Lab 2 – War of Brawns Product Specification

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1. Introduction

1.1. Purpose

War of Brawns is a mobile Role-Playing Game (RPG) application that uses exercise and diet tracking to help gaming addicts become healthy and active (Fang, 2020). This application is for all gamers but targets game addicts as its intended user community. Game addicts and gamers around the world looking to make a healthy change in their lifestyle benefit from this application. The goal of this application is to help game addicts and gamers make healthy changes in their lifestyle.

War of Brawns uses a client graphical user interface(GUI) to interact with the gamer (Fang, 2020). The key features of War of Brawns include the following: diet journal, weight progression, workout challenges, and gameplay. The diet journal offers the gamer a way to track caloric intake and meet their goal weight through diet tracking. Weight progression shows the gamer their progress in weight loss or gain through a line graph that helps the gamer visualize their progress. The workout challenges offer compiled workouts and the ability to create their own to increase their gamer stats. The gamer will become healthy and active through diet tracking and workouts. Gameplay has its own levels separate from the gamer, but the only way the gamer can continue to beat those levels is if they increase their stats or equip items. This progression of gameplay will allow the gamer to motivate themselves to achieve significant progress in both the application and real life.

1.2. Scope

The objectives of War of Brawns is for the gamer to complete any of the following: meet their goal weight, eat healthy, be active, or progress in gameplay. The War of Brawns prototype will be similar to the real-world product with a few key differences (Fang, 2020). The prototype

implements the diet journal using the nutritional database to receive nutritional information of food. The diet journal also offers a suggested daily caloric intake for the gamer to meet their goal weight. Workout challenges will use the WoB database to store and access compiled databases that when completed increase certain stats based on the combination of challenges. The prototype implements progression of gameplay through the game avatar that engages in battle using the stats earned through completion of workout challenges. The simulated ECG data is used within the verification interpretation algorithm within workout challenges to track the heart rate of the gamer. Features such as account creation, avatar creation, custom workout challenges, and workout tutorials will be severely limited or not functional at all. Other features such as options, workout challenges, diet journal, and verification interpretation are limited but will be able demonstrate some functionality.

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1.3. Definitions, Acronyms, and Abbreviations

Basal Metabolic Rate (BMR): The number of calories required to keep the body functioning at rest.

Electrocardiogram (ECG): A test that measures the electrical activity of the heartbeat. With each beat, an electrical impulse (or "wave") travels through the heart.

Experience Points (XP): A unit of measurement to quantify an avatar's progression through a game. Once a sufficient amount of experience points are accumulated, the player or a certain statistic "levels up." The higher the level, the stronger the avatar.

Game Artificial Intelligence (AI): Artificial intelligence is used to generate responsive, adaptive, or intelligent behaviors primarily in non-player characters similar to human-like intelligence.

Game Avatar: A personalized graphical illustration that represents either a computer user or a character/alter ego that represents that user.

Gaming Disorder: Pattern of persistent or recurrent gaming behavior in which people lose control of their gaming behavior, give priority to gaming over other interests and activities, and continue gaming despite negative consequences such as impairments in their family relationships, social lives, work duties or other areas.

Heads Up Display (HUD): The display area where players can see their character's vital statistics such as current health, bonus attributes, armor level, and ammunition count.

Mifflin-St Jeor Formula: Formula that calculates BMR from age, sex, height, and weight

Role-playing Game (RPG): Type of game in which players assume the roles of characters.

Total Daily Energy Expenditure (TDEE): The total amount of calories burned in a day including basic body functions and physical activity

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1.5. Overview

The War of Brawns product description will include detailed information on different topics of the application such as hardware and software specifications, external interfaces, capabilities, key features, prototype design, prototype architecture, and prototype challenges.

The hardware necessary for War of Brawns is a smartphone and an optional smartwatch (Fang, 2020). Two types of databases are used for this application: the nutritional database and the WoB managed database through the usage of Cloud Storage for Firebase (Fang, 2020).

