INFT 3970 IT Major Project

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Current problem

Currently in Australia the eating habits and lifestyle choices of young children are catalyst to what is described as a public health crisis. It is estimated that 28% of all children in Australia are either overweight or obese, with an increased risk of type 2 diabetes, sleep apnoea, heat intolerance and a range of other health issues associated with being overweight (Health Direct, 2018). According to the Australian Institute of Health and Welfare (2018) the number of obese children are increasing every year, with only 8% of children born between 1974-1977 being obese or overweight.

This problem is compounded by the difficulty many adults have when trying to communicate with children and highlight the future implications of their actions. Another reason is that some children and adults are not educated enough on the effects of an unhealthy lifestyle. Only 50% of schools in the US offer education on nutrition (Youdim, 2016), contributing to the lack of education. This project is presented as one many emerging solutions to this problem.

Project Objective

The objective of the project is to create a fully functional and simple to use desktop executable endless runner game targeted at children aged 8 to 12. The game will utilise Fitbit activity data (steps) to encourage and reward children to increase their physical activity. Additionally, the objective of the game will be to educate the children about healthy eating habits and dietary choices. The project be will completed within 9 weeks at no cost.

Scope of features

Game

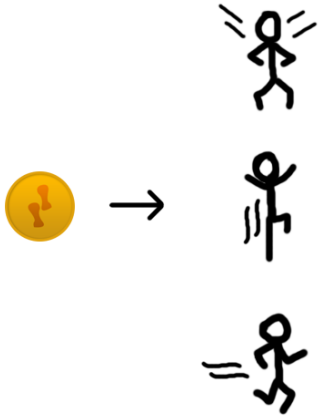
The game will be a three dimensional endless runner with 3 levels. This means that the player will be running forward towards oncoming obstacles to jump over, duck under or dodge. Users will utilize their fitbit to count steps they have done to convert to an in game currency known as ‘Step coins’. “Stepcoins’ will be exchangeable for in game perks. The ingame perks will be structured in a skill tree style. With the skill tree, the children will have the choice to use their Step Coins to upgrade a perk of their choice, this will include jump height, running speed and agility. The skill trees therefore will be broken up into levels, for example jump height level one may cost 10 000 step coins and level two another 20 000.

To encourage competitiveness between children the game will be in a time trial format where the children have the option to rerun levels and showcase their best times on each level. Children can

view and compare their times with friends using the in-game leaderboard for each level. To educate about eating habits the game will have pick up items within the levels that will be categorized as either healthy good or unhealthy food. For example picking up a piece of fruit may increase running speed or agility temporarily, where as a chocolate bar may lead to a brief burst of energy followed by sluggish movement for a longer period, suggesting the effects of high GI sugary foods.

Web application

The game will be bundled with a web application that provides ongoing feedback about the users daily step count and how this will translate to ingame progression. The mobile app will be purely informative for the children. The app will show the daily progress of steps and how this will translate to Step Coins. In addition, players also set daily goals for them to achieve.



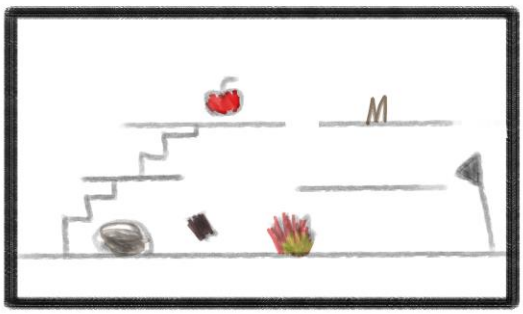
Fitbit app

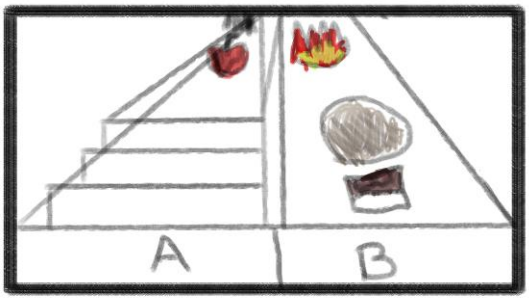
Fitbit apps for the Verse and Ionic will mimic the functionality of the web app.

Deliverables

Game storyboard

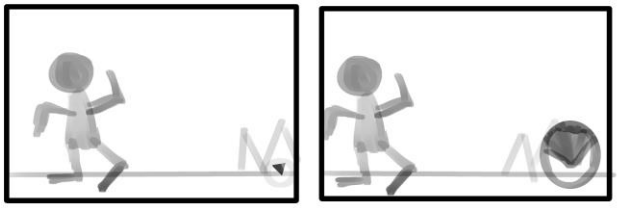
The first and necessary step of the planning phase will be the game storyboard.

