the video in the application was pulled from YouTube API reason been not to overload the application internally.

- **SQLite:**
  SQLite is a relational database management system (RDMS). The lite in SQLite means light weight in terms of setup, database administration, and required resource (Tutorial, 2018). For saving the quiz section of the application. SQLite was used to store questions and answers for the quiz.

- **USAD API:**
  Our API provides REST access to the USDA Food Composition Databases. It is intended primarily to assist application developers wishing to incorporate nutrient data into their applications or websites.

2.4 Structure

The structure of this document is as follows, Requirement which contain functional and non-functional requirements. Design and Architecture, which include UML diagrams, use cases, system architecture, hardware and software architecture diagrams. Implementation, GUI, Analysis and Design, Testing, Evaluation, Conclusion and future development.

3 System

3.3 Requirements

3.3.1 Functional requirements

This section lists the functional requirements in ranked order. Functional requirements describe the possible effects of a software system, in other words, what the system must accomplish. Other kinds of requirements (such as interface requirements, performance requirements, or reliability requirements) describe how the system accomplishes its functional requirements. Each functional requirement should be specified in a format similar to the following:

The Functional requirement of BeWell will be the imperative sentence stating highest ranked functional requirement.

- **Registration: -** If User is a new, the system shall let the User to register to the system via Social Network or via register form.

- **Login: -** The system shall let the User login in. User will have to register providing their input username and password which will be validated and authenticated on the server side. Most importantly is that all the data that are going to the server side will be encrypted.

- **Forgot Password:** User shall be able to change or reset their password if they want to.

- **Selecting Option Category:** System shall let the User to select category (Workout, Relaxation sound or Calorie counter).

- **Monitoring progression**: System shall record progress of user Workout activity. User should be able to use a wearable device and get their exercise result on their application.

- **Monitoring Calories:** System shall allow User to get their Total Daily Energy Expenditure, search food intake, view and record their meal counter.

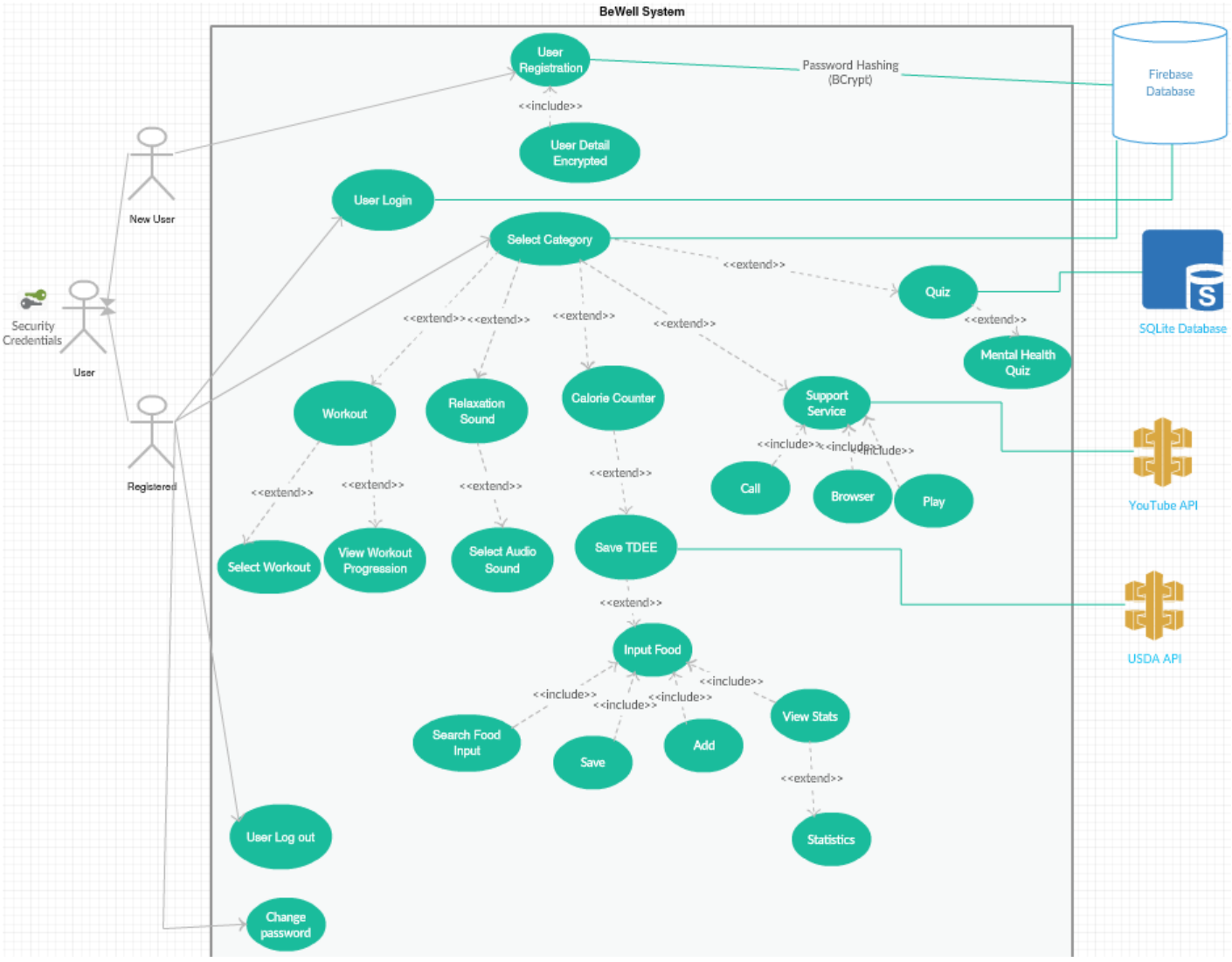
- **Improving sleep:** System shall allow user to select audio to helps the user relax, meditation audio to help improve self-care and pink sound to help user to fall asleep with ease.

- **Support Services:** System shall allow user to view who they can go to for help information and view video of real life stories and how littlething worked for them getting through rough time.

- **Quiz:** System shall allow user to take a mental health quiz to engage user in a fun and challenging way to test their knowledge on mental health.

3.3.2 Use Case Diagram

Each requirement should be uniquely identified with a sequence number or a meaningful tag of some kind.
This is use case diagram illustrates how the mobile application will interact with the user of the system and provides an overview of all functional requirements.

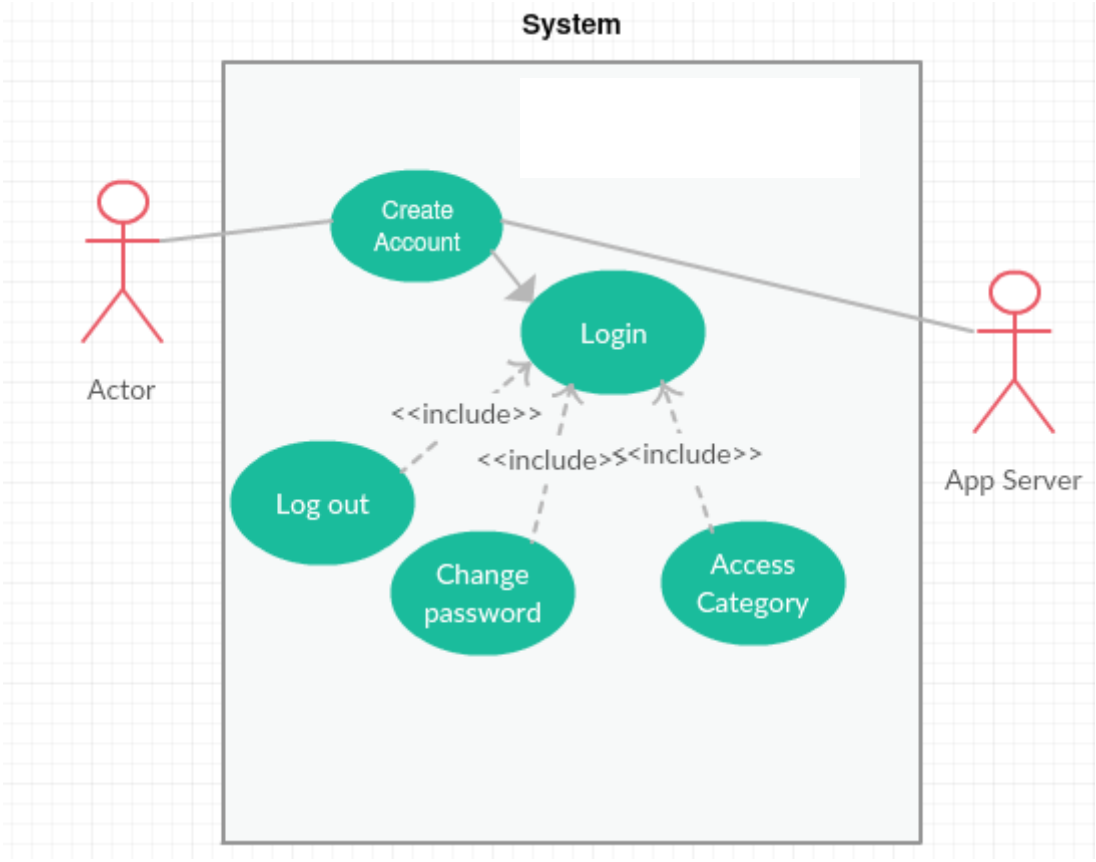


3.3.3 Requirement 1: <User Login & Registration>

Description & Priority

The system shall allow the use to Login or Register to create an account which gives them access to the application. User must provide First name, Surname name, email and a strong password. The priority of this use case is high as the user needs an account to use the application functionalities

Use case Diagram



Scope

The scope of this user is to grant the user access to the application features by logging in or/and register with user credentials.

Description

This use case describes the logging in and registration.

Flow Description

Precondition

The user must enter all fields in the form. The fields are: first name, last name, email, username and password.

Activation

The use case starts when user click signup button or click to create an account with their social media credentials

Main flow

1. The System presents user option to create account with social media credentials
2. The User initialises connection with their social platform
3. The System server collects the information to initialise a session with the user
4. The User proceeds to login
5. The User is able to access activities
6. The System encrypts the data provided by the user

Alternate flow

A1: <Registration>

1. The User clicks on register.
2. The System displays the registration page.
3. The User fill in required details.
4. The system validates the details.
5. The System registers the Users detail to the Database.
6. The System registers the User.
7. The system sends the user to the Login page.

Alternative flow

A2: <Failed Login>

1. The System can't find the user credentials provided in Database.
2. The System displays the error message.
3. The system sends the user to the registration page.

Exceptional flow

E1:<>

1. The user attempts to connect account with social media credentials
2. The app rejects the credentials provided
3. The user is displayed a helpful dialog to either try again or choose a different social platform
4. The app continues at main flow 2.

Termination

The app presents the user to the home screen to proceed with its activities

Post condition

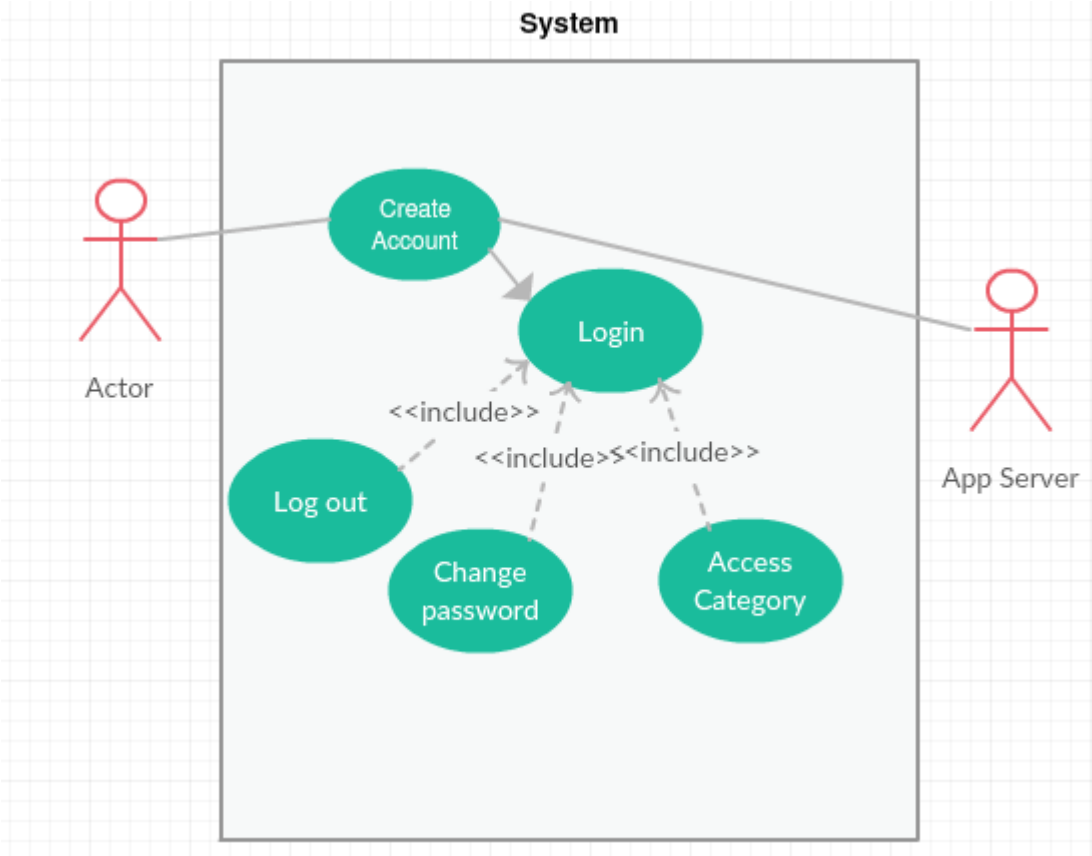
The app awaits user interaction

3.3.4 Requirement 2: <Selecting Option Category>

Description & Priority

User must select the specific category they wish; Exercise, Sleep or Meals. This allows the System to allow User to select the platform for the specific category they want.

Use case Diagram



Scope

The scope of this use case is to allow User to select platform category they want.

Description

This use case describes the procedure to selecting a category and the users begin presented with their platform to start their category.

Flow Description

Precondition

The System presents the user to the home screen to select specific category

Activation

The use case starts when the user 'selects their category'

Main flow

1 The User selects their category
2 The System initializes the platform for the user
3 The User attempts to start the platform the choose

Alternate flow

A1: < Selects their category >

1. The User clicks on one of the option: Workout, Relaxation Sound, Calorie Counter, Support Services or Quiz.

Termination

The System grants the user access to click the option category they want

Post condition

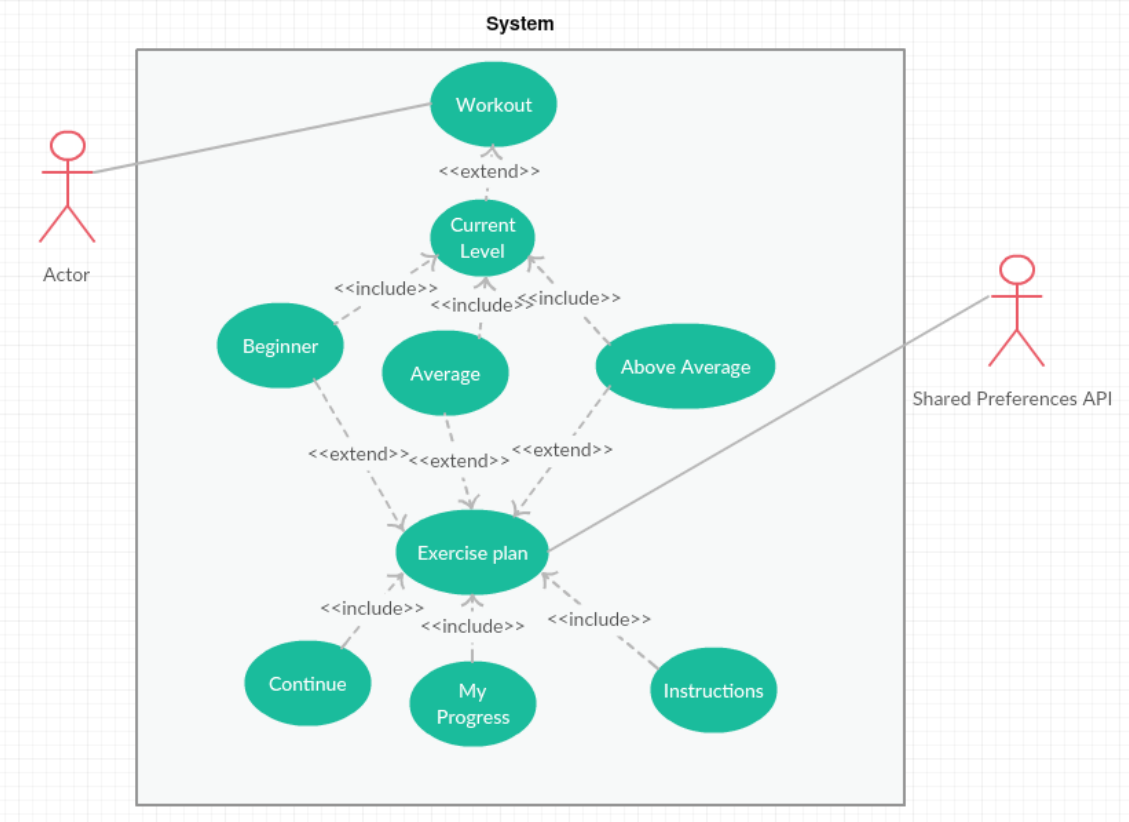
The system will take the User to the category they want.

3.3.5 Requirement 3: <Monitoring Progression >

Description & Priority

When user select Workout. This allows the system to setup the platform for their workout.

Use Case Diagram



Scope

The scope of this use case is setup the workout platform based on the user's specific category.

Description

This use case describes the procedure when user select workout from the category. The system will present platform to pick the work level that suit them and start their workout.