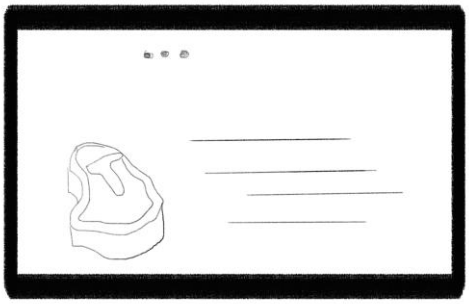


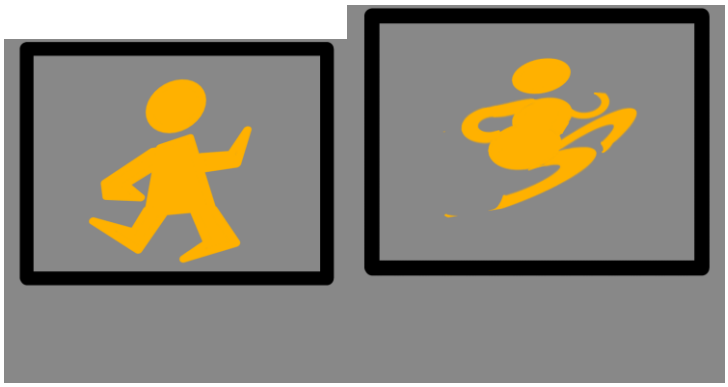


Sugar Rush:
Short burst that is followed by long penalty

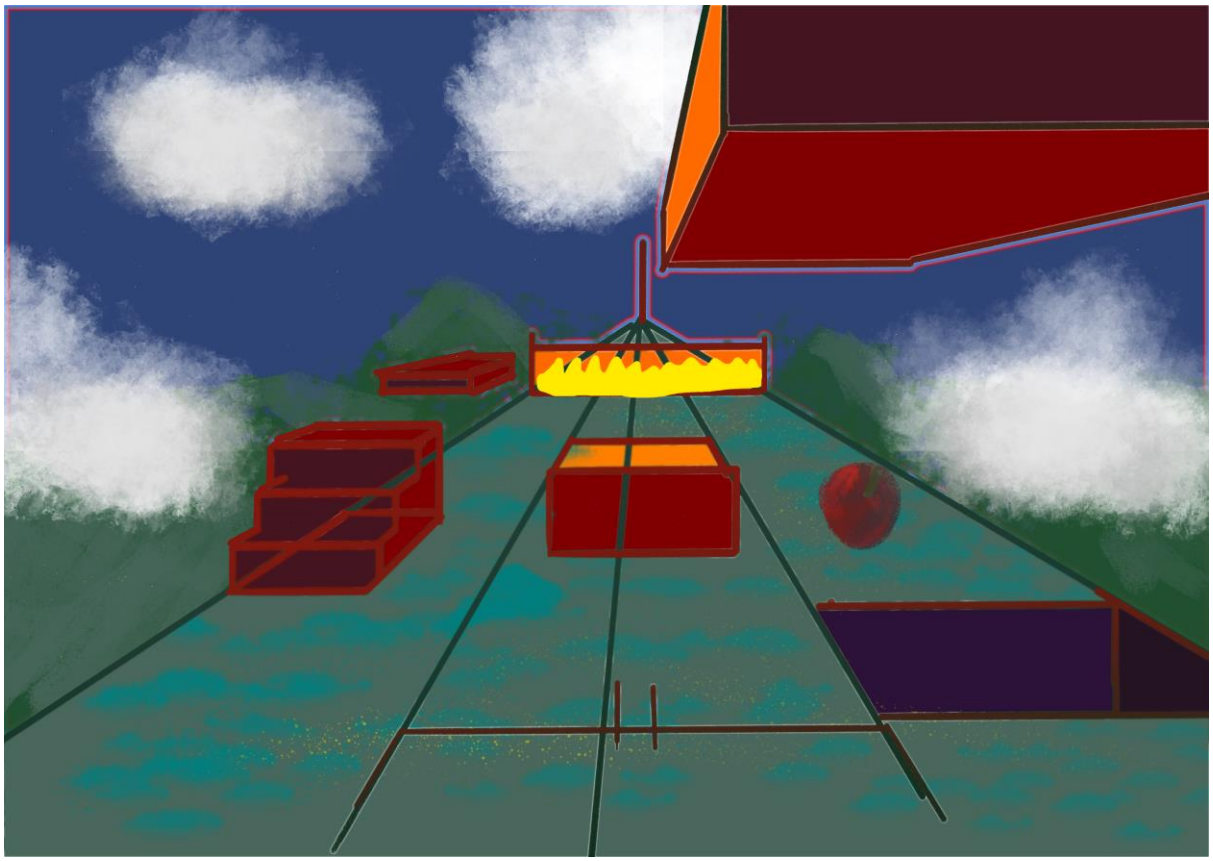
Healthy Food:
Benifitial effect followed by little penalty







This will provide a layout of each playable level, including the types of pickups and obstacles that the player can interact with. Here we can use artistic graphs to depict ideas and game assets.