Flow Description

Precondition

The system presents the user category and then the user select workout

Activation

The use case starts when user click on ‘Workout’ from the category

Main flow

1 The User selects their specific category
2 The System initializes the platform for the user
3 The User select ‘Workout
4 The User pick the level of workout exercise
5 The User pick Beginner, Average or Above Average workout
6 The User attempts to start their ‘Workout’
7 The System starts the workout exercise
8 The User can rest after time count down
9 The User resumes the exercise
10 The User attempts to stop exercise
11 The System stops the exercise and saves information during the session.

Alternate flow

A1: <Rest during Exercise >

1. The user takes a break to take rest during exercise
2. The app will pause the session while resting is being executed
3. The user will resume their exercise to finished up the workout

Exceptional flow

E1:< Exercise not resume >

1 User can’t resume to exercise
2 User need to go back to main page, pervious exercise is saved
3 The System will continue at main flow

E2:< Phone Call >

1. The user answers another feature on the device i.e. phone call
2. The app will pause the exercise in the background
3. The user reopens the app from the background task
4. The exercise is in a pause state
5. The user reactivates the exercise
6. The app goes to main flow 9

Termination

The system saves User workout activities automatically when workout done

Post condition

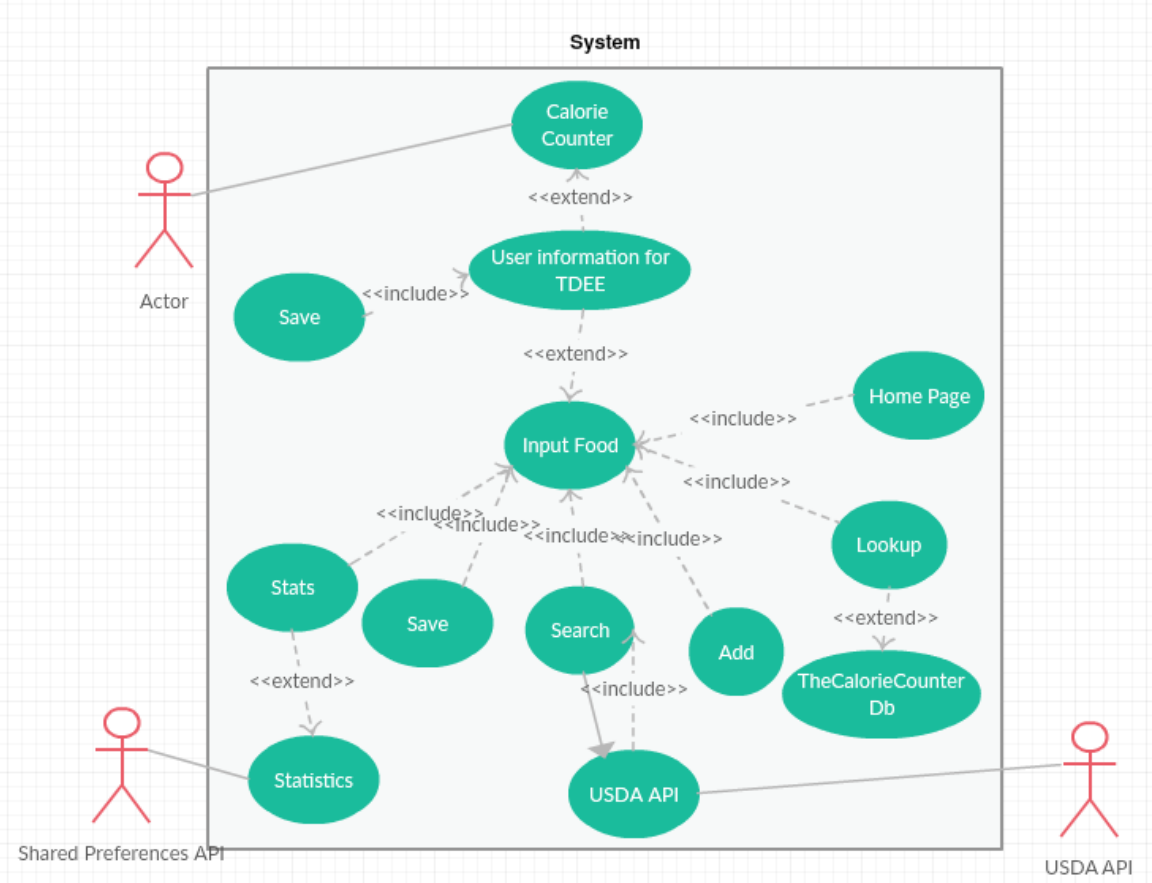
The system saves user progressing

3.3.6 Requirement 4: < Monitoring Meal>

Description & Priority

When user select Calorie Counter. This allows the system to setup the platform for their meal.

Use Case Diagram



Scope

The scope of this use case is setup the calorie counter platform based on the user's specific category.

Description

This use case describes the procedure when user select calorie counter from the category. The system will present platform for Calorie counter

Flow Description

Precondition

The system presents the user category and then the user selects Calorie counter

Activation

The use case starts when user click on ‘Calorie Counter’ from the category

Main flow

1. The User selects their specific category
2. The System initializes the platform for the user
3. The User select ‘Calorie Counter’
4. The User enter information detail (Gender, Age, Height, Weight, Activity Level and Goal)
5. The System saves the information.
6. The System show User goal calories per day intake
7. The User input the food they eat
8. The User add number of calories of the food they eat
9. The User add to food input
10. The User save the food
11. The System stores the food information
12. The User click Stats
13. The System shows User analysis graph of the food intake daily
14. The System shows User average calories per day intake
15. The System show goal of the User if above or below daily intake.

Alternate flow

A1: <User input food they eat >

1. User add food they eat
2. User click Search
3. The System add number of calories automatically
4. User continue from Main Flow 10

A2: <Meal already entered >

1. The System checks if the meal already entered
2. The System confirms that enter already entered.
3. The System notifies the User.

Exceptional flow

Termination

The Use case is terminated when the User is notified that their calories is stored

Post condition

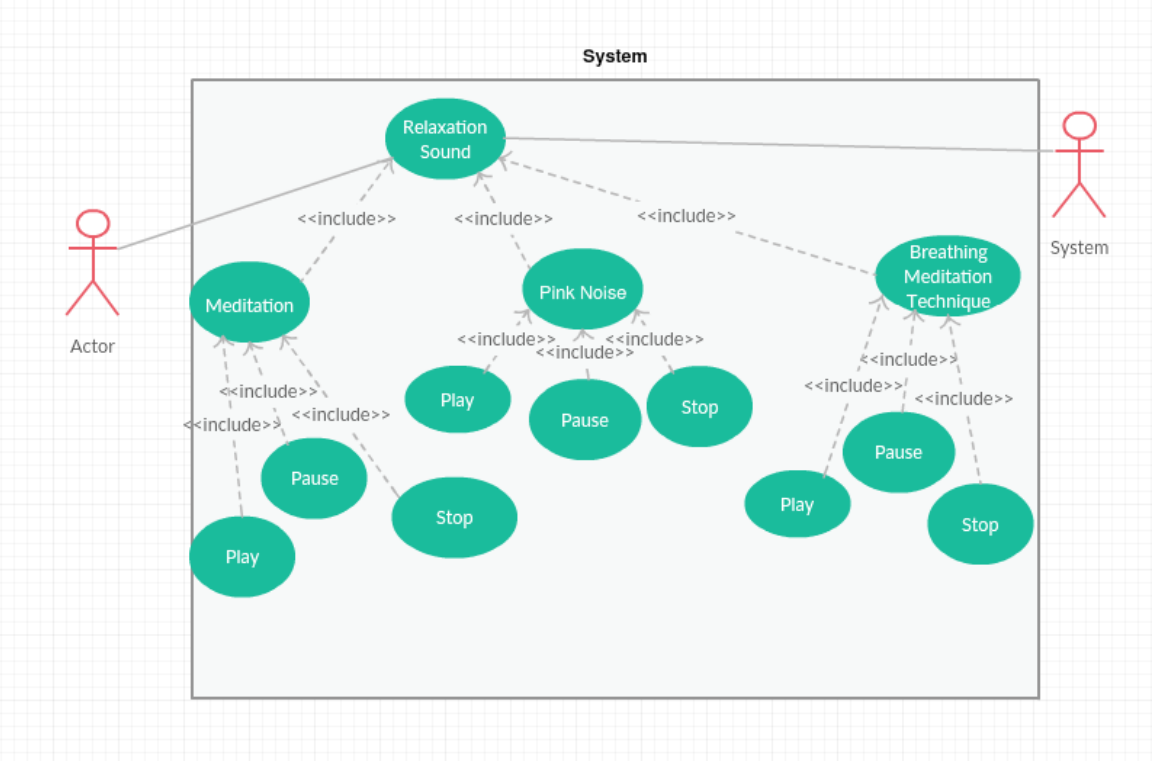
The system saves user meal and user can view stats on the achievement goals.

3.3.7 Requirement 5: < Improving Sleep>

Description & Priority

When user select Calorie Counter. This allows the system to setup the platform for improving sleep function.

Use Case Diagram



Scope

The scope of this use case is setup the Relaxation sound platform based on the user's specific category.

Description

This use case describes the procedure when user select relaxation sound from the category. The system will present relaxation sound platform

Flow Description

Precondition

The system presents the user category and then the user selects relaxation sound

Activation

The use case starts when user click on 'Relaxation Sound from the category

Main flow

1. The User selects their specific category

2. The System initializes the platform for the user
3. The User select ‘Relaxation Sound’
4. The system shows instruction
5. The System shows Meditation audio or Pink Noise audio or Breathing Meditation Technique audio.
6. The User clicks which option to start.
7. System active according to User choose

Alternate flow

A1: < Meditation >

1. The System checks if User select Meditation
2. The User click Play, pause or Stop
3. The System start audio sound perception

A2: < Pink Noise >

1. The System checks if User select Pink Noise
2. The User click Play, Pause or Stop
3. The System start audio sound perception

A3: < Breathing Meditation Technique>

1. The System checks if User select Breathing Meditation
2. The User click Play, Pause or Stop
3. The System start audio sound perception

Exceptional flow

E1: No Exception flow.

Post condition

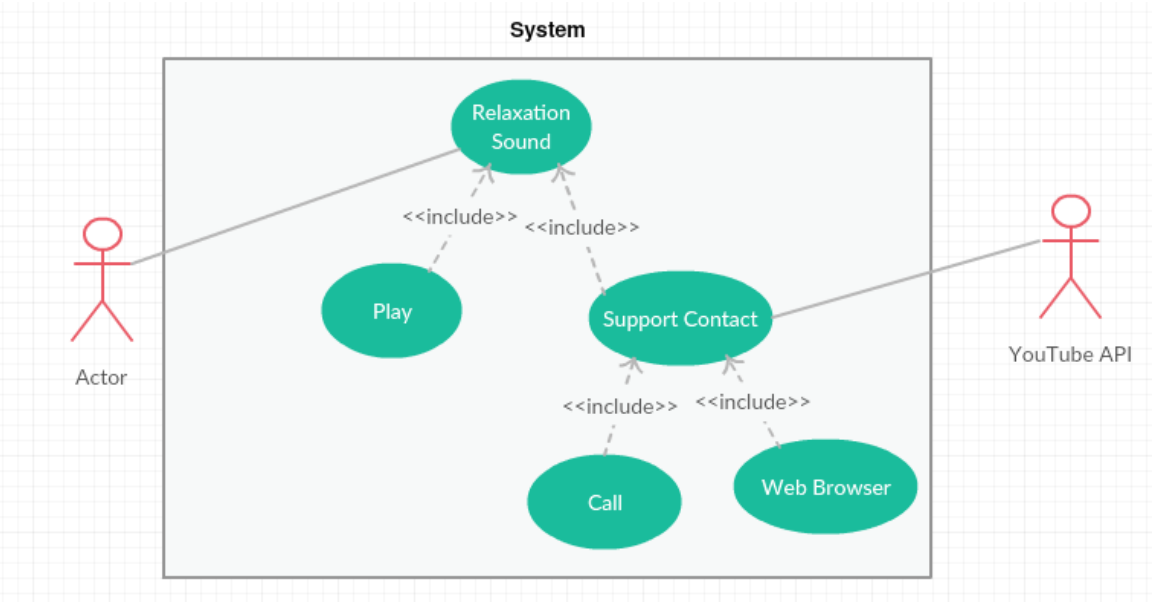
The system waits until User interact with it.

3.3.8 Requirement 6: <Support Services >

Description & Priority

When user select Support Services. This allows the system to setup the platform for Support Services function.

Use Case Diagram



Scope

The scope of this use case is to setup the Support Services platform based on the user's specific category.

Description

This use case describes the procedure when user select Support Services from the home page category. The System will present platform for Support Services.

Flow Description

Precondition

The system presents the user category and then the user selects Support Services.

Activation

The use case starts when user click on 'Support Services' from the category

Main flow

1. The User selects their specific category
2. The System initializes the platform for the User
3. The User select 'Support Services'
4. The User have three options
5. The User click play <A1>

6. The User click call from the Support Contact <A2>
7. The User click browser in the Support Contact <A3>
8. The System finished

Alternate flow

A1: <Option 1: User click play > <E1>

1. The User click play
2. The System clicks if the user Click Play
3. The System play the video of real life stories playlist (YouTube API)

A2: <Option 2: User call Support Contact >

1. The User click call
2. The System checks if the User Click call
3. The System call the number the User clicked

A3: <Option 3: User call Support Contact > <E2>

4. The User click web browser
5. The System checks if the User Click call
6. The System browse to the site the User clicked

Exceptional flow Termination

E1: < User click play >

1. User attempts to Play content without Wi-Fi connection
2. System displays helpful message that the user is not connected need Wi-Fi
3. User initialises Wi-Fi connection
4. System brings user to main flow 4

E2: < User call Support Contact >

1. User attempts to browser without Wi-Fi connection
2. System displays message that the user is not connected need Wi-Fi
3. User initialises Wi-Fi connection
4. System brings user to main flow 4

Termination

The Use case is terminated when the User is notifying the System to call or to browser or play video.

Post condition

The system waits until User interact with it.

3.3.9 Data requirements

This will describe the data requirements, which are essential to implementing the functionalities of the application. The data stored, and data user needs may be accessible and available all times.
For user to access the application, the user provides name and email which will be stored or require from a database.

- User activity record Workout– application will be recording the user's exercise activity to get back where they left off.
- User activity record Calories – application will be record and storing the Calories intake and shows the analysis.
- Google Firebase – The application will store all the data in the non-SQL back end system, this will involve user's profiles.
- The back-end system will be link with the application using the dependencies added in the configuration files of application.

3.3.10 User requirements

The user requirement of BeWell is to incorporate an application to improve mental health wellbeing. Find a way to motivate people with mental health issue using technology to solve this problem. The "The Little things" campaigns highlight some of the important area to improve day to day basic. Client expectations of a mental health application are:

Fitness: The application will provide a workout plan for the user. User can do the exercise at comfort of their home because there are users who doesn't feel comfortable going to the gym. The application tracks their progression and user is able to pick the level of activities that best suit their need.

Diet: The application will provide a calories counter and provide the day to day calories intake of Users. Along with this functionally, the application will provide how to improve diet and provide easy to make recipes that the user can effort in further development.

Sleep improvement: The application will provide relaxation section where user can listen to audio of meditation, breathing mediation techniques and pink noise to give user ease to improve their breathing and to sleep at ease.

Support services: The app will allow the user to get support from expect by calling direct from the app. Also, to few information they need to help them in any way possible. This feature also allows the user to watch past victim and how TheLittleThings campaign help them.

Android (4.4 or higher): The user will need a mobile Android device and will need version 4.4 or higher for faster loading and working better.

Internet access: The device will need Internet access to use the application because it has to connect to a server to retrieve information. The faster the internet the faster the server get and post requests (Adekanmbi, 2015/2016).

3.3.11 User Requirements Definition

This section describes the set of objectives and requirements for the system from the customer's perspective. What are the clients saying they want?

- System should allow User to create an account and/or log in
- System should allow User to create a workout.
- System should allow User to view workout progress
- System should allow User to add Calories Counter
- System should allow User to select option to help them improve sleep.
- System should allow User to call for help
- System should aloe User to browser for support

3.3.12 Environmental requirements

These are the vital requirements that must be present when developing the application.

- **Android Device:** An android device will require during the running and testing of application in the development stages. The mobile application environment will need to be able to push and synchronous to ensure user can gain access to there information.

- **Internet Access:** Internet access is required to test functions in application and connecting to database.
- **Laptop(Window):** This application will be developed Windows laptop with android studio as the Android development IDE.
- **Photoshop/Paint 3D:** Photoshop was used to customize any images and graphical assets used during the development of my application.

3.3.13 Usability requirements

This section will cover and evaluate the usability requirements for the system application. This outline the standards and objectives to be met regarding the systems.

- **Ease of use:** The application is user friendly and easy to use.
- **Understandability:** The system is understandable to use. Easy to follow the functionality.
- **Operability:** The system should perform as mentioned in the requirement. The app should be consistent in terms of functionality.
- **Attractiveness:** The application should be appealing to users (GUI, Design and layout). The app should use colour that is easy for the eye.

4 Non-Functional requirements

The divergence between Functional Requirement and Non-Functional Requirement is Functional Requirement deal with what the system shall and much do, while Non-Functional Requirement focuses on, How the system operate.