The game

The game itself will be a desktop executable (Microsoft Windows) application which is built using unity c#. The application will need to connect to the database to retrieve Fitbit tracking activity.

Game rules

The game starts at a base speed 6.0F. The character progresses through levels at a steady pace at this speed. It also has a base jump speed of 8.0F against a gravity of 20.0F. All game levels are completable with the base speed, it is just difficult.

On object pickup, the object is destroyed and effects are applied to the player.
When running through 'junk' foods in the game players incur a speed penalty. The speed of the character is altered to 2.0F
When moving through healthy foods such as apples, Bananas and other health products the players speed increases to 9.0F.
Speed increases are available through traits. Traits are capped and have 10 levels to each. Traits

include: Speed increase and jump strength. The traits increase speed and jump strength by 0.5F each time they are unlocked. This does not infinitely scale, as the cap is at 10.

The character can move in 3D, allowing for movement to the side. There are platforms that create pathways for the player to traverse to get to the goal. There are boundaries to prevent players from falling off the level.

Game levels

Starting with 3 levels at game launch. Each level will be an increase in difficulty and length. Every level has a set speed that the player must keep up with while running through the platformer. Higher levels have faster speeds that the character can only keep up with if they buy extra abilities and perks for their character using the step coins. Each level has a different series of healthy or unhealthy foods that the player must either collect or avoid. Collecting healthy food will allow the character to run faster, and collecting unhealthy food will slow the character down and damage his health. This is to replicate the real world effects on your body when eating certain foods. The levels must be complete and polished. At the end of a level players will be given a question about healthy nutrition… that recording whether the game is teaching the players about healthy eating.

Game assets

This will include textures and models for the game with a common theme. Game assets will include:

- Character sprite (including visuals/customizable look if we decide to include it)
- Different models of the character sprite to replicate animations such as running and jumping
- Game pick up items - Foods such as bananas, chocolates, apples & hotdogs
- Level textures
- Artwork for menus, such as icons
- Sound effects when collecting items, jumping and completing a level
- Soundtrack music for the game
- Artwork for menus is an asset right? like the talent/trait icons Oh yes. Icons are assets

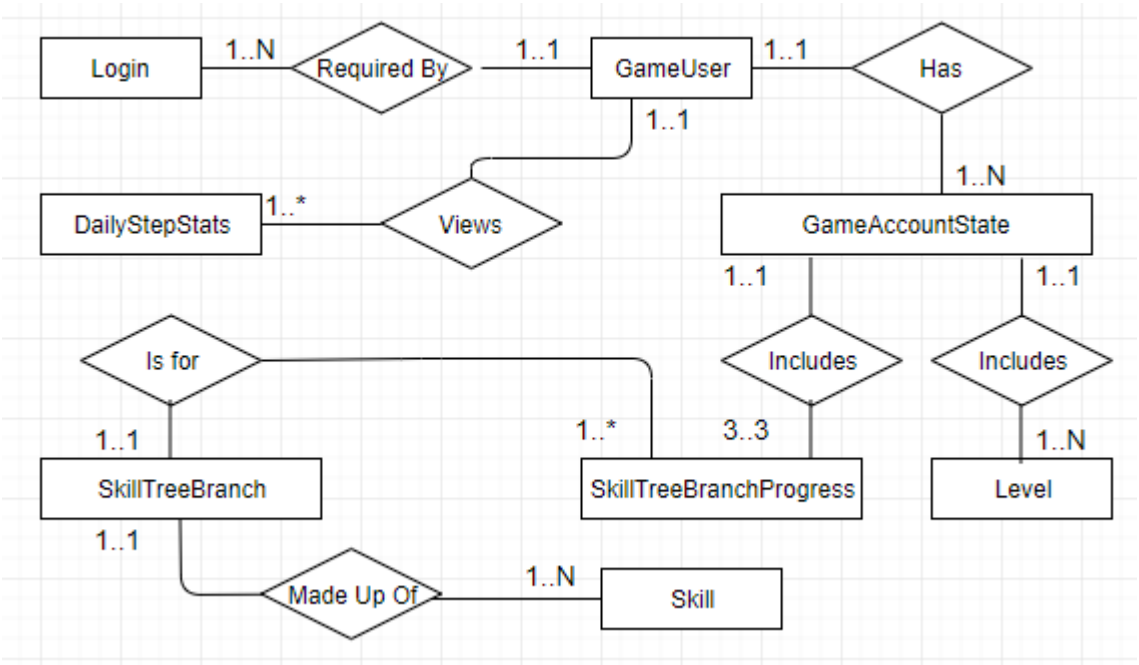
Quality sound assets will either be acquired from the assets store or will be recorded in a studio to ensure the game has excellent sound quality.