4.1 Performance/Response time requirement:

Performance and system response times are conjoined in that one can affect the other. It is a determination of what is acceptable to a user as adequate performance/response time.
Both are response times variables dependent upon many factors that could affect either but in general 0.2 or 0. second(s) is what is to be expected and what can be defined to a user as an unnoticeable instantaneous response of the system to an action triggered by the user. 1.0 second(s) is mildly disrupting and noticeable but still within the spectrum of the user feeling they've operated the system. Anything above and beyond this time frame can cause a user to ultimately lose interest in the application.
BeWell mobile application should be fast in response. The login process should take 0.2 second once the user clicks submit. The performance and the response are crucial for the success of the application because the application will be capturing, measuring activity, calorie counter of the User and we don't want any error. Also, to keep the user engage with the app.
Internet connection and strength will proportional on the requirement performance. The faster the internet the faster data pass and load and if the internet is slow it will have the opposite effect.
The user's hardware could also prevent ample performance and response time of the system. It is important as such to assess the performance of the system under both gradual pressure and immediate high traffic scenarios. Client-side testing, Network

testing and server-side testing will be implemented and as well as specifying the following:

1. **Response Time**
2. **Workload -** Work that the system must support
3. **Scalability –** Increase in system workload that the system should be able to process
4. **Platform –** Hardware and software (Operating System & Software Utilities) that houses the system

4.2 Availability requirement

Availability refers to the periods in which a solution can be used, in this case, the timeframe in which the application will be available and use. Dependent upon the application in which availability requirements are enlisted, there may be designated times in which the system can be used and under maintenance. Relation to the project the aimed availability requirement is that of 99.999%. In reality, 100% cannot be guaranteed and would have cost limitations restricting the robustness of the solution. Reliability, Security and Robustness are another non-functional requirement that are related to the available requirement.
Internet connect will have to be used to connect to the application and to interact with the database.

4.3 Recover requirement

The recovery is the area of security that must be put in place if there were a significant negative event.
In the case of system shutdown and no response to the user. The system should be down and shouldn't take no more than one to two working day for the system to be back. Also, Information will be send to the user to let them know when the system is back working.

4.4 Security requirement

Security will be considered throughout the application life cycle to prevent manipulation of data impacting data integrity, quality and the developer reputation. Security is extremely important. If user don't think the system is secure they will not download the application.
Security measure will be in place to protect from hackers and unauthorized access to the system which holds sensitive data of users. Solid authentication and validation will be in the system when users are logging in to the system with their correct credentials. Any sensitive information will be encrypted in the database.
Also, SQL injection will be prevented in the application. SQL injection is an attack that involves sending modified SQL statements to application that will, in turn, modify a

database. Attackers can send unexpected input through input field which will enable them to read from, write to, and even delete entire databases.

4.5 Portability requirement

The application will cater to different Android version. The android API version the application will support are:

- Android 4.4 KitKat (API 19)
  - Android 4.4W KitKat, with wearable extensions (API 20)
- Android 5.0 Lollipop (API 21)
  - Android 5.1 Lollipop (API 22)
- Android 6.0 Marshmallow (API 23)
- Android 7.0 Nougat (API 24)
  - Android 7.1 Nougat (API 25)
- Android 8.0 Oreo (API 26)
  - Android 8.1 Oreo (API 27)

Automated and manual testing will be carry out to support different version listed to ensure portability always (Arbuckle, 2017).

4.6 Reliability requirement

The term reliability could be referring to as the ability for a software or mobile application component to consistently perform according to its specifications.

Objectives:

The main objectives of reliability requirements are to;

- Ensure that all aspect of the application function perfectly for long periods without any failure.
- Minimizing any unintentional disruptions during operation (E.G, unscheduled downtime).

Measurements:

The reliability requirements basic specification in terms of the below measurements:

- The mean time between failures (MTBF), MTBF can be defined as the estimated elapsed time between built-in failures system during operation.
- The maximum accepted number of failures per unit time.
- The maximum permitted probability of the failure during a given time period.

Crash Tolerance:

Crash tolerance is the ability of a system to ensure predetermined properties despite the occurrence of one or more unpredictable crash failure. Crash can be managed through data backup, which prevents catastrophic loss of information while using the system.

4.7 Maintainability requirement

From security prospective there are many black hat hackers in the current time. One of the goal is to develop an application that not only completes its intended functionality with ease but also impresses and exceeds users' expectations. Where the application happens to fall in terms of performance, functionality or it needs to be updated, several key aspects will be taking to help maintain the application and to help security:

- **Defects/Vulnerability:**
  This involves as a developer that reviewing the area of concern for possible abnormalities and addressing them appropriately.
  If there is an update or new installation in methods. This should not affect user information in database setting both personal or private record in workout section or the food calories activities of the application.
- **Code Quality:**
  Looking over the existing code where there lies a potential problem and either patch or improve it.
- **Reducing Redundancy:**
  To make the application easy to understand and to make sure that two pieces of code are not doing the same thing, the aim is to eliminate redundancy altogether, assisting in maintaining the steadiness of the overall system.

4.8 Extendibility requirement

The system shall be extensible which mean that developers can add more functionality in the system or make update on the exist code without major changes or changing the architecture of the system.
The database mechanism shall be design and implemented to be fully extensible, if it ever happened to need further functionality added throughout the development process.

The Quiz section of the application was added late to BeWell system architecture to facilitate a fun and engagement way to user to test their knowledge on mental health that is an example.

4.9 Reusability requirement

Reusability is a valid requirement for all projects that involve software development. The application will aim to have multiple functions and other code that can be re-used and implemented into further or new developments going forward or indeed when creating something new.

Reusability is an important factor and requirement as applications in the real world are based hugely on re-used code. The goal is to develop unique code that can be understand and that am comfortable implementing into new environments.

The login/registration system is a prime example of this, the vast majority of mobile application with user interaction require user login. The database which will be implemented and connected should be flexible and reusable with other applications where some type of information is being stored.

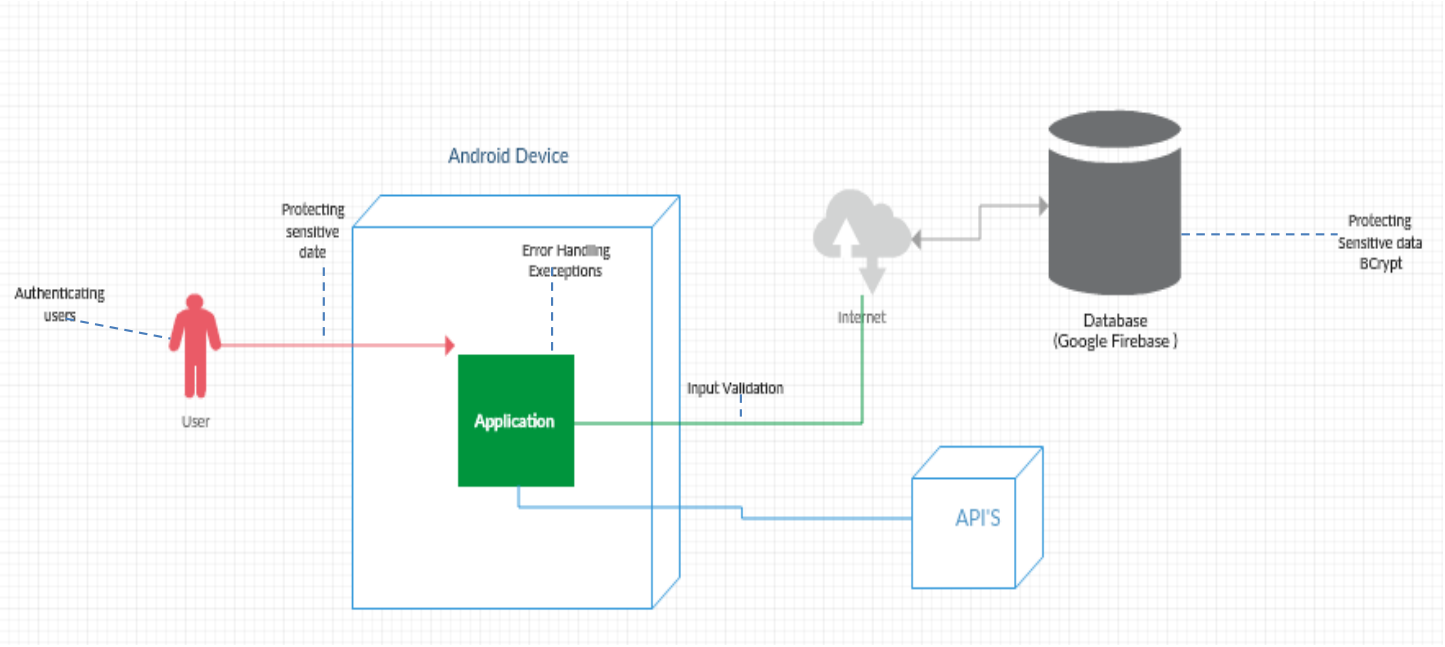
4.10 System Evolution

To make this application evolve over time the design application has to be flexible, making sure unnecessary and difficult to understand code does not exist within the development process. Then it's possible to have innovative, something that is not easily achieved but possible.

5 Design and System Architecture

5.1 Secure System Architecture

Below is the system architecture of BeWell application. The application is hosted locally

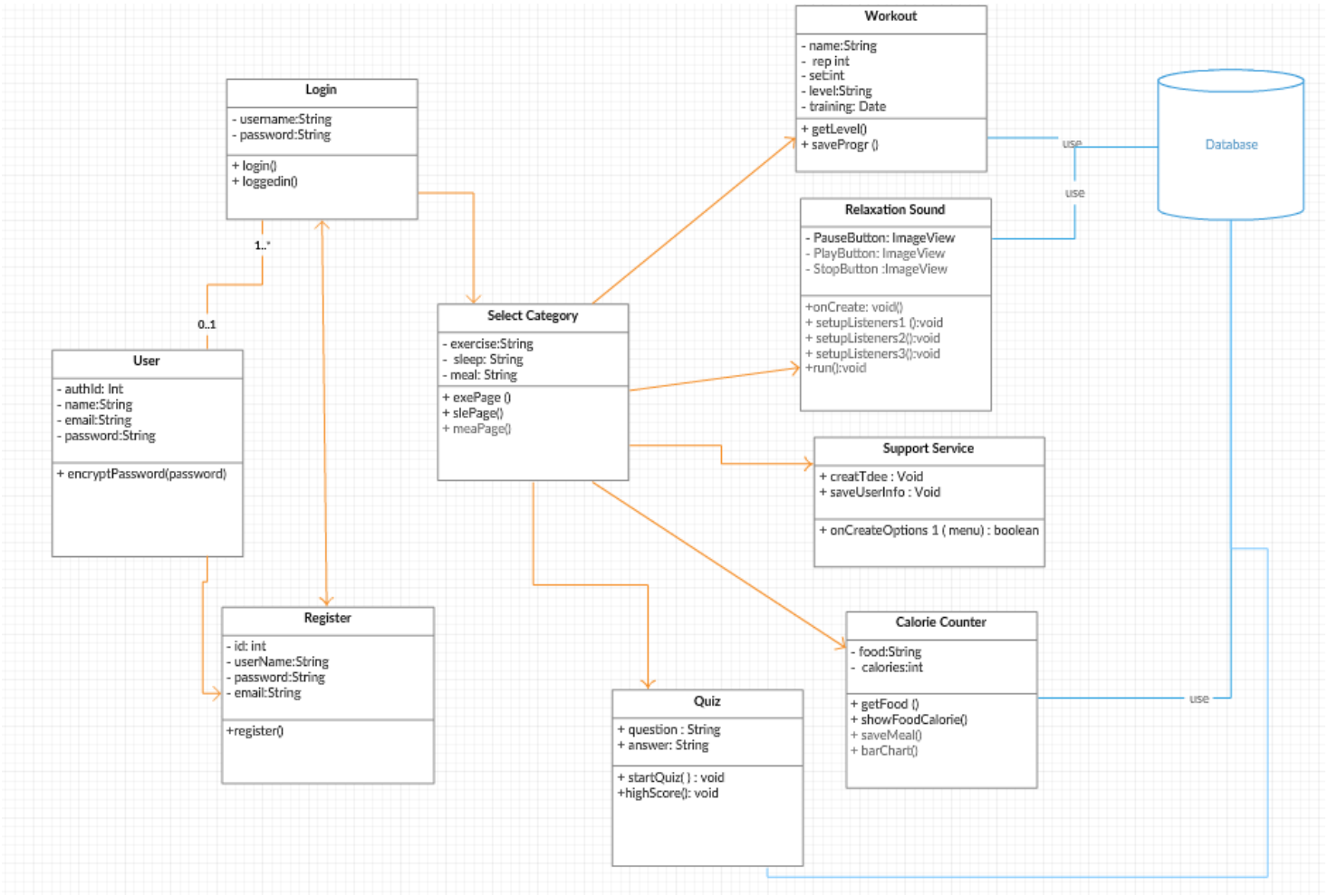


on a device running Android OS

The Secure System Architecture above shows all the components the system was made off after development. This architecture was chosen because of its simplicity and also separating all the major components which allows better lamentably and flexibility BeWell system application. The architecture employs security throughout the system as shown (Software, 2015).

The application is hosted locally on device running Android Operation system. Google Firebase is the database that was used to store user credential and logging. BeWell application also uses some API services.

5.2 Class diagram

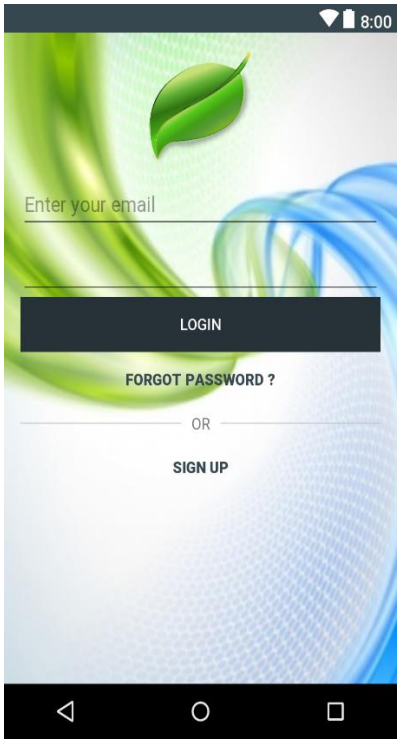


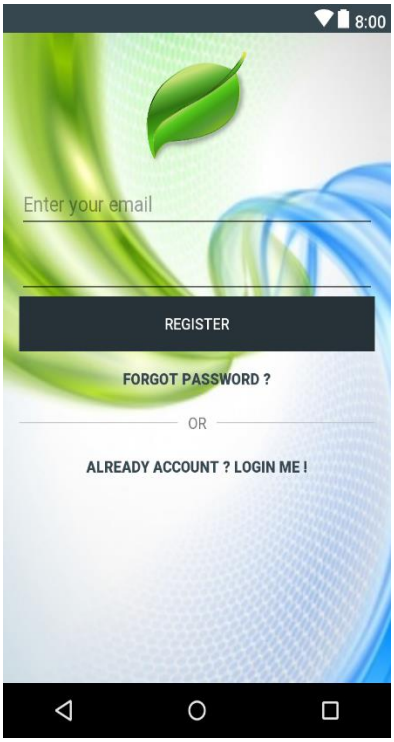
5.3 Graphical User Interface (GUI) Layout

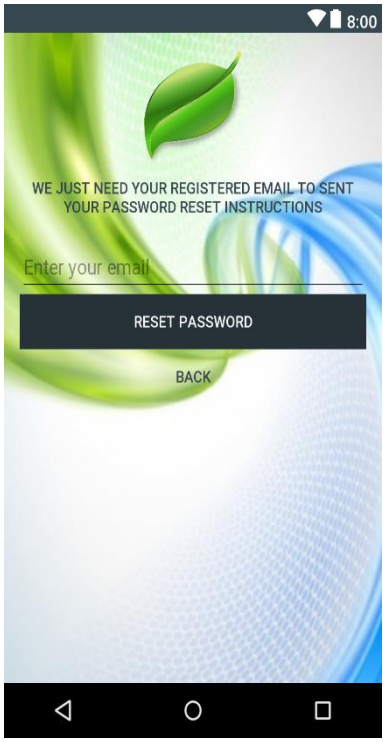
The application will provide the user with the following Graphical interface:

- Log in page
- Registration page
- Forget password
- Change password page
- Main menu page
- Activity Level
- Fitness page
- My progress page
- Workout page / Countdown page
- Instruction Page
- Relaxation sound page
- Calories Counter page
- User Info page
- Food Input Page
- Statistics page
- Support Services page
- Quiz page

The following GUIs are of the login/register/reset activity







Login page: Login page is where the user enters his/her information to access his/her account. There are two text fields which has to be fill in before getting access to the main menu of BeWell application. Once the user fills in all his/her detail, it will be validated, and the user will be shown the main menu page.

Registration page: This is the page where a new user must register with his/her detail to create an account. After user Register his/her detail, the application will validate the email and the password if it meets the input validation of the application.

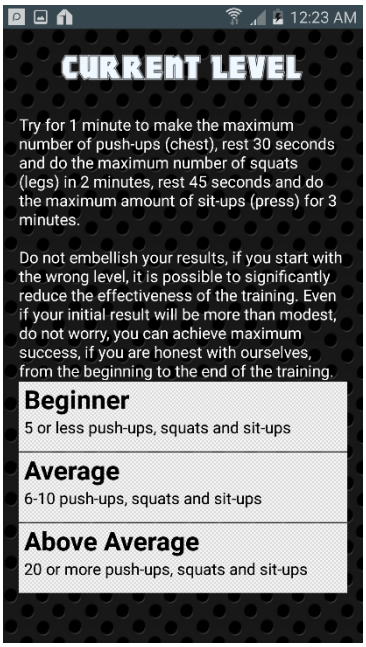
Reset Password: This is the page if the user forgets his/her password. The user will provide his/her email address they registered with and the application will send the user reset instruction to their email address. After they rese their password they will be able to login to the system.