Fitbit Activity Tracking Database

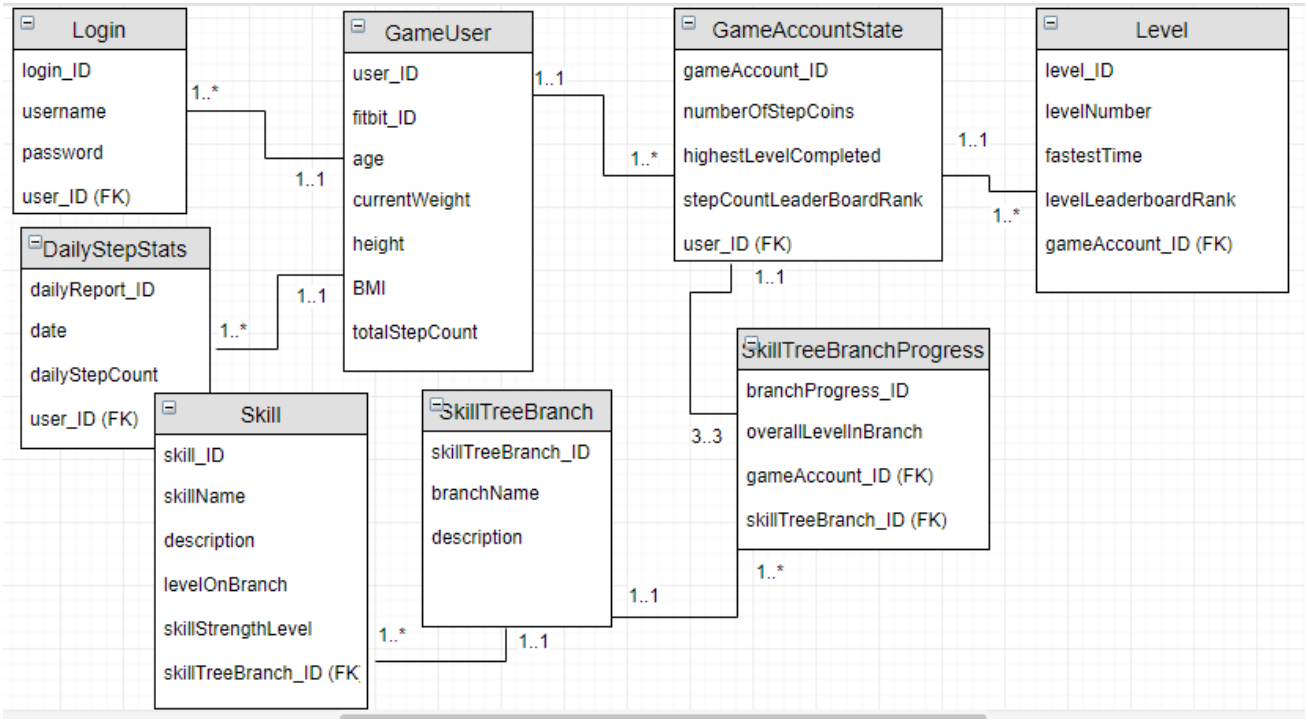
The online server side database will be required to store Fitbit activity and user identifiers. The database will store the user's step counts, login credentials, leaderboard rank, level statistics, and game state. Multiple users will be using the app, so unique usernames and passwords for each user will allow them to log into their own game account. Each game account stores how many step coins the user has as currency, and their overall ranking on the step count leaderboard. No data will be stored that will give away the identity of the user, due to privacy concerns of children under 18 years of age. However, data regarding their current health will be retrieved using the fitbit. The user can view their monthly and daily step counts.

Data about the game state is also stored, such as the highest level the player has completed and their skill statistics such as their current speed, current jump and current stamina. Their level on the skill tree for each of the stamina, speed and jump skill branches will be updated every time they spend their coins on a new skill. The database will only be accessed by a DBA and users will not require a client side tool to update, insert or delete records. To start, dummy test data will be populate the database for testing purposes and for the leaderboard.

The following Enhanced Entity-Relationship Model (EER) shows the relationships between entities used for the database:



The following Database Schema shows the attributes and data organisation of the database:



At any point, the database can query the most recent skill that a player has acquired under one of the speed, jump and stamina branches on the skills tree. It will take that skill and find the speed, jump height or stamina strength associated with it, so the player's skill progress can always be saved and updated. The skillStrengthLevel attribute will determine the speed, jump height or stamina strength of the player. Below is an example of a player's tree branch progress.

	gameAccount_ID	branchName	highestSKillOnBranch	skillName	skillStrengthLevel
1	ACC_1001	Speed	5	Power Run	8.0
2	ACC_1001	Jump	2	Hop	8.5
3	ACC_1001	Stamina	3	Stamina 3x	10.0

Instructional video/Advertisement

When students are engaged in digital technologies to assist their learning, the educational outcomes for them are improved (Durham University, 2012). It is for this reason instructions will be delivered through videos embedded within the game. This will include game play instructions as well as Step Coin and skill tree system details. Annotations will be available as an alternative for accessibility.

Mobile app

A web app will be used to show daily step progress and how this will convert to step coins, providing ongoing feedback for the children. App includes basic game details such as unlockables and costs in step coins. The app provides details to users about the game while they are collecting/earning their 'Step Coins' so users can be aware of their goals.

Fitbit Verse and Ionic GUI app

The Verse and Ionic app feature a display so that the mobile app functionality can be mimicked.

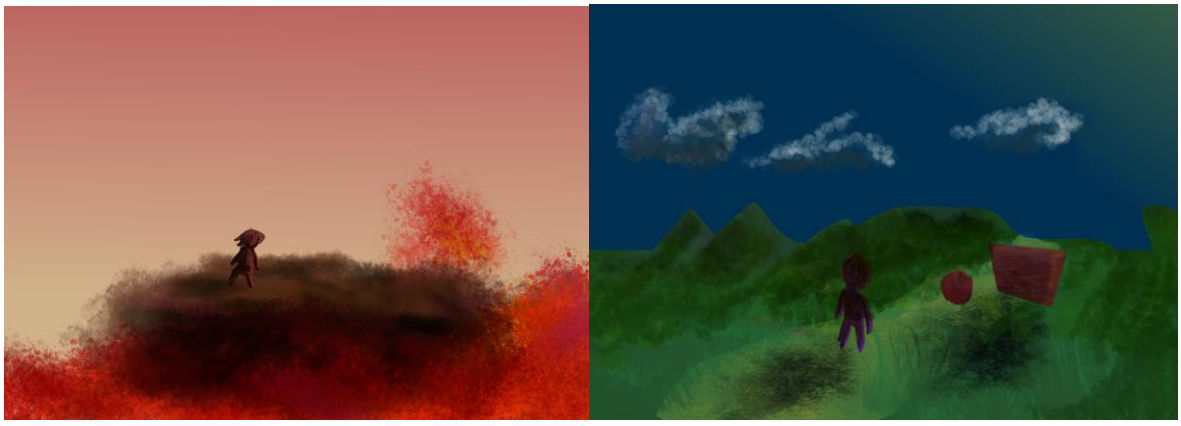
Quiz questions

At the end of each level, a quiz question is presented to the player to measure the effectiveness of the game and educate the children. At the end of each level, a random quiz is selected out of a list of quiz questions that can be presented to the children one at a time in the game. Quiz questions are used as a tool for determining engagement and as as tracking tool for students knowledge over time. Given that the core requirement of the project is to educate kids, it is essential that this deliverable allows for tracking of educational outcomes over time.

Fitbit activity tracking functionality

This deliverable refers to the software development required to update user Fitbit activity data from the Fitbit device to the database. Updates will be half hourly and only include the step count progress of the user.

Concept Designs



Milestones and Resource Allocations

1. Game storyboard	16-8-18
2. Registered Fitbit app	21-8-18
3. Basic game assets	28-8-18
4. Game prototype	3-10-18
5. Database for user Fitbit activity	8-10-18
6. Fitbit activity data transfer	9-10-18
7. Fitbit Verse and Ionic app	23-10-18

Technical requirements

The functional parts of this project that must be working and technically correct in order for it to be considered a success are varied and are;

1. Functionality with all current Fitbit devices. This means that compatibility with discontinued devices will not be guaranteed. In order for a Fitbit to be considered current it must be actively available through official retailers.
2. The ability to directly compare daily steps with game progression on a mobile app or Fitbit GUI.
3. Fully functional database able to store data related to the user's steps, leaderboard rankings, and attributes related to the game progress, such as the user's speed, jump height.
4. A mobile app for progression monitor on Android devices compatible with Android 4.0 and up.
5. A server side database to store basic information including user step count, unlocked abilities and modifiers.
6. The game must be well optimised to minimise processing power required and and enhance user experience.
7. The ability to add new levels and more quiz questions as time goes on.