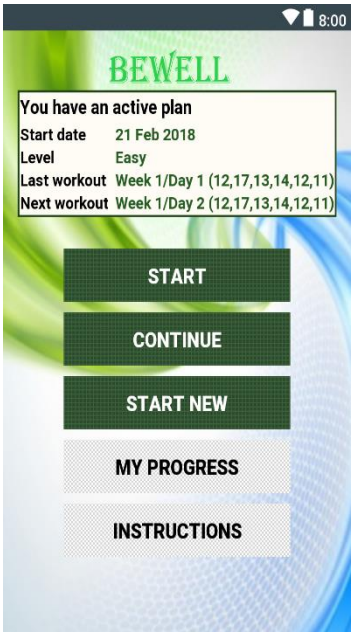
The following screenshots is the main activity home and change password GUI.

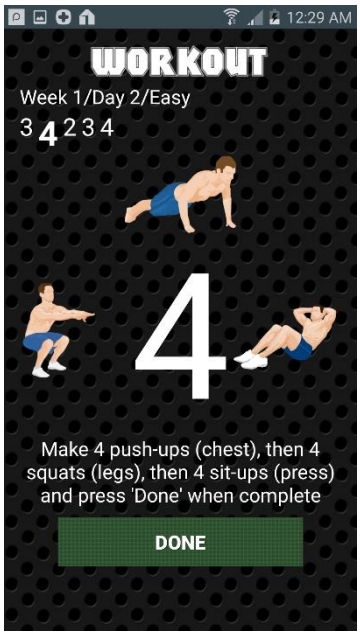
Main Menu: After user have been login to the main menu page the above screen will be shown. The main menu page will contain following options:

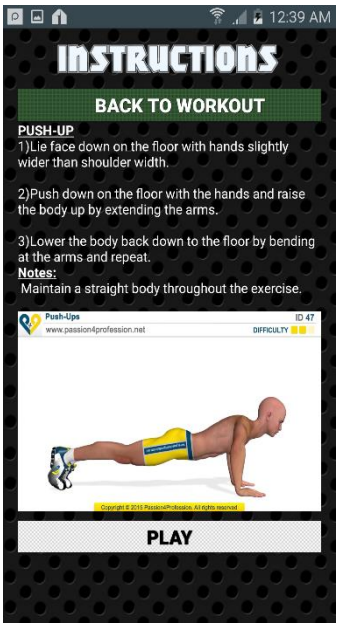
- Workout: by choosing this option user will be brought to his/her workout page
- Relaxation sound: by choosing this option user will be brought to his/her relaxation sound page
- Calories Counter: by choosing this option user will be brought to the calories counter page
- Support Services: by choosing this option user will be brought to the support service page
- Quiz: by choosing this option user will be brought to the quiz page
- Logout: by choosing this option user will be logout of his/her account
- Change password: by choosing this option user will be brought to the change password page and user have the option to change their password from the old password to a new password.

The following GUIs are of the Workout section of the BeWell application.









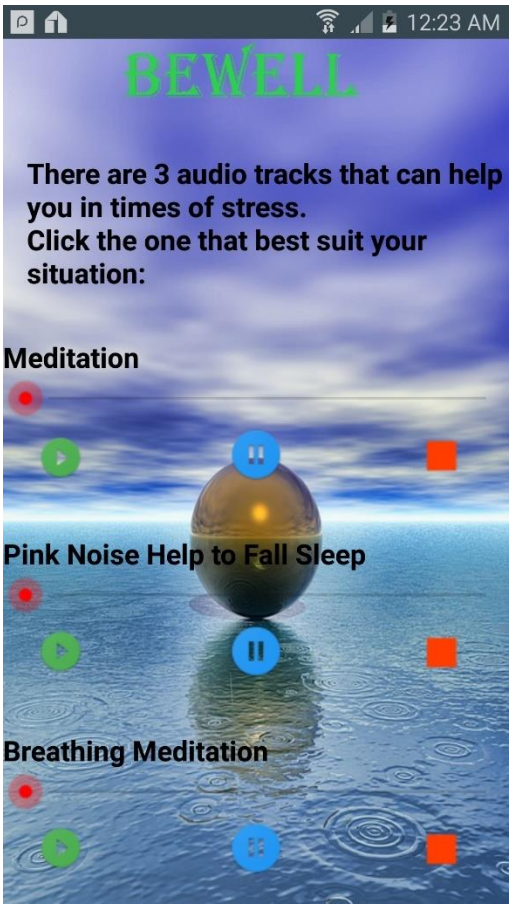
BeWell Workout page: In this page user will have the following options:

- Start: by choosing this option user will be able to choose their current level of exercise.
- Instruction: by choosing this option user will be able to read the health and safety guide.

Workout page: In this page shows the user the exercises they have to do, then user click done when they are finished.

Instructions page: In this page user can view how to do their exercises with video and reading instructions.
My Progress page: In this page use can view their progression of their workout.

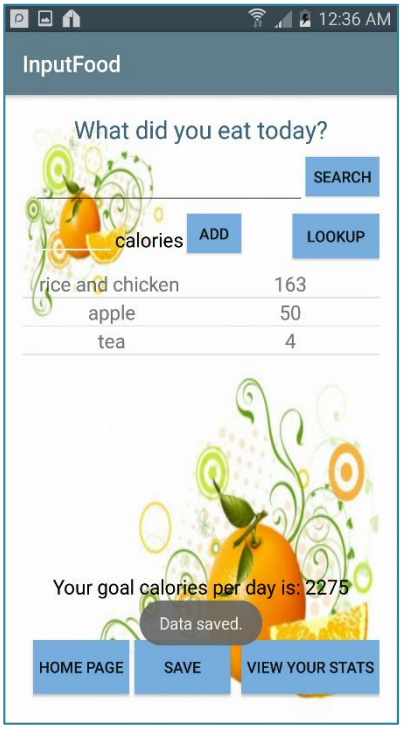
The following GUIs are of the Workout section of the BeWell application.

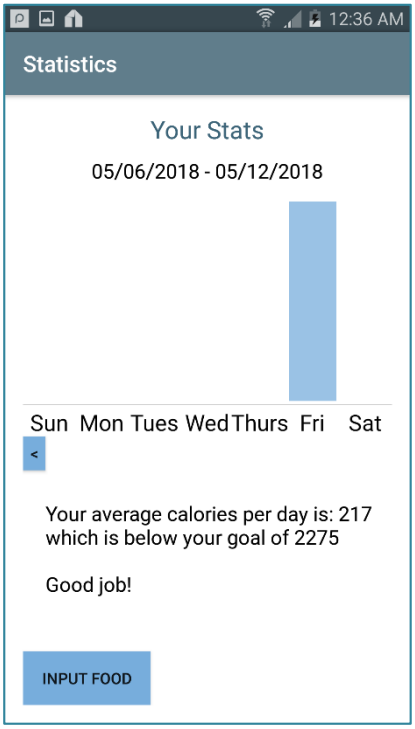


Relaxation sound: In this page user will have the following options:

- Meditation: user can choose to play activity, pause activity or stop activity the meditation audio to help calm the mind.
- Pink Noise: user can choose to play activity, pause activity or stop activity the pink noise audio to help sleep at ease in night.
- Breathing mediation: user can choose to play, pause or stop the breathing mediation audio to help sleep at ease in night.

The following GUIs are of the Calories Counter section of the BeWell application.

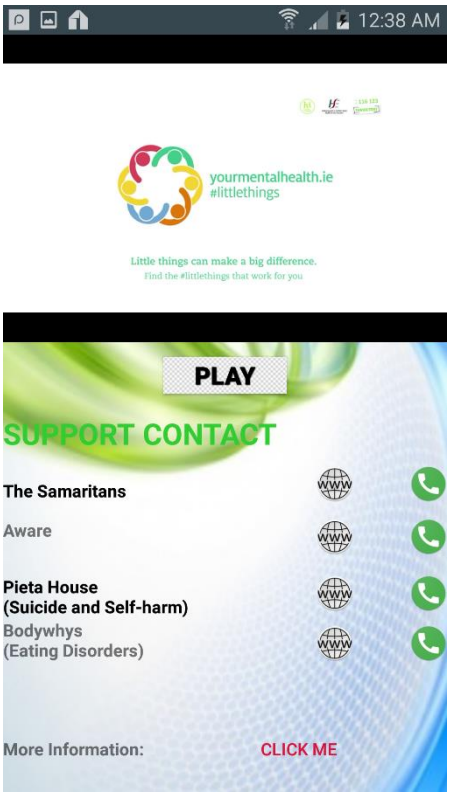




Calories Counter: In this page user will have the following:

- User information for Total Daily Energy Expenditure (TDEE) page: In this page user need to fill out all the detail to get their TDEE. Which will be determining the goal of the user calorie intake by day.
- Input food page: In this page user enter the food they eat and enter the calorie of the food. Also, the user has the option to enter the food they eat and click search to get the calorie automatically from Food Composition Databases API (USDA). User click save or view their stats for the weeks.
- Statistics page: In this page user can view their stats for the weeks or months calories intake. The page shows user their average calories per day and if their calories is above or below their intake goals. Also, a bar chart visualisation of their calories intake.

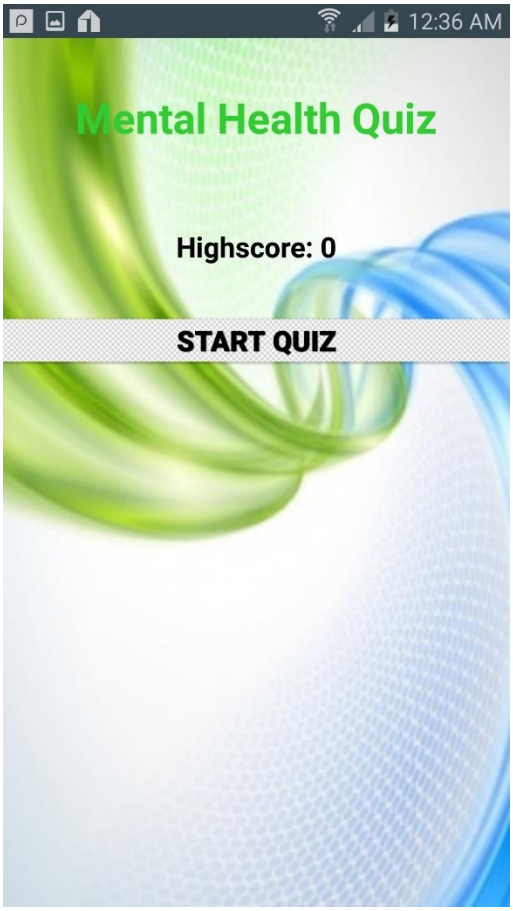
The following GUI is of the support services section of the BeWell application.

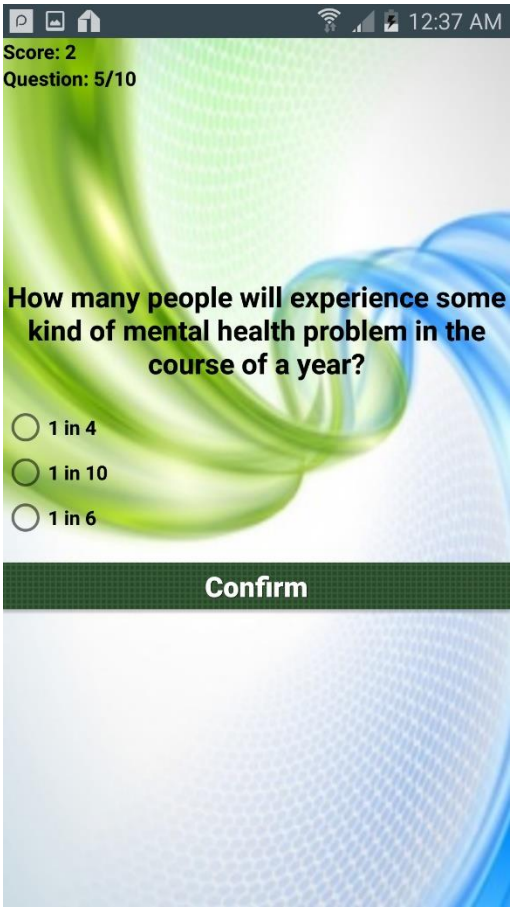


Support Services: In this page user will have the following:

- Play activity: by choosing this option, user will play the video and will be able to watch the video.
- Call activity: by choosing this option, user can call the support their want.
- Web: by choosing this option, user can browser the support website there want.

The following GUI is of the quiz section of the BeWell application.





Quiz: In this page user will have the following:

- Start: by choosing this option, user will start the quiz
- Confirm: by choosing this option, user have picked their answer and moving on to the next question.

6 Analysis and Design

6.1 Purpose of The Product Design Specification Document

This document describes the Product Specification of BeWell app, also to track the necessary information required to efficiently define architecture and system design in other to provide management during the development cycle.

6.2 General Overview and Design Guidelines/Approach

This section describes the principles and strategies to be used as guidelines when designing and implementing the system.

6.2.1 Assumptions / Constraints / Standards

The Constraints that could be faced when doing this application could be outdated coding examples android updating there Gradle.

Another constraint that could be faced when doing this application is not having the knowledge that is needed be able to perform some of the certain task and will be require learning the method from scratch before been able to complete the task.

BeWell application will require an active internet connection during some operations in the application.

6.3 Architecture Design

6.3.1 Logical View

The logical view for BeWell will be split into three parts:

The user interface build using XML, the android activities dealing with the business logic and the Google Firebase back end system to hold all the information received from the application and SQLite Database to hold the multiple quiz of the user.

6.3.2 Hardware Architecture

The user will need a mobile Android device and will need version 4.4 or higher for faster loading and working better or android device running on OS level 19 and have 2Gb RAM.

The android API version the application will support area are as follow:

- Android 4.4 KitKat (API 19)
- Android 4.4W KitKat, with wearable extensions (API 20)
- Android 5.0 Lollipop (API 21)
- Android 5.1 Lollipop (API 22)

- Android 6.0 Marshmallow (API 23)
- Android 7.0 Nougat (API 24)
- Android 7.1 Nougat (API 25)
- Android 8.0 Oreo (API 26)
- Android 8.1 Oreo (API 27)

Automated and manual testing should be carry out to support different version listed to ensure portability always.

6.3.3 Software Architecture

This project will use the Android studio, android libraries and Google firebase and SQLite database for the backend;

Other Requirements of software:

- **Windows Machine:** Windows laptop will be used to develop the application.
- **Android Device:** An android device is needed during the running and testing of application in the development stages. The android phone must have a developer option to run and test the application.
- **Internet Access:** Internet access is required in order to test particular functions in application and connecting to database. Two examples will be the login and/or registering the user.
- **Photoshop and paint3D:** Photoshop and Paint3D used to customize images and graphical assets used during the development of my application.

6.3.4 Security Architecture

Security will be considered throughout the application life cycle to prevent manipulation of data impacting data integrity, quality and the developer reputation. Security is extremely important. Security measure will be in place to protect from attackers and unauthorized access to the system which holds sensitive data of users.
Solid authentication and validation will be in the system when users are logging in to the system with their correct credentials. Any sensitive information will be encrypted in the database with the help of Google Firebase authentication system.
Also, attacker will not be able read from, write to, and even delete entire databases with SQL injection which will be tested in the testing phase of the application.

6.7 Application Algorithms and methods

- **Sign up and authentication**

Sign up, Registration and authentication for the application will be done using Google Firebase provided methods of authentication and registration. The table shown below show how it looks in the database and the code snipped of login and registration.

Identifier	Providers	Created	Signed In	User UID ↑
amina@hotmail.com	✉	5 May 2018	5 May 2018	N0WXzfDVPcVWI7oURNfWPUBdU...
azeez@hotmail.com	✉	5 May 2018	11 May 2018	Uammo0dygqVfoi0erswLFpO9Xfv1
yusuff@hotmail.com	✉	7 May 2018	7 May 2018	fsT5yY4lIxUmLiyNB9wHuBPkzBv1
bobbob@hotmail.com	✉	5 May 2018	6 May 2018	pcz7cmXLVBaf7VU1JpNsLEgL8eq1

Login

```
public void onClick(View view) {
    if (view.getId() == R.id.login_btn_forgot_password) {
        startActivity(new Intent( packageContext: MainActivity.this, ForgotPassword.class));
        finish();
    } else if (view.getId() == R.id.login_btn_signup) {
        startActivity(new Intent( packageContext: MainActivity.this, SignUp.class));
        finish();
    } else if (view.getId() == R.id.login_btn_login) {


        String email = input_email.getText().toString().trim();
        String password = input_password.getText().toString().trim();
        loginUser(email, password);

    }
}


//Login User if they have an account
private void loginUser(final String email, final String password) {
    auth.signInWithEmailAndPassword(email, password)
            .addOnCompleteListener( activity: this, (task) → {
                    if (!task.isSuccessful()) {

                        Snackbar snackBar = Snackbar.make(activity_main,  text: "Invalid email address or Password. R
                        snackBar.show();
                    } else {
                        //After user is create HomeScreen intent is created
                        startActivity(new Intent( packageContext: MainActivity.this, HomeScreen.class));
                        finish();
                    }
            });
}
```

Registration

```
public void onClick(View view) {
    //The validate the user name to meant before authentication
    String upperCaseChars = "(.*[A-Z].*)";
    String lowerCaseChars = "(.*[a-z].*)";
    String numbers = "(.*[0-9].*)";
    String emailPattern = "[a-zA-Z0-9._-]+@[a-z]+\\.+[a-z]+";
    String email = input_email.getText().toString().trim();
    String password = input_pass.getText().toString().trim();
    if (view.getId() == R.id.signup_btn_login) {
        startActivity(new Intent( packageContext: SignUp.this, MainActivity.class));
        finish();
    } else if (view.getId() == R.id.signup_btn_forgot_pass) {
        startActivity(new Intent( packageContext: SignUp.this, ForgotPassword.class));
        finish();
    } else if (view.getId() == R.id.signup_btn_register) {

        // check if the email meet the validation
        if (!email.matches(emailPattern)) {
            Toast.makeText(getApplicationContext(),  text: "Invalid email address", Toast.LENGTH_SHORT).show();
        }
        if (!password.matches(upperCaseChars) || !password.matches(lowerCaseChars) || !password.matches(numbers)) {
            Toast.makeText( context: SignUp.this,  text: "Password should contain at least one upper case,one lower case alphabet and a numb
                    Toast.LENGTH_LONG).show();
        }
        signUpUser(email, password);
    }
}

private void signUpUser(final String email, final String password) {
    auth.createUserWithEmailAndPassword(email, password)
            .addOnCompleteListener( activity: this, (task) → {
                    if (!task.isSuccessful()) {
                        Toast.makeText( context: SignUp.this,  text: "User with this email already exist. Provide another email",
                                Toast.LENGTH_SHORT).show();
                    } else if (task.getException() instanceof FirebaseAuthUserCollisionException) {
                        Toast.makeText( context: SignUp.this,  text: "User with this email already exist. Provide another email ",
                                Toast.LENGTH_SHORT).show();
                    } else {
                        snackbar = Snackbar.make(activity_sign_up,  text: "Register success! ", Snackbar.LENGTH_SHORT);
                        snackbar.show();
                    }
            });
}
```

❖ Workout Function

Workout function where user choose the level of their workout, save and track their progression.