Limitations and exclusions

While the project aims to provide a full experience from fitbit to the windows game there are limitations and exclusions that the project needs to acknowledge in order to not over promise or underdeliver.

1. App is exclusive to the Windows platform, there will be no compatibility with other operating systems.
2. The app will be exclusive to Fitbit manufactured devices, other activity trackers will not be included.
3. The children will need to confirm parental approval for use due to privacy and ethical concerns. Fitbit may track GPS locations and use data for marketing.
4. Data that identifies an individual child can not be stored.
5. Viewing the user's monthly and daily step count is only limited to the last 3 months.

Performance monitoring

To measure the effectiveness of healthy eating education the game will have built in quiz questions related to the food items within the game. The results of individuals performance on quiz questions will be stored in the database along with step data. This means we can use the data to measure step count average over time and correct answers provided from children over time. Therefore the two KPI's have been identified:

1. ADS - Average daily steps, this is the average number of steps per day over a specified longer duration.
2. CAR - Correct answer ratio, this is the total number of correct quiz answers over the total number of attempted quiz questions.

Customer review + Prototype testing.

In order to maintain standards and ensure the project is outputting deliverables at an acceptable quality testing of prototype features with potential users could be undertaken. The required attention to detail and needs of the project is more easily highlighted through the use of testing and review.

Below is a proposed testing feedback form that potential users will be asked to fill out to give the development team valuable feedback.

Prototype testing feedback form draft.

Please rate the following on a scale of 1 to 5. 1 represents highly negative 3 represents neutral 5 represents highly positive

Visuals	1	2	3	4	5
Gameplay	1	2	3	4	5
Difficulty of level	1	2	3	4	5
Complexity of game	1	2	3	4	5
Abilities unlocked	1	2	3	4	5

Additional feedback, suggestions or comments:

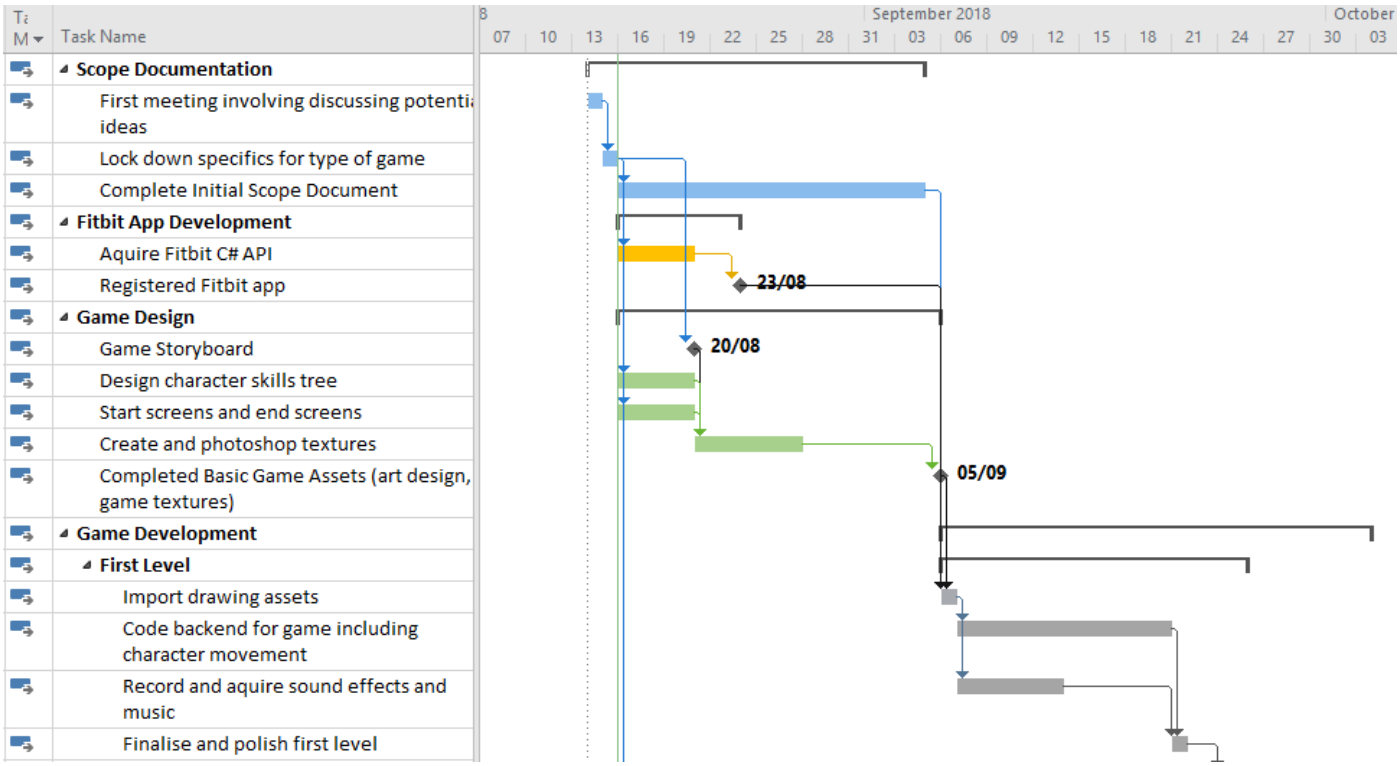
Key Roles

Task	**Task Manager**	**Support**
Level Design	Duncan	Emily, Max
Game Systems Design	Sharlene	Simon
Level/Animation Implementation	Duncan	
Storyboard/Art Design/3D Modeling	Emily	Eddie, Sharlene
Sound Design	Duncan	Simon, Eddie
Fit-bit Integration	Max, Simon, Sharlene	
Research	Eddie, Simon	Max
Database Design	Sharlene	Simon, Max
Database Implementation	Sharlene	Duncan
Login/Authentication Implementation	Simon, Max	
List and implementation of questions for quiz	Eddie, Sharlene	
Testing level prototype	Eddie	Sharlene
Documentation	Simon, Eddie, Sharlene	Emily, Max, Duncan

Timeline Schedule and Resource Management

Below is the timeline schedule for the project, along with the resource allocation :

Ta M	Task Name	Duration	Start	Finish	Predeces	Resource Names
	Scope Documentation	**16 days**	**Tue 14/08/18**	**Tue 04/09/18**		
	First meeting involving discussing potential ideas	1 day	Tue 14/08/18	Tue 14/08/18		All Members
	Lock down specifics for type of game	1 day	Wed 15/08/18	Wed 15/08/18	2	All Members
	Complete Initial Scope Document	14 days	Thu 16/08/18	Tue 04/09/18	3	All Members
	Fitbit App Development	**6 days**	**Thu 16/08/18**	**Thu 23/08/18**		
	Aquire Fitbit C# API	3 days	Thu 16/08/18	Mon 20/08/18	3	Simon,Max
	Registered Fitbit app	3 days	Tue 21/08/18	Thu 23/08/18	6	Simon,Max
	Game Design	**15 days**	**Thu 16/08/18**	**Wed 05/09/18**		
	Game Storyboard	3 days	Thu 16/08/18	Mon 20/08/18	3	Emily
	Design character skills tree	3 days	Thu 16/08/18	Mon 20/08/18	3	Simon
	Start screens and end screens	3 days	Thu 16/08/18	Mon 20/08/18	3	Emily,Duncan
	Create and photoshop textures	5 days	Tue 21/08/18	Mon 27/08/18	9,10,11	Emily,Sharlene
	Completed Basic Game Assets (art design, game textures)	7 days	Tue 28/08/18	Wed 05/09/18	12	Emily,Sharlene,Duncan
	Game Development	**20 days**	**Thu 06/09/18**	**Wed 03/10/18**		
	First Level	**14 days**	**Thu 06/09/18**	**Tue 25/09/18**		
	Import drawing assets	1 day	Thu 06/09/18	Thu 06/09/18	13,4,7	Duncan,Max
	Code backend for game including character movement	10 days	Fri 07/09/18	Thu 20/09/18	16	Duncan,Max,Simon
	Record and aquire sound effects and music	5 days	Fri 07/09/18	Thu 13/09/18	16	Duncan
	Finalise and polish first level	1 day	Fri 21/09/18	Fri 21/09/18	18,17	Duncan,Max
	Test first level	1 day	Mon 24/09/18	Mon 24/09/18	19	Sharlene,Eddie
	Aquire analysis feedback for first level	1 day	Tue 25/09/18	Tue 25/09/18	20	Sharlene,Eddie,Duncan
	Preceeding Levels	**6 days**	**Wed 26/09/18**	**Wed 03/10/18**		
	Code backend for game including character movement	5 days	Wed 26/09/18	Tue 02/10/18	21	Duncan,Max
	Finish Game Prototype	1 day	Wed 03/10/18	Wed 03/10/18	23	Duncan,Max
	Database Development	**39 days**	**Thu 16/08/18**	**Tue 09/10/18**		
	Database Design	3 days	Thu 16/08/18	Mon 20/08/18	3	Sharlene
	Code Database	1 day	Tue 21/08/18	Tue 21/08/18	26	Sharlene
	Connect DB to game backend	2 days	Thu 04/10/18	Fri 05/10/18	27,24	Sharlene,Duncan,Simon
	Completed DB for user fitbit activity	1 day	Mon 08/10/18	Mon 08/10/18	28	Sharlene,Duncan,Simon
	Fitbit activity transfer data	1 day	Tue 09/10/18	Tue 09/10/18	29	Simon,Sharlene
	Multiplayer Integration	**3 days**	**Wed 10/10/18**	**Fri 12/10/18**		
	Design Leaderboard	1 day	Wed 10/10/18	Wed 10/10/18	30	Emily,Sharlene
	Code Leaderboard screens and GUI	1 day	Thu 11/10/18	Thu 11/10/18	32	Duncan,Max
	Data transfer to leaderboard screens	1 day	Fri 12/10/18	Fri 12/10/18	33	Sharlene,Duncan
	Marketing Ad	**6 days**	**Mon 15/10/18**	**Mon 22/10/18**		
	Design and storyboard marketing ad	1 day	Mon 15/10/18	Mon 15/10/18	34	Emily,Sharlene,Simon
	Film marketing ad	5 days	Tue 16/10/18	Mon 22/10/18	36	All Members
	Closing Project	**3 days**	**Tue 23/10/18**	**Thu 25/10/18**		
	Fitbit verse and Ionic App	1 day	Tue 23/10/18	Tue 23/10/18	30,37	All Members
	Complete documentation	1 day	Wed 24/10/18	Wed 24/10/18	39	All Members
	Presentation of Product	1 day	Thu 25/10/18	Thu 25/10/18	40	All Members


Task Name
September 2018
October
07 10 13 16 19 22 25 28 31 03 06 09 12 15 18 21 24 27 30 03
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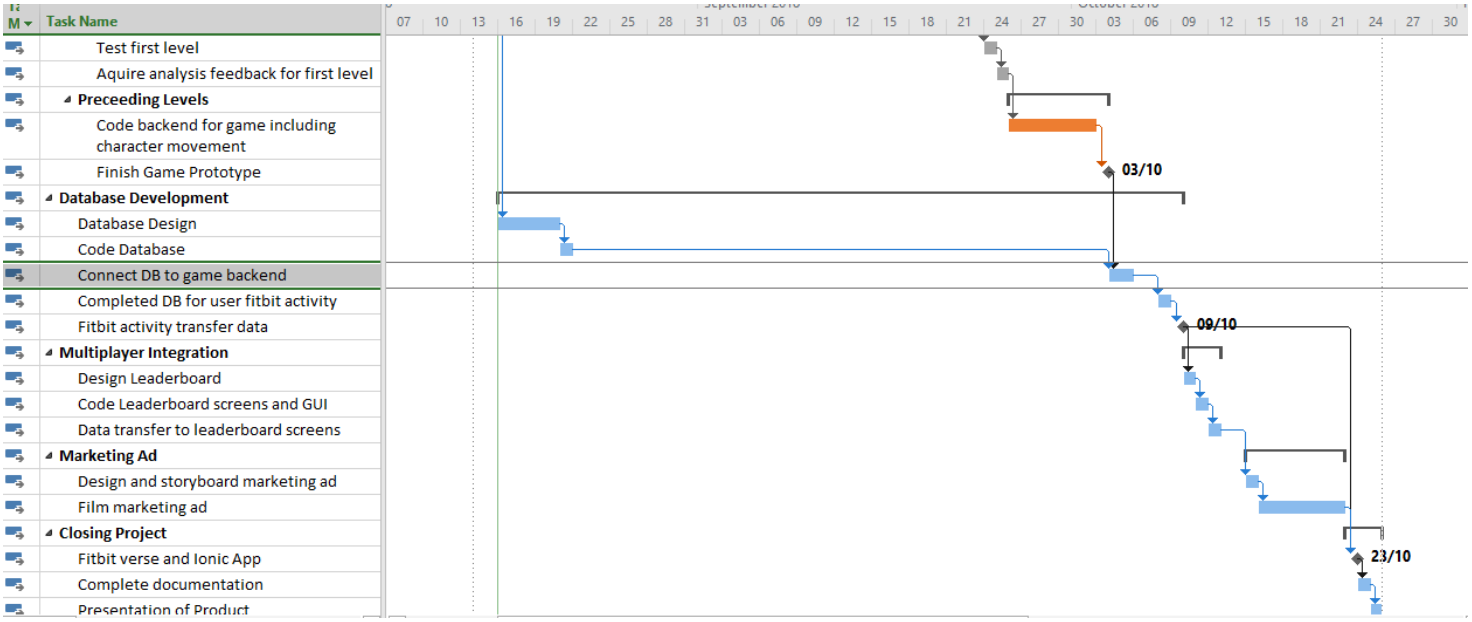
05/09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03/10
09/10
23/10

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