Progression Adapter

```
//Save the state when the user done doing the set. we are using share preferences to save the state in
public static CurrentState getCurrentState(Activity context){
    SharedPreferences mPrefs = context.getSharedPreferences( name: "200", Activity.MODE_PRIVATE);
    Gson gson = new Gson();
    String json = mPrefs.getString( s: "CurrentState",  s1: null);
    if(json == null)
        return new CurrentState();
    CurrentState obj = gson.fromJson(json, CurrentState.class);
    return obj;
}

//save the CurrentState
public static void saveCurrentState(Activity context, CurrentState currentState){
    SharedPreferences mPrefs = context.getSharedPreferences( name: "200", Activity.MODE_PRIVATE);
    SharedPreferences.Editor prefsEditor = mPrefs.edit();
    String json = null;
    Gson gson = new Gson();
    json = gson.toJson(currentState);
    prefsEditor.putString( s: "CurrentState", json);
    prefsEditor.commit();
}
```

State

```
public View getView(int position, View convertView, ViewGroup parent) {
    ViewHolder holder;

    //Getting information of Day, Reps, finished data to set the History Record
    if (convertView == null) {
        holder = new ViewHolder();
        convertView = inflater.inflate(R.layout.progress_list_item, parent,  attachToRoot: false);
        holder.day = (TextView) convertView.findViewById(R.id.workout_day_text);
        holder.repetitions = (TextView) convertView.findViewById(R.id.workout_repetitions_text);
        holder.finishDate = (TextView) convertView.findViewById(R.id.workout_finishdate_text);
        convertView.setTag(holder);
    } else {
        holder = (ViewHolder) convertView.getTag();
    }

    //Setting the user plan detail in the workout page (Day, Reps, finished data)
    HistoryRecord w = workouts.get(position);
    holder.day.setText(String.format("Day %d", w.day));
    holder.repetitions.setText(String.format("%s", TrainingHelper.join(w.counts,  d: "/")));
    holder.finishDate.setText(TrainingHelper.getDateString(w.completionTime));

    return convertView;
}
```

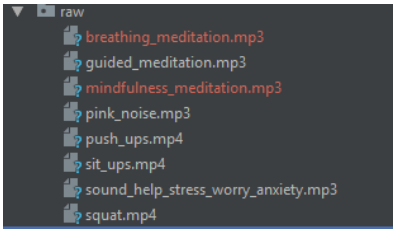
Level

```
// Level the user can select from
public static String getLevelDescription(int level){
    switch (level){
        case 1:
            return "Easy";
        case 2:
            return "Average";
        case 3:
            return "Above Average";
    }

    return "";
}
```

❖ Relaxation Function

Relaxation allow user to select audio to helps the user relax, meditation audio to help improve self-care and pink sound to help user to fall asleep with ease. Using mediaPlayer.




```
private void setupListeners1(){
    startButton.setOnClickListener(new View.OnClickListener(){
        @Override
        public void onClick(View v){
            soundPlayer.start();
        }
    });

    pauseButton.setOnClickListener(new View.OnClickListener(){
        @Override
        public void onClick(View v){
            soundPlayer.pause();
        }
    });

    stopButton.setOnClickListener(new View.OnClickListener(){
        @Override
        public void onClick(View currentView){
            soundPlayer.stop();
            soundPlayer = MediaPlayer.create(getBaseContext(), R.raw.guided_meditation);
        }
    });

    soundSeekBar.setOnSeekBarChangeListener(new SeekBar.OnSeekBarChangeListener(){
        @Override
        public void onStopTrackingTouch(SeekBar seekBar){

        }
```

❖ Calories Counter Function

Calories counter provide the day to day calories intake of Users and calculating TDEE.

Calculating Learn Your Total Daily Energy Expenditure (TDEE)

```
//CALCULATING TDEE
public int calculateTDEE(int heightFt, int heightIn, int weight, int activityLevel, int age, int gender,
    int height = heightFt * 12 + heightIn;
    double kg = weight * .453592;
    double m = height * .0254;
    double cm = height * 2.54;
    double bmr = (10 * kg) + (6.25 * cm) - (5 * age) + 5;
    if(gender == 1) {
        bmr = (10* kg) + (6.25 * cm) - (5*age) - 161;
    }
    double activity = 1.25;
    switch(activityLevel) {
        case 1:
            activity = 1.375;
            break;
        case 2:
            activity = 1.55;
            break;
        case 3:
            activity = 1.725;
            break;
        case 4:
            activity = 1.9;
            break;
    }
    double tdee = bmr * activity;
```

```
/**
 * Sets the daily target amount of calories
 */
public void setTarget(View view) {
    EditText editText3 = (EditText) findViewById(R.id.editText3);

    //check if calorie amount is a valid integer
    try {
        Integer.parseInt(editText3.getText().toString());
    }
    catch(NumberFormatException e) {
        Toast.makeText(getApplicationContext(), "Invalid calorie amount", Toast.LENGTH_SHORT).show();
        return;
    }

    target = Integer.parseInt(editText3.getText().toString());
    editText3.setText("");

    updateTotal();
```

United States Department of Agriculture (USDA API)

```
protected String doInBackground(Void... params) {
    //Getting the input of the user input intake and search USDA API online to get the calories number
    try {
        food = food.replaceAll( regex: " ", replacement: "%20");
        URL url = new URL( spec: "http://api.nal.usda.gov/ndb/search/?format=JSON&q=" + food +
                "&max=1&offset=0&sort=r&api_key=xMJV33vSmKsguFqcBwZ23oJ7DlL2abmfsrDUUx1l");
        HttpURLConnection urlConnection = (HttpURLConnection) url.openConnection();
        try {
            BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(urlConnection.getInputStream()));
            StringBuilder stringBuilder = new StringBuilder();
            String line;
            while ((line = bufferedReader.readLine()) != null) {
                stringBuilder.append(line).append("\n");
            }
            bufferedReader.close();
            String result = stringBuilder.toString();
            if(result.contains("zero results")) {
                String s = "empty";
                return s;
            }
            JSONObject object = (JSONObject) new JSONTokener(result).nextValue();
            JSONObject list = object.getJSONObject("list");
            JSONArray items = list.getJSONArray( name: "item");
            String item = items.get(0).toString();
            int i = item.indexOf("ndbno\":\"") + 8;
            int f = item.indexOf( str: "\"", i);
            String ndbno = item.substring(i,f);
            Log.d( tag: "DEBUG", ndbno);

            URL url2 = new URL( spec: "http://api.nal.usda.gov/ndb/reports/?ndbno=" + ndbno +
                    "&type=b&format=JSON&api_key=xMJV33vSmKsguFqcBwZ23oJ7DlL2abmfsrDUUx1l");
            HttpURLConnection urlConnection2 = (HttpURLConnection) url2.openConnection();
            BufferedReader bufferedReader2 = new BufferedReader(new InputStreamReader(urlConnection2.getInputStream()));
            StringBuilder stringBuilder2 = new StringBuilder();
            String line2;
            while ((line2 = bufferedReader2.readLine()) != null) {
                stringBuilder2.append(line2).append("\n");
```

Graph

```
private void createGraph() {
    int color = Color.parseColor( colorString: "#9ac2e5");
    ArrayList<Bar> bars = new ArrayList<Bar>();
    Bar sun = new Bar();
    sun.setColor(color);
    sun.setName("Sun");
    sun.setValue(0);
    bars.add(sun);

    Bar mon = new Bar();
    mon.setColor(color);
    mon.setName("Mon");
    mon.setValue(0);
```

```
    BarGraph g = (BarGraph)findViewById(R.id.graph);
    g.setBars(bars);
    g.setUnit("");
}
private boolean inThisWeek(Date date) {
    int week = currentViewingWeek.get(Calendar.WEEK_OF_YEAR);
    int year = currentViewingWeek.get(Calendar.YEAR);
    Calendar targetCalendar = Calendar.getInstance();
    targetCalendar.setTime(date);
    int targetWeek = targetCalendar.get(Calendar.WEEK_OF_YEAR);
    int targetYear = targetCalendar.get(Calendar.YEAR);
    return week == targetWeek && year == targetYear;
}
```

❖ Support Services

Support Services provides user to get support from expect by calling direct from the app. This feature also allows the user to watch past victim and how TheLittleThings campaign help them. Using YouTube API.

YouTube Key

```
public class YouTubeConfig {

    public YouTubeConfig() {
    }

    private static final String API_KEY = "AIzaSyBRLkZAblMFaAClNlUlXQAJZehVc-LZ_1k";

    public static String getApiKey() { return API_KEY; }
}
```

Playlist

```
    public void onInitializationSuccess(YouTubePlayer.Provider provider, YouTubePlayer youTubePlayer, boolean b) {
        Log.d(TAG, msg: "OnClick: Done Initializing." );
        //Getting playlist from youtube
        youTubePlayer.loadPlaylist( s: "PLZ4LpIeB-0SLH53_Wcsnc-8Gm-ml_Rz20");

    }

    @Override
    public void onInitializationFailure(YouTubePlayer.Provider provider, YouTubeInitializationResult youTubeInitializati
        Log.d(TAG, msg: "OnClick: Fail to Initializing." );
    }
};
```

Call and browser

```
//Call intent, when you click the call imageview for samaritans
samaritans_call = (ImageView)findViewById(R.id.samaritans_call);
samaritans_call.setOnClickListener((view) → {

        String phone = "116 123 ";
        Intent call = new Intent(Intent.ACTION_DIAL,Uri.fromParts( scheme: "tel", phone,  fragment: null));

        startActivity(call);
});

//web browser intent to  samaritans website
samaritans_id = (ImageView)findViewById(R.id.samaritans_id);
samaritans_id.setOnClickListener((view) → {

        Intent web = new Intent(Intent.ACTION_VIEW);
        web.setData(Uri.parse("https://www.samaritans.org"));
        startActivity(web);

});
```

❖ Quiz

Quiz provide user to take a mental health quiz to engage user in a fun and challenging way to test their knowledge on mental health. Using SQLite database.

```
public class QuizDbHelper extends SQLiteOpenHelper {

    //Two constant
    private static final String DATABASE_NAME = "BeWellQuiz.db";
    private static final int DATABASE_VERSION = 1;

    //Ref to the database so we can add some valve to it later
    private SQLiteDatabase db;

    private QuizDbHelper(Context context) { super(context, DATABASE_NAME,  factory: null, DATABASE_VERSION); }

    @Override
    public void onCreate(SQLiteDatabase db) {
        this.db = db;

        final String SQL_CREATE_QUESTIONS_TABLE = " CREATE TABLE " +
                QuestionsTable.TABLE_NAME + " ( " +
                QuestionsTable._ID + " INTEGER PRIMARY KEY AUTOINCREMENT, " +
                QuestionsTable.COLUMN_QUESTION + " TEXT, " +
                QuestionsTable.COLUMN_OPTION1 + " TEXT, " +
                QuestionsTable.COLUMN_OPTION2 + " TEXT, " +
                QuestionsTable.COLUMN_OPTION3 + " TEXT, " +
                QuestionsTable.COLUMN_ANSWER_NUM + " INTEGER " +
                ")";

        db.execSQL(SQL_CREATE_QUESTIONS_TABLE);
        fillQuestionsTable();
    }
```

<u>Questions and Answer</u>

```
//Saving the question in SQLiteDB

private void fillQuestionsTable() {
    Question q1 = new Question( question: "How many people will experience some kind of mental health problem in the course of a year?", option1: "1 in 4", option2: "1 i
            answerNum: 1);
    addQuestion(q1);
    Question q2 = new Question( question: "What percentage of children have a mental health problem at any given time?", option1: "5%", option2: "20%", option3: "10%",
            answerNum: 3);
    addQuestion(q2);
    Question q3 = new Question( question: "How many people does depression affect?", option1: "1 in 5", option2: "1 in 10", option3: "1 in 12",
            answerNum: 1);
    addQuestion(q3);
    Question q4 = new Question( question: "Who is most likely to die from committing suicide?", option1: "Same Ratio", option2: "Women", option3: "Men ",
            answerNum: 3);
    addQuestion(q4);
    Question q5 = new Question( question: "How many prisoners have a mental disorder?", option1: "1 in 2", option2: "1 in 5", option3: "9 in 10",
            answerNum: 2);
    addQuestion(q5);
    Question q6 = new Question( question: "What is the female to male ratio of Obsessive Compulsive Disorder", option1: "1 in 5", option2: "1 in 10", option3: "1 in 12",
            answerNum: 1);
    addQuestion(q6);
    Question q7 = new Question( question: "What are not physical symptoms of depression?", option1: "Sleeping for longer", option2: "Lessened sex drive", option3: "Loss o
            answerNum: 1);
    addQuestion(q7);
    Question q8 = new Question( question: "On how many days a week should you aim to be active for at least 30 minutes?", option1: "5 days", option2: "2 days", option3: "E
            answerNum: 2);
    addQuestion(q8);
    Question q9 = new Question( question: "After exercise you are better able to cope with the stresses and strains of life?", option1: "Maybe", option2: "False", option3:
            answerNum: 3);
    addQuestion(q9);
    Question q10 = new Question( question: "Exercise can be as effective as medication in treating depression? ", option1: "True", option2: "Maye", option3: "False",
            answerNum: 1);
    addQuestion(q10);
}
```

Show the user the answer that is right after their answer.

```
//letting user know the answer
private void showSolution(){
    rb1.setTextColor(Color.RED);
    rb2.setTextColor(Color.RED);
    rb3.setTextColor(Color.RED);

    switch (curentQuestion.getAnswerNum()) {
        case 1:
            rb1.setTextColor(Color.GREEN);
            textViewQuestion.setText("Answer 1 is correct");
            break;
        case 2:
            rb2.setTextColor(Color.GREEN);
            textViewQuestion.setText("Answer 2 is correct");
            break;
        case 3:
            rb3.setTextColor(Color.GREEN);
            textViewQuestion.setText("Answer 3 is correct");
            break;
    }
```

6.4 Testing

6.4.1 Unit testing

Each function of the BeWell application, throughout the development. Unit testing was carried out on each functionally.

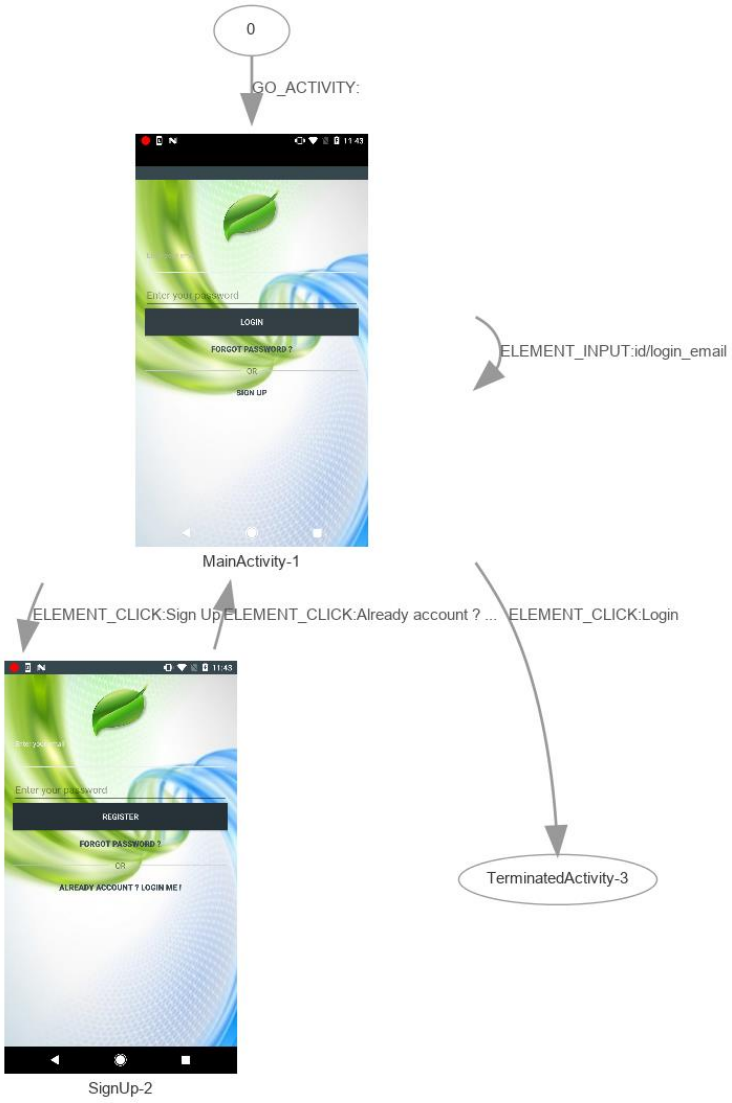
The application was run on my android phone and emulator on my pc. Android Monitor was view, which shows any errors that the code may have while the application is running. This was a very effective way to finding errors in your code and go fix the errors in the code.

Unit testing was performed on the login and registration process, to ensure that validation and authentication worked perfectly.

6.4.2 Firebase Test lab

Firebase Test Lab, Robo test was used for testing. You select the devices to test. The Robo Test checks if your application will crash if no values are entered in textbox and button is presses to save values. If test fail, there is a log shown where the error occurs. (Firebase, 2018).

Firebase Test Lab provides log of warning and error report if testing fail.



Above is example of the testing using Firebase Testing Lab. Also, there is a video of the test been preform and you can see where there is failure.

Example of failure:

```
java.lang.IllegalArgumentException: Given String is empty or null
        at com.google.android.gms.common.internal.zzbq.zzgm(Unknown Source)
        at com.google.firebase.auth.FirebaseAuth.signInWithEmailAndPassword(Unknown Source)
        at log.bewell.login.MainActivity.loginUser(MainActivity.java:86)
        at log.bewell.login.MainActivity.onClick(MainActivity.java:78)
        at android.view.View.performClick(View.java:5637)
        at android.view.View$PerformClick.run(View.java:22429)
        at android.os.Handler.handleCallback(Handler.java:751)
        at android.os.Handler.dispatchMessage(Handler.java:95)
        at android.support.test.espresso.base.Interrogator.a(Interrogator.java:19)
        at android.support.test.espresso.base.UiControllerImpl.a(UiControllerImpl.java:142)
        at android.support.test.espresso.base.UiControllerImpl.a(UiControllerImpl.java:134)
        at android.support.test.espresso.base.UiControllerImpl.a(UiControllerImpl.java:34)
        at android.support.test.espresso.action.MotionEvents.a(MotionEvents.java:74)
        at android.support.test.espresso.action.MotionEvents.a(MotionEvents.java:52)
        at android.support.test.espresso.action.Tap.c(Tap.java:9)
        at android.support.test.espresso.action.Tap.a(Tap.java:19)
        at android.support.test.espresso.action.Tap$1.b(Tap.java:2)
```

6.4.3 Think Aloud Task

- Register
- Login and logout
- Forget password
- Change/Reset password
- Go to menu main
- Start workout activity
- Start any give challenge
- Start instruction activities
- Save progression
- Navigate to my progression
- Start relaxation sound
- Play activities and close the screen
- Start calorie counter
- Save TDEE and calories per day
- Search calories number
- Save food input
- Check your stat in the statistics bar graph
- Navigate to support services
- Call activity
- Play activity
- Start quiz activity
- Save quiz activity

College student: Amina is 21-year-old college student studying neuroscience in Trinity College Dublin. Amina has an android phone and lie the workout section of the application. He finds the workout challenge and love she can keep track of her progression.

Project Coordinator: Kerrie is 45-year-old. She works as a project coordinator at Don Bosco. She owns an android phone. She thought the app was simple and easy to use. She like the support services page. The fact that you can call the support you want direct from the app. Also, she liked links to helpful websites.

Social Worker: Adewale is 25-year-old man and work as a social worker. He like the total daily energy expenditure (TDEE) that tell you the day intake of calories and the statistics graph of the application.

6.4.4 Think Aloud Test: Results Summary

Task	Result
Register	The tester didn't have any major issue or completing the task. The user was confident, quick and efficiently.
Login and logout	Testers was able to login and out of the application with no issue
Forget password	Testers were able to retrieve their password after following instruction they got to their email addresses and were able to successfully login after
Change/Reset password	Testers were entering their new passwords and updated successfully without any issues
Go to Menu Main	The testers were able to get to the Menu main after login straight away in a reasonable time.
Start Workout Activity	Those who try to perform workout they were able to start the workout with no problem.
Start any give level	Testers who pick level of workout was able to pick the level of the workout with no problem.
Start Instruction Activities	The Tester was able to view the Instruction of the activity of the level picked and complete it smoothly and efficiently
Navigate to My Progression	Tester was able to view their progression with no problem
Start Relaxation Sound	Tester was able to start the audio with no problem but one of the seek bar not working properly problem
Play Activities and Close the Screen	Tester where able to play their audio and close the app and tester where still able to hear the audio with no major issues.
Start Calorie Counter	Those who try to start were able to start the calories counter activity with no problem.
Save TDEE and calories per day	No problem getting TDEE and getting calories per day

Search calories number	Tester had no problem getting numbers pf calories from search from an API but slow to get the number of calories some time.
Save Food Input	Same outcome, no problem food input saves
Check Stat in Statistics	Testers able to check there start of food intake and goals calories.
Navigate to Support Services	Those who try to start Support services activity were able to start the Support services with no problem.
Call Activity	Testers were able to call the support service from the app with no problem.
Play activity	Testers were able to play video with no major problem except with internet connect.
Start Quiz Activity	Testers who pick level of quiz was able to do so with no problem.
Save Quiz Activity	No hesitation and straight forward completeness of task

6.4.5 Effectiveness

Testers did not have major problem navigating through the functionality of the app. Testers seem to be able to complete the task they need to be done immediately was reasonable time.

6.4.6 Efficiency

There wasn't time allocated for the tasks to be done. But to say, the task was finished from the tester between 20 to 40 minutes depending on the task. The tester shows that their interaction with the app was efficient. This kind of tester

6.4.7 Scope for further improvements

The testers didn't find any issue regarding the functional of the app. There was feedback giving back from the testers. Also, there was some interesting idea and suggesting for future implementation that will be taking into consideration in future implementation.

6.4.8 Testing Conclusion

The Testers shows there wasn't no major issues in doing their task they needed to do. Testers completed their task successfully and with no difficultly. There was feedbacks and suggestions from the testers which will be considered. The overall user experience was pleasing.

6.4.9 System Usability Scale

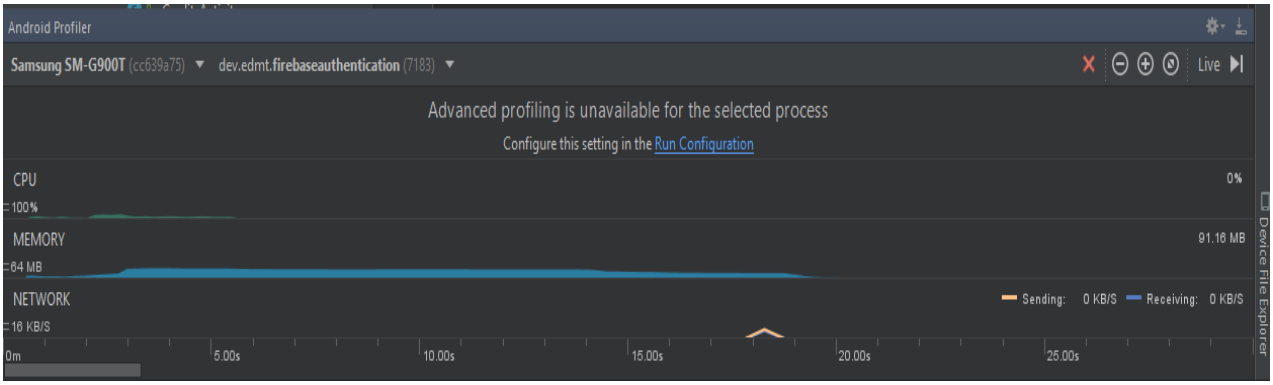
System usability scale(SUS) was carried out from the testers of the app. SUS have been used to evaluate overall of usability of BeWell application. There were 8 questions that was asked to each tester which they have to answer scaling from 1 to 5 (1 = strongly disagree, 5 = Strongly Agree). Below are the 8 questions:

- What is your gender
- How old are you
- I believe the system was easy to use
- I find the system complicated to use
- I think that I would like to use this system often
- I felt the app is helpful/useful for me
- I felt the user interface was pleasing to look at & work with
- I found the functionally in this system were well integrated
- I would recommend this service to a friend or colleague
- I needed to learn a lot of things before I could get going with this system

After going through the completed system usability scale calculations. The result revealed from the calculation shows it was a positive testing from the testers of the application.

7 Evaluation

Android studio Monitor tool was used to test the real-time data for BeWell app. It measures for CPU, memory and network activity performance (Developers, 2018). The performance was evaluated on Galaxy S5. It uses little ram and spikes up in network when you want to login to the application.



8 Conclusions

Advantage

BeWell app was development in aim of helping client or people with self-care. This application show awareness for the Little Things Campaign 'remind us of the little things that make a big difference to how we feel.'

Also, the app offers a simple interface easy to use and easily understandable to the users.

Disadvantage

There is not real financial gain in developing this application. The aim os the app is developing of helping people.

Opportunities and Limits

The opportunity that may came for the app is that any company that work with mental health could endorse the app and be used to help and improve mental health or self-care. Also, HSE could be interesting in the app and may provide feedback on how to develop this application better in the future.

The Limits of BeWell app could be no chance on the app.

9 Further Development

This application was developed in design to helping people with self-care, therefore further development with be linked to the users who will be using the application.
More features and functionality could be added in the app.
All the feedback from users will be considered in the next phase of BeWell application.
Improving the performance and fixing any bug that was arise from the testing phase of the app.

The following further improvements can be released:

- **Notification**:
  The application could have the ability to send a reminder notification to get the users to exercise, meditations and meal counter.

- **Improve workout section**:
  The application could have the ability to let the user to design their own workout exercises. Also, wearable device that the client will wear while doing the exercises and by using Bluetooth or a way to get the data information from the device to the application to analyze their progressing and improvement.

- **Download LittleThings:**
  The application could have the ability for user to download all the LittleThings Posters

- **Chatroom:**
  The application could have the ability to allow user to create a chat room to talk to another user who are going through what they are going through anonymously

- **Improve Nutrition:**
  The application could have the ability to show user make recipes that the user can effort.

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11 Appendix

11.1 Project Proposal

Objectives

The main aim of this project is basic on the highly important area of highly important area of mental health with a view to using the technology which is becoming ubiquitous in our lives to assist those with mental health issues through simple lifestyle intervention. This work will be based around implementing a mobile application to encourage one or more of the "little things that make a big different to how we feel" as identified and advertise in the recent Irish government campaign.
The application will be able to help and improve general health and wellbeing by focusing on this key aspect:

- Improving sleep
- Encouraging healthy eating
- Encouraging increased movement.
- Notification with the Client activities.

I believe the scope of the objective show that more features can be added that can help people with mental health issue.

Background and Research

Approximately 80 – 90% of smartphone have sensors such as camera, light sensors etc. It's becoming easy to use the feature to implement it to your application and use it to understand our body and help to improves our lives.
Sleeping is a must in your life and essential. People gain weight, stress out or you can develop major diseases (Diabetes) if you don't get your sleep in. We need to sleep to relax the brain and to process all the experiences we had throughout the day.
To mention, smartphone applications wouldn't be able to give deep detail extensive sleep study but having sleep data from different patient can help sleep researchers with a low cost and benefit (Mohr, 2015).

There are increasing in mobile apps for mental health problems and increasing. The project idea came of Irish government campaign LittleThings campaign.
The LittleThings campaign designed some posters to remind people of the little things that make a big difference to how we feel. To share them with friends and family (Health, 2017).
In recently research done by J Med Internet Res (JMIR), Over 15,000 mobile apps are out in the market for health care and 29% intended for mental health. The apps have different functions to deal with different issues that is related to mental health e.g. symptom assessment, practicing skills learning in therapy, physical exercises etc (Rebecca Grist, 2017).

According to The World Health Organization (WHO), almost 3.2miliion death every year due to lack of physical exercise and 31% of adult isn't active.
"Report from WHO also shows 8 that 86% of deaths, 77% of the loss of years of healthy life and 75% of healthcare costs in Europe are caused by certain diseases (cardiovascular diseases, cancers, diabetes mellitus, chronic respiratory diseases, mental health problems and muscular-skeletal disorders) that have in common modifiable risk factors, such as smoking tobacco, excessive weight and obesity, alcohol abuse, the low consumption of fruit and vegetables, physical inactivity, excess fat in the blood and high blood pressure. These risk factors, alone, are responsible for 60% of the loss of years of healthy life in Europe." (Giovanna Sannino, 2017).
To help with sleeping Science of psychoacoustics will be used to explores sound perception.
According to Jue Zhang, Ph.D, professor at Chinas Peking University (Heid, 2012)."Pink noise" is one of the sound that help with deep sleep, a mix of high and low frequencies that sounds balance and natural (Heid, 2012) (MacMillan, 2017).
From my research, there are some mental health applications that are out in the markets. Here are some of the applications:

MiYo (Mind Yourself) is an application develop by SpunOut.ie. The application focus on physical health and wellbeing (sleeping eating and connecting with friends and learning).
The application is easy to navigate, the graphs aspect of the app shows weekly effort. But something you get confuse about what the application is about and its purpose (Out, 2017).

Calm: The application helps with stress and improving wellbeing in area of meditation. The applications show how to meditate, and you can set nature scenes and relaxing music track that can help distress. Help with focus, energy and sleep. You must pay for 95% of the majority material. Goals: Achieve balance, be healthier, Better habits, improve general wellbeing, sleep better Goals: Achieve balance, be healthier, Better habits, improve general wellbeing, Sleep better (Out, 2017).

Recovery Record: This application was developed by Recovery Record. Help manage people with eating disorders. You can track your progress and set personal reminder schedules. Goals: Manage eating disorders.

Technical Approach

The project implementing will be using Android Studio Development Environment. Android Studio program uses Java programming language. This isn't my strongest programming language but am looking forward to challenge myself. Along the way, different programming languages may be used to achieve some part of the project. This is my first time developing an app on android studio platform so am learning this technology as am going forward.

Task 1

Improving sleep: Implementing a mediation breathing routing which can help to sleep better and relax the mind before heading to bed.

Task 2

Notification: Implementing a notification for a reminder to push whoever is using the application to do some exercises or to do their mediation.

Task 3

Encouraging increased movement: Implementing an exercise board. Client can view their progression and challenge themselves.

Task 4

Encouraging healthy eating: Implementing a calorie counter that help track client diet and eventually become health.

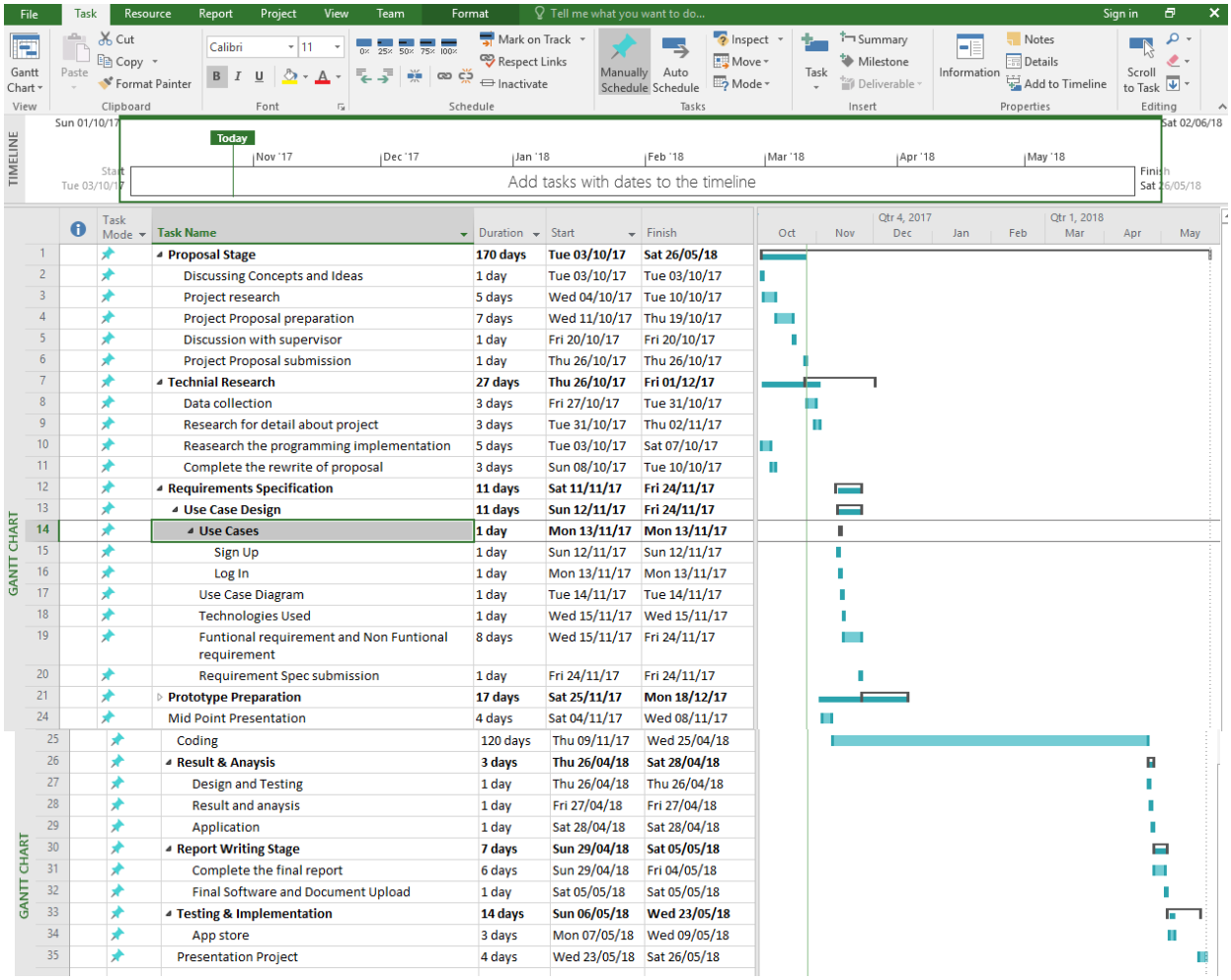
Task 5

Android Wear: Implementing a app that can be available to users whenever they are wearing a watch to track their fitness.

Special Resources Required

The main external resource that will be required during the development of this project is android device to run the application.

Old Project Plan



Technical Details

The build for my project will be comprised of various technologies, some of which are, Android Studio platform, JAVA and external storage (Firebase). Additional technologies that are featured within the application will be consist of Google API and Android wearable.

Android Studio: "Android Studio is Android's official IDE. It is purpose built for Android to accelerate your development and help you build the highest-quality apps for every Android device." (Studio, 2017).
It offers tools custom-tailored for Android developers, including rich code editing, debugging, testing, and profiling tools
Java: Android app is specified by XML files and the back end uses java code.

API: Android provides different application framework that allows you to provide unique resources for different device.

Firebase: "Firebase is a scalable, real-time cloud data service. It is designed for building real-time, collaborative applications. Data in Firebase is standard JSON, and developers can access it using a client library or the REST API. When accessed through a client library, changes to data are synchronized in real-time to clients within milliseconds." (Consulting, 2016)

Evaluation

Testing is an important quality control measure that will be taking during the time developing my application. There will be serval test case run early of development life cycle of the project, checking for some errors before there deeply rooted with the system. My main goal is to expose requirement, design and coding error in my program (Rihan696, 2012).

Unit tests: One of the fundamental tests in app testing strategy. After building some feature or adding changes in my build, unit tests will be run to catch and fix software progressing change to the app. Unit testing will check if the class is in a right state (Developers, n.d.).

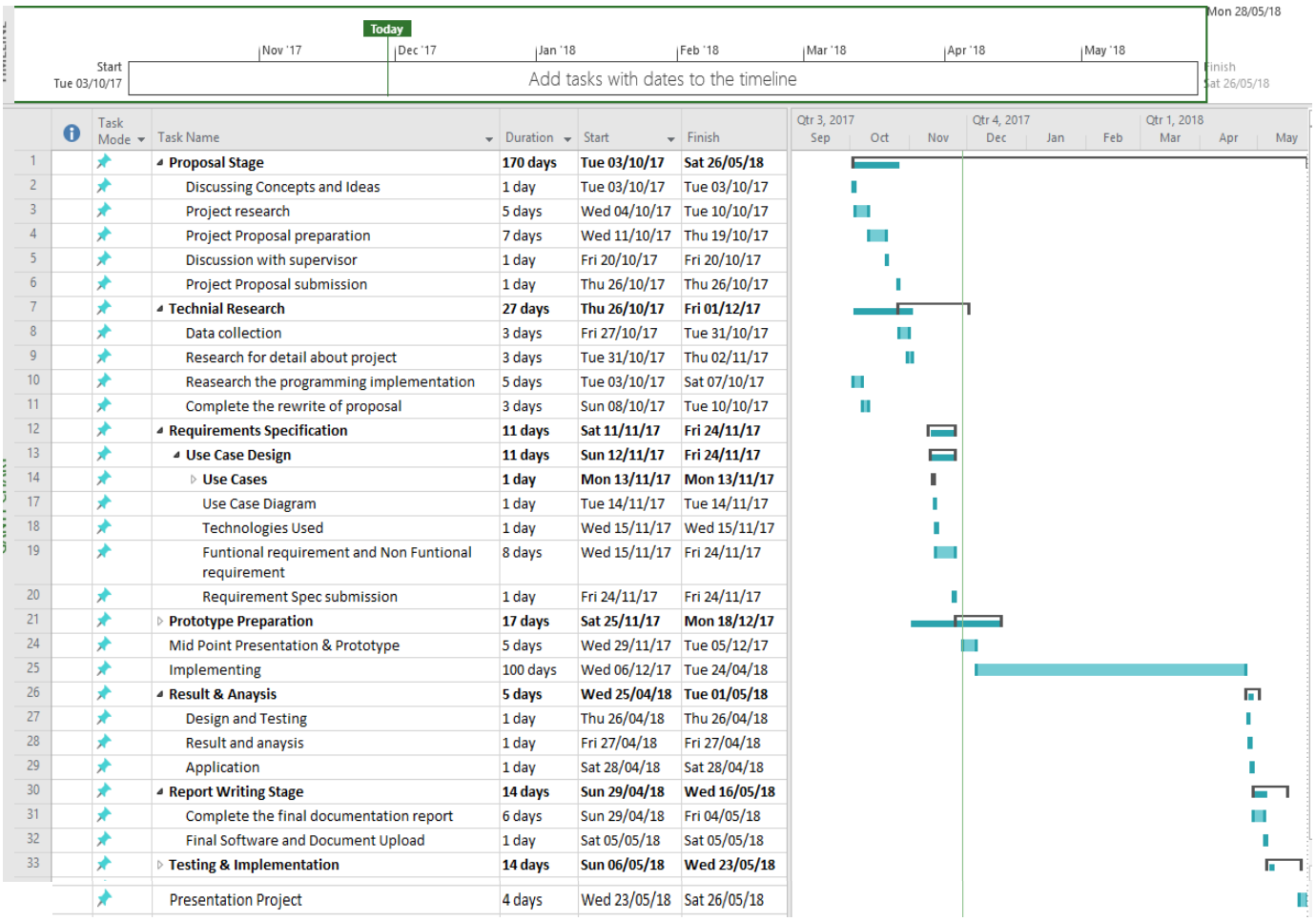
- Local test: "Unit tests that run on your local machine only (Java Virtual Machine(JVM))."
- Instrumental tests: "Unit tests that run on an Android device or emulator" (Developers, n.d.)

Integration tests: There will be Integrating test framework with Mockit to test API in local unit tests and UI Automator to check user interaction in instrumentation test. Some components will be Activity testing and Service testing. (Studio, n.d.).

Operation tests: As well called Functional Tests, High level tests designed checking for completeness and correctness of the app. FitNess may be used for operation test for the app (guru99, 2017).

System Tests: Preformed when the app is done, testing in contradiction of system requirement and if the requirement is melt. The testing includes: GUI tests, Usability tests, Performance tests and Stress tests. Performance test is more focused on. Traceview might be used to debug and profile its performance (guru99, 2017).

Project Plan



	Task Mode	Task Name	Duration	Start	Finish
1		**Proposal Stage**	**170 days**	**Tue 03/10/17**	**Sat 26/05/18**
2		Discussing Concepts and Ideas	1 day	Tue 03/10/17	Tue 03/10/17
3		Project research	5 days	Wed 04/10/17	Tue 10/10/17
4		Project Proposal preparation	7 days	Wed 11/10/17	Thu 19/10/17
5		Discussion with supervisor	1 day	Fri 20/10/17	Fri 20/10/17
6		Project Proposal submission	1 day	Thu 26/10/17	Thu 26/10/17
7		**Technial Research**	**27 days**	**Thu 26/10/17**	**Fri 01/12/17**
8		Data collection	3 days	Fri 27/10/17	Tue 31/10/17
9		Research for detail about project	3 days	Tue 31/10/17	Thu 02/11/17
10		Reasearch the programming implementation	5 days	Tue 03/10/17	Sat 07/10/17
11		Complete the rewrite of proposal	3 days	Sun 08/10/17	Tue 10/10/17
12		**Requirements Specification**	**11 days**	**Sat 11/11/17**	**Fri 24/11/17**
13		**Use Case Design**	**11 days**	**Sun 12/11/17**	**Fri 24/11/17**
14		**Use Cases**	**1 day**	**Mon 13/11/17**	**Mon 13/11/17**
17		Use Case Diagram	1 day	Tue 14/11/17	Tue 14/11/17
18		Technologies Used	1 day	Wed 15/11/17	Wed 15/11/17
19		Funtional requirement and Non Funtional requirement	8 days	Wed 15/11/17	Fri 24/11/17
20		Requirement Spec submission	1 day	Fri 24/11/17	Fri 24/11/17
21		**Prototype Preparation**	**17 days**	**Sat 25/11/17**	**Mon 18/12/17**
24		Mid Point Presentation & Prototype	5 days	Wed 29/11/17	Tue 05/12/17
25		Implementing	100 days	Wed 06/12/17	Tue 24/04/18
26		**Result & Anaysis**	**5 days**	**Wed 25/04/18**	**Tue 01/05/18**
27		Design and Testing	1 day	Thu 26/04/18	Thu 26/04/18
28		Result and anaysis	1 day	Fri 27/04/18	Fri 27/04/18
29		Application	1 day	Sat 28/04/18	Sat 28/04/18
30		**Report Writing Stage**	**14 days**	**Sun 29/04/18**	**Wed 16/05/18**
31		Complete the final documentation report	6 days	Sun 29/04/18	Fri 04/05/18
32		Final Software and Document Upload	1 day	Sat 05/05/18	Sat 05/05/18
33		**Testing & Implementation**	**14 days**	**Sun 06/05/18**	**Wed 23/05/18**
		Presentation Project	4 days	Wed 23/05/18	Sat 26/05/18

11.2 Monthly Journals

Reflective Journal September 2017

It's a been a stressful September to be honest. I believe there is too many works been throwing at us. We are doing six module this semester.

I think I made a big mistake not having my Software project idea before we started college. I find it so hard to come up with a software project idea. I still having come up with my project idea end September. I just can't think of what I can do.
I'm not the best with programming and most of the Software project I done in second year and third year was a group project and contributed a lot but it very difficult to come up with one myself.

This whole has been dealing with other modules and trying to come up with my software project idea. I spend a lot of time researching on my software idea and seeking information from Eugene McLaughlin for what I can have as a security aspect of my project.

I finally came up with a project idea. I had a fitness Application idea app in mind for my project for my pitch on 2nd of Oct 2017 to the judges. Figure cross it gets approval.
I have the observative of my project postal done and it due on this Friday 27 of October. I feel am behind. I will be staying in college until 9pm to see what I'll get done.

Reflective Journal October 2017

3/0ct/2017
Unfortunately, my Software project pitch was rejected. I got rejecting because they think the project is not complex enough. I really feel stress out and sad seriously. Have never have this pressure in my life in terms of coming up with a software project idea.
I believe am not the best person to come up with a project idea because I like when someone come up with an idea and I take my idea from that.
My Project pitch was the fitness application I had in September: Fitness application that can help and motivate people to be more active and workout.
The aim of the project was that people can go on my fitness app and will be able to create their own work out plans and can calculate calorie of the food they want to eat.
My application aims to encourage people that don't want to go to gym, I believe there isn't many applications that let you create workout plan but most of these are design for people who are going to the gym.
I was hoping to focus also in social aspect of application also. Whoever will be using my application. They will be able to post video and photo to encourage people who stay at home, people that can't go to the gym.
8/Oct/2017

After a week of my pitch be rejected. There was a list of project ideas that was posted on out Moodle page from different lectures. I tool one of the idea from Dr Dominic Carr, Technology to improve Mental Health.

"The project targets the highly important area of mental health with a view to using the technology which is becoming ubiquitous in our lives to assist those with mental health issues through simple lifestyle interventions. This work could be based around implementing an App to encourage one or more of the ``little things that make a big difference to how we feel'' as identified and advertised in the recent Irish government campaign (http://www.yourmentalhealth.ie/Get-involved/LittleThings-campaign).This project could be offered in multiples:

- Improving sleep & encouraging healthy eating
- Encouraging increased movement
- Detecting distant friends and encouraging connections
- Identify a small behavioral change to improve someone's mental health and implement it "

The project seems right to me. I need to finalize the project and find a way to implement security principle within the application.
I'm not should how I will get the project done but have been doing a lot of research in the field of Mental health to see how I can get the application on.

20/0ct/17
I have an appointment with my supervisor Thibaut Lust today. I am hoping he can help me with the overall the project because I know am behind. I have an idea but am not sure how to go about it.
I don't have my project proposal done but I have the overview of the project. I want to stay focus but it hard to with the work load I have and trying to finalize what I will have in my application.

23/Oct/17
I finally melt up with my supervisor. The first meeting was a productive one I believe. We decide what feature the app may have. We haven't finalized the application fully. We will have to seek some information from Dr Dominic carr since it was his idea I took. Firstly, I'm happy now that at last I have an idea to be working on for my software project. I need to start my project postal document now. I don't feel like I can do some of the requirement I spoke with my supervisor, but I believe I will do my very best to make it happen. I need to learn a new technology with the mobile application I will develop (Android Studio).
I believe the project will be challenging but am ready to give it everything it takes. Also, my supervisors seem nice and I hope we can work great together.

26/Oct/17

Project proposal is due in two days and I haven't finished it yet. I must finish the grant chant for the project. I haven't come up with the security side of the application except for the login in details.

I don't feel comfortable with the project because am still a bit lost for the overall of the project. I have an appointment with my supervisor on the 27th of this month.

27/Oct/17

Today is the final day to submit the project proposal. I'm still not finished the proposal yet. I have the grantt chart left to do and I have a meeting with my supervisor today to discuss further on my project.

The meeting today with my supervisor was good. Thibaut my supervisor went through my project proposal and highlight what needed to fix and some sector that needed more explanation. We are close to finalizing all the functional that my application will have. I learned my lesson today that I need to submit any document to my supervisor early before the deadline to review it and help me improve it.

Thibaut review on my proposal. He was happy with it, but some part of the proposal just needed more explaining. Also, I need to find out way to apply wearable device to sync into my app as I went to be able to track client activities.

Main achievements for this month will be project proposal was submitted on time and 80% of my application research is done.

Reflective Journal November 2017

05/Nov/2017

The reading week was a busy reading week. I was mostly in college studying for CA and doing Web service and API. Some adjustment was make on my project proposal that my supervisor highlight that need to be done. Some research was done on how to implement a notification on my application. A mockup wireframe was also done to show how the app pages are going to link. The mockup was draw on a paper which I will show to my supervisor to get a feedback when we meet.

11/Nov/2017

Meeting with my supervisor today was good. He looked at my proposal again and my grant chant that was one of the task he told me to fix during the reading week. We went through some section of the requirement specification document where he explains some of the section I was having difficulty understand in terms of what is requirement, even though I started some of the document already.

My grantt chant time frame on some of the sections needs to be change supervisor said (Result and Analysis and Report writing stage etc).

We spoke about an implementing a chat system to my application, but my supervisor told me to have a reason why I should implement the chat system he showed me some

example of application that have a chat system in them but there is a purpose why its implemented. Research need to be done on that and he like the idea just must give him what the purpose will be.

Supervisor is happy with my progressing so far, he told me. I need to finish my requirement document now and send it to my supervisor by next week even though it due in 2 weeks.

17/Nov/2017

I started my requirement specification on the 15th of November my supervisor wants me to send it to him today 17th of November. I have some part of the requirement done but not near finished.

I will email my supervisor to tell him why I didn't finish it. We had Web Service and API programming exam this Wednesday which wasn't the best test have done. It was like the lecture was just setting you to get low grade because whole class were complaining about the test. NetBeans was acting up and we had to get the programming test done in 2hour. The server was acting up and I couldn't run the silly program. While doing test my NetBeans shut off about two times. The test was messed up and we are hoping there is a way to do it again. I understand what the test was asking but it was impossible to get it done due to NetBeans and the times was short I believe. We couldn't use our laptop for the test which I would have like to use my laptop which doesn't crack like college citrix.

The test is over now just need to focus to the next task.

21/Nov/2017

Have been working really hard on my requirement specification document that is due his week 24th Nov. My supervisor told me to send him my requirement specification document last Friday 17th Nov which was impossible to send it to him that week of the 17th due to Web services and API 30% programming test we had on Wednesday. My main focus was the test, then I focused on the requirement document. I send my supervisor an email with attachment of some of the work I done on the requirement on Saturday 18th Nov even though he wanted Friday.

Today I sent the finished requirement document to my supervisor this morning. I'm waiting for a feedback from him now before the 24th Nov when I'll submit the document. GUI is the only thing left to be added in the requirement document. It isn't developed on photoshop yet, but I have it drawing on paper. I'll be meeting my supervisor this Friday 24th before I submit the document, but I want him to give me feedback on the document before I meet him up and before submitting it.

I need to start researching how to implement all my functional on android studio and start some prototype for mid-point presentation.

I'm afraid about this project because I haven't developed anything on android before and not really sure how to implement all my the functional I intended to have on the application.

27/Nov/2017

I got a feedback on the 23rd of Nov from supervisor that he's happy with requirement specification just need some correction.

The meeting with my supervisor was a long one last Friday the 24th of Nov. We spoke about the Requirement Specification document. I was giving feedback on my requirement document again.

There were some things I want to add on to requirement which I spoke to him about. Abuse case use cases in every requirement section on the document and of cause my GUI, which was the only thing I didn't do before sending the requirement document to him. We spoke about the mid-point presentation and the prototype etc.

We need to submit our Technical report this week the 30th. Technical report is what I'll be working on this week and change /add some things in the requirement specification and finally the project proposal. I will have to send all the document I need to submit to my supervisor before Wednesday, so he can review it and send it back to me before submitting everything on the 30th.

Here will be all the requirement I need to finish before Wednesday: Finished up the Requirement, finish up the Proposal, finish final grantt chart, finish Use cases & Abuse cases and GUI for app. Also starting my prototype.

At the same time this week AI chess needs to be submitted on Friday and web service and API needed to be started. Security principle and Secure Programming need to be started also. This week will be busy.

30/Nov/2017

All this week have been busy doing. After submitting the requirement document, I had to start working on my technical report document. I upload the technical report on time but still believe there was more to be written. We got little time to do the to do the technical report.

Thank god, the technical report is got out of the way now. Funny story happened before I submitted my technical report. "I sent my supervisor the final technical report and he was meant to review and give me a feedback. He reviewed the document and forgot to attach the document he reviewed. I had to submit the report tonight at 11 55pm. Luckily, I got it review by one of my mentor in work in the office and submitted it before the deadline.

I will be working on my mid-point presentation and prototype now. I have my presentation on the 6th if December. Before the presentation on the 6th I have an appointment with my supervisor on the 5th at 2 30pm to review the presentation slide I make.

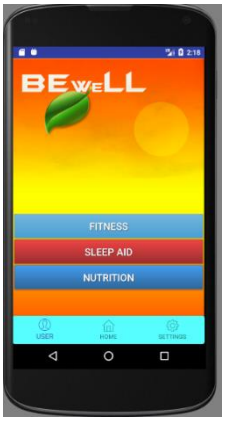
November was a stressful month I wish December isn't like that. I'm looking forward to doing some implementation now for my project.

Reflective Journal December 2017

5/12/2017

I had a meeting with my supervisor today to show him the mid-point presentation that I will be presenting to him and an extra examiner on the 6th of Dec.

There were few slides he wanted me to fix up and some slides he wanted more information on it. He was happy will my prototype. I made a login system which was connected to Firebase database. Also, I have my home page which was lined up to my three-main functionality of my project although there wasn't any functionally working. Here are some GUI I made:



6/12/2017

I had my mid-point presentation today with Thibaut and an extra examiner. Honesty, I was really scared and nervous going to the room of my presentation. The presentation took 30 min altogether.

I felt the presentation went well apart from the fact that I was nervous going in. I believe the examiner like the idea of the whole project. I was pretty happy with myself after the presentation. Next, I just have to way for the result. There was 25% going for Technical report I submitted last month and mid-point presentation.

I'm glad this one is done out of the way now because there are 4 projects due this month after we break for Christmas and start studying for January exam.

15/12/2017

Our mid-point presentation grade came out today. I am happy with my result honest. I got over 70%. I wanted to start doing some coding on the project this month, but I doubt anything will be done before the new year. I have three exams which I need to study for for January.

Reflective Journal January 2018

22/01/2018

Didn't do much in term of my software project during the break due to Exams. I was studying during over the break.

Unfortunately, Thibaut my supervision left NCI to go back to Paris for personal reason. I was assign a new supervisor who is Eamon Nolan. We meet Eamon for the first time as our supervisor with another students Thibaut supervise. I was getting feedback on my Technical report and Mid-Point presentation from Eamon which he got from Thibaut.

29/01/2019

Android studio is a pain in the leg my god. Have be battling with it for a while. Its kept on breaking and crashing. I started to develop my login system with firebase but am finding it's hard to implement it which I wasn't expecting.

My aim was to allow user to login in normally and be able to login with google account, but as its seems now, I'll just let the user to login with the email and password. I will implement the google login in if I have time.

The time is flying for the software project and also there is assignments been handed out for now from other modules.

Reflective Journal February 2018

20/02/2018

I started looking at the analysis and design document for my application. I still kind of lost of what I have to write. I made some change in my technical analysis. The functionally I intended to have in the first place will definitely change due to not understand some of android studio features and not use to many features in android studio.

25/02/2018

I believe am behind on my software project. I have the fitness page and fitness page done but need to try implement a virtualization to show the user program. I'm really am finding this project really hard. Android studio is a pain in the leg my god.

I'm having trouble integrating my login system with the fitness page I have.

I finished writing my showcase this week, just need it to be approved by my supervisor Eamon and the career advices.

Reflective Journal March 2018

10/03/2018

There is some progression. I got the login system and the fitness section done of the application working perfectly.

I worked on the nutrition section of the application also. I have a basic nutrition section that takes the user food type and amount of calorie intake of the food. My goal by the head this week is to research and implement MPAdroidchard to integrate a chart that can show the user the visualisation of the calorie they have taking in a day, weeks and month.

18/03/2018

I decide to add in a quiz activity feature in my application. Doing a research on mental health, a lot of people don't know a lot about the subject themselves. I believe this will be a fun way to inform people. The idea is to test people knowledge also to education people on a broad scale.

I developed the quiz section of the application separate for my main app to see if I could develop it. I just need to integrate it into my application. I have new Database that I used SQLite to take in the question and the answer for the quiz. I haven't decided the question to add to the quiz. I must research the most important question that need to be known by people. This month have been busy with my software project and other module.

22/03/2018

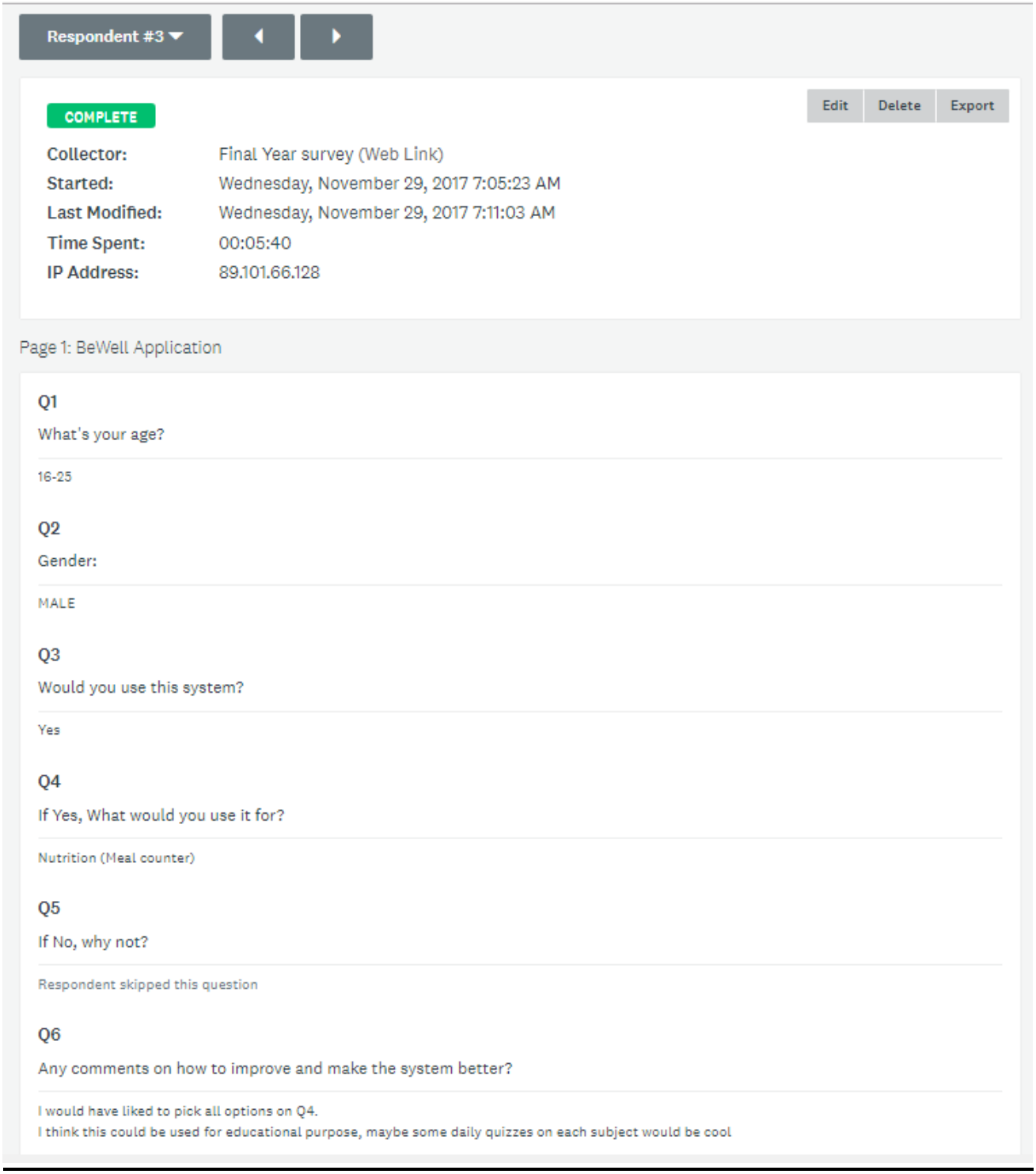
I'm currently working on the sleep section of my app now. I had to change my mind from the original idea I had for this section.

My original intention for this sector is to develop an application that can track the user breathing when they sleep. From the data that the app gathers, it should be able to show user data in a graph of how they slept with time and date. By tracking user pattern of breathing when they sleep, user can get a good idea of their sleep and find out how to improve it from see the grapy analysis.

I have design a new sector for the sleep sector. I will have a page with audio that's focus on relaxation, meditation and pink noise. March was a busy week as a whole with another modules.

But am nearly done with the main implementation of the project.

Survey



Respondent #3

Edit | Delete | Export

COMPLETE

Collector:	Final Year survey (Web Link)
Started:	Wednesday, November 29, 2017 7:05:23 AM
Last Modified:	Wednesday, November 29, 2017 7:11:03 AM
Time Spent:	00:05:40
IP Address:	89.101.66.128

Page 1: BeWell Application

Q1

What's your age?

16-25

Q2

Gender:

MALE

Q3

Would you use this system?

Yes

Q4

If Yes, What would you use it for?

Nutrition (Meal counter)

Q5

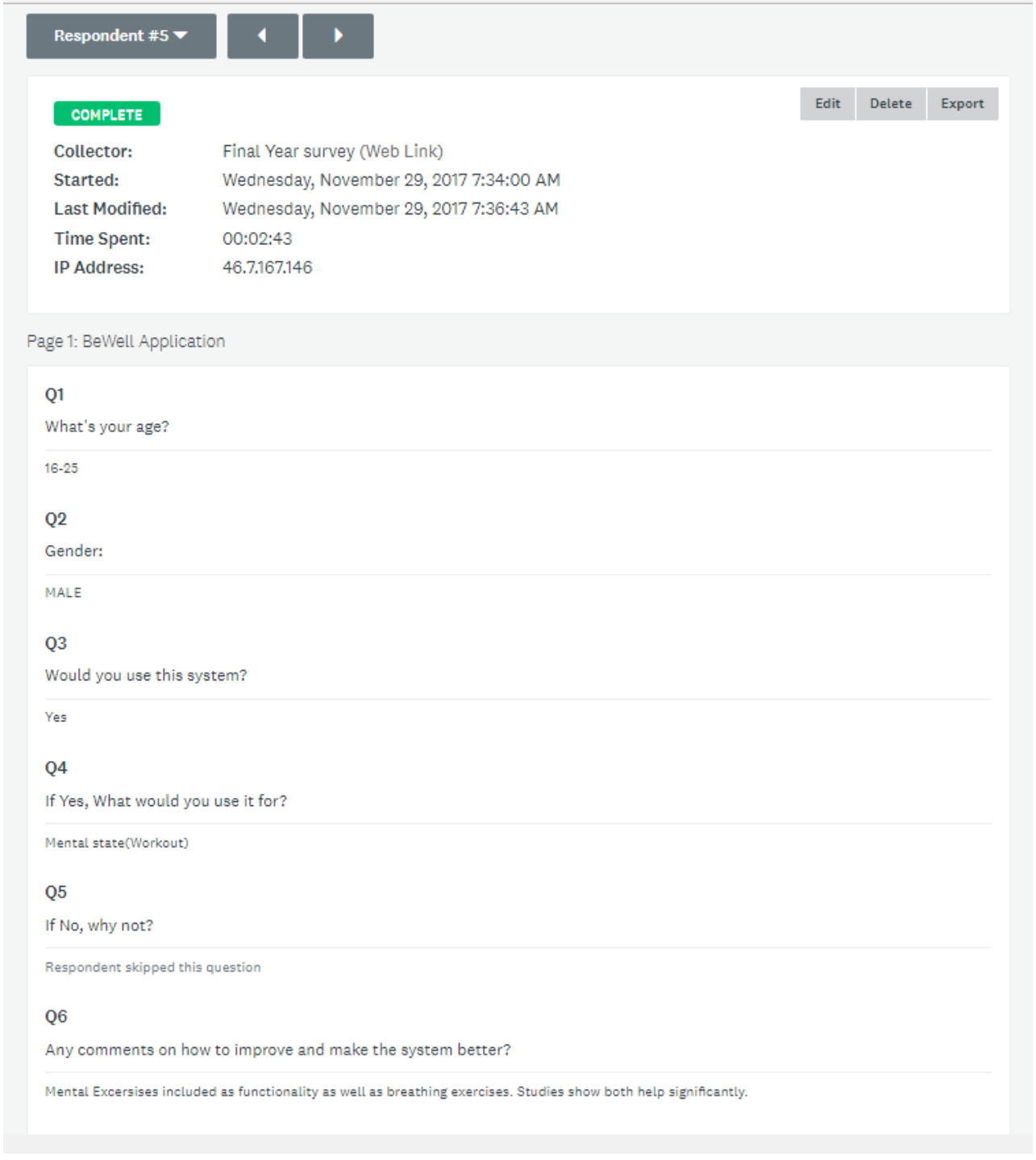
If No, why not?

Respondent skipped this question

Q6

Any comments on how to improve and make the system better?

I would have liked to pick all options on Q4.
I think this could be used for educational purpose, maybe some daily quizzes on each subject would be cool


Respondent #5
COMPLETE
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Delete
Export
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Started: Wednesday, November 29, 2017 7:34:00 AM
Last Modified: Wednesday, November 29, 2017 7:36:43 AM
Time Spent: 00:02:43
IP Address: 46.7.167.146
Page 1: BeWell Application
Q1
What's your age?
16-25
Q2
Gender:
MALE
Q3
Would you use this system?
Yes
Q4
If Yes, What would you use it for?
Mental state(Workout)
Q5
If No, why not?
Respondent skipped this question
Q6
Any comments on how to improve and make the system better?
Mental Excersises included as functionality as well as breathing exercises. Studies show both help significantly.

COMPLETE

Edit | Delete | Export

Collector:	Final Year survey (Web Link)
Started:	Wednesday, November 29, 2017 9:15:34 AM
Last Modified:	Wednesday, November 29, 2017 9:16:34 AM
Time Spent:	00:01:00
IP Address:	193.1.209.156

Page 1: BeWell Application

Q1

What's your age?

16-25

Q2

Gender:

MALE

Q3

Would you use this system?

Yes

Q4

If Yes, What would you use it for?

Mental state(Workout)

Q5

If No, why not?

Respondent skipped this question

Q6

Any comments on how to improve and make the system better?

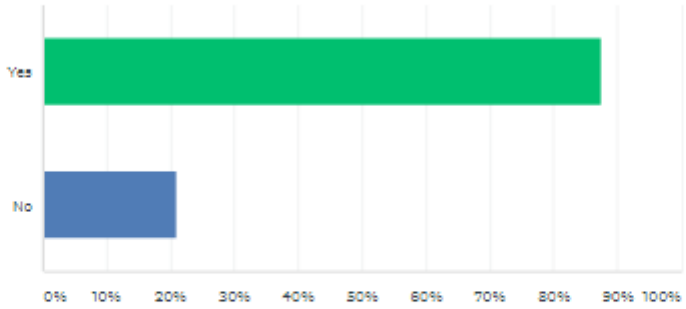
Azzez remember about the Security aspect :D #DawidTrojanowski

Q3

Customize Export

Would you use this system?

Answered: 24 Skipped: 0



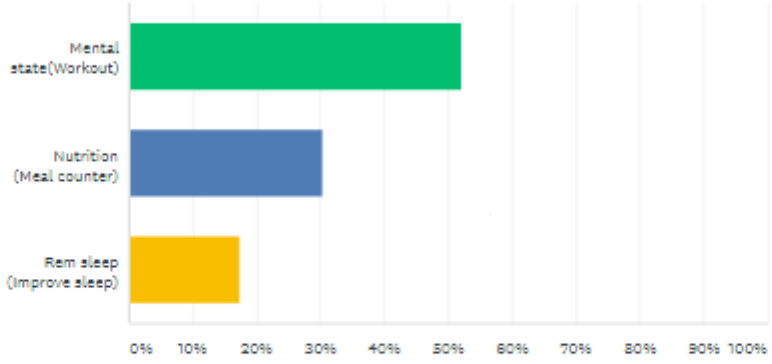
ANSWER CHOICES	RESPONSES	
Yes	87.50%	21
No	20.83%	5
Total Respondents: 24		

Q4

Customize Export

If Yes, What would you use it for?

Answered: 23 Skipped: 1



ANSWER CHOICES	RESPONSES	
Mental state(Workout)	52.17%	12
Nutrition (Meal counter)	30.43%	7
Rem sleep (Improve sleep)	17.39%	4
TOTAL		23

Final Year Software Project Survey (BeWell)

BeWell Health App

My name is Azeez Yusuff final year computing student and I would be delighted if you could take this survey after testing my application. BeWell is a mobile application based on the HSE's Little Things Campaign. BeWell allows users with mental health difficulties to improve well-being with three approaches: access relaxation sound recordings, access workout programs and track their physical activities, and log and monitor calorie intake to improve nutrition.

Overall usability of the application.
Scaling the answer from 1 to 5 (1 = Strongly disagree, 5 = Strongly Agree).

If you are not feeling confident continuing the survey, you can leave it at any time.

By pressing OK button you give your consent that you are agreeing to start the survey.

* 1. What is your gender?

- ◯ Female
- ◯ Male

* 2. How old are you?

- ☐ 0-17
- ☐ 18-25
- ☐ 26-45
- ☐ 46- 70
- ☐ +70

* 3. I believe the system was easy to use?

1	2	3	4	5
○	○	○	○	○

* 4. I find the system complicated to use?

1	2	3	4	5
○	○	○	○	○

* 5. I think that I would like to use this system often?

1	2	3	4	5
○	○	○	○	○

* 6. I felt the app is helpful/useful for me?

○	○	○	○	○

* 7. I felt the user interface was pleasing to look at & work with?

1	2	3	4	5
○	○	○	○	○

* 8. I found the functionally in this system were well integrated?

1	2	3	4	5
○	○	○	○	○

* 9. I would recommend this service to a friend or colleague?

1	2	3	4	5
○	○	○	○	○

* 10. I needed to learn a lot of things before I could get going with this system?

1	2	3	4	5
○	○	○	○	○