2. General Description

2.1. Prototype Architecture Description

The War of Brawns product is comprised of the following major components: smart phone, Android mobile application, simulated smartwatch ECG data, network, Firebase API, and WoB database. The architecture of the application includes features such as gameplay, GUI, user accounts, and verification interpretation. The user interface and gameplay will be developed using Unity. The simulated smartwatch ECG data is used in the workout challenges feature to verify that physical activity is being done. The simulated smartwatch ECG data input will be hard coded into the verification interpretation algorithm through a file. The network is used to connect the application to the WoB database using the Firebase API. The Firebase API is used to connect and communicate data between the mobile application and the database. The WoB database will be developed using Cloud storage for Firebase. The WoB database will be used to store information relevant to the application and the gamer. The hardware necessary for War of Brawns is a smartphone and an optional smartwatch (Fang, 2020). The overall architecture of the prototype can be seen in Figure 1.

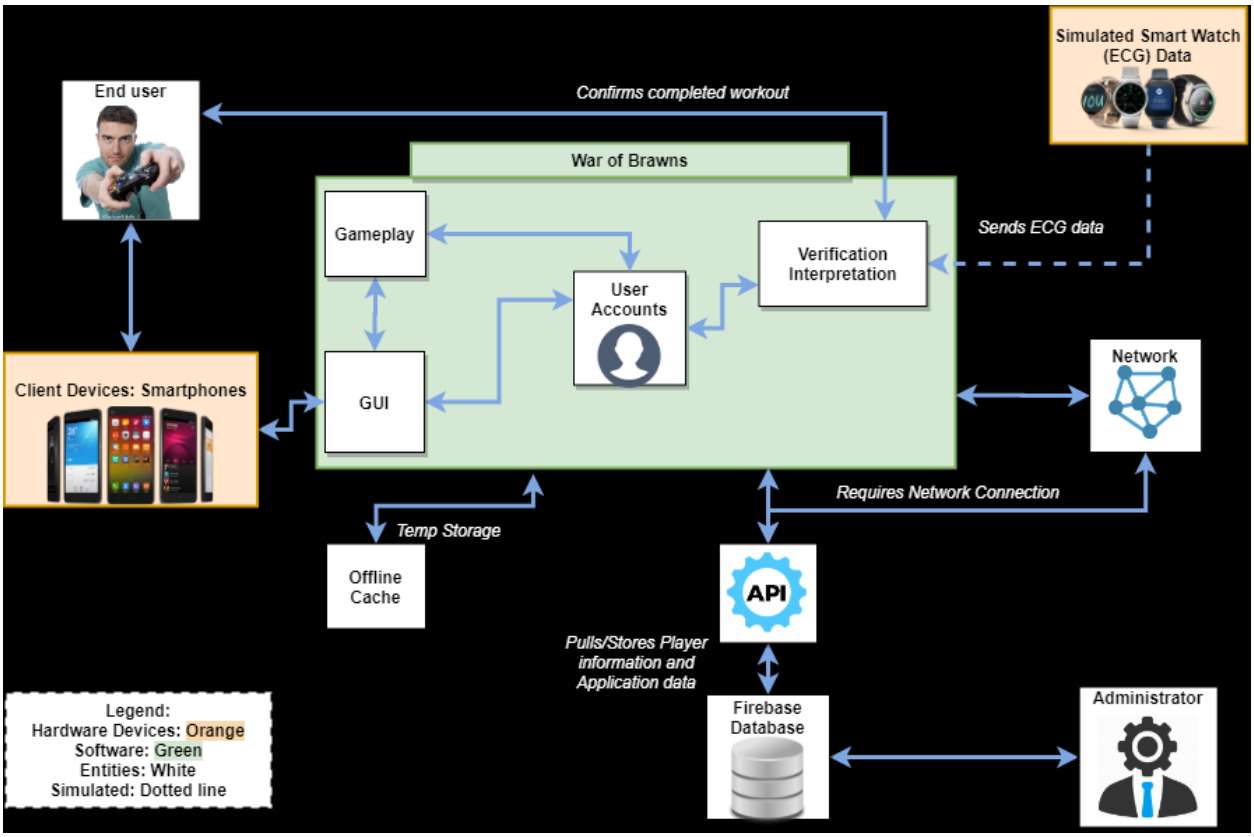

Figure 1: War of Brawns Prototype Major Functional Component Diagram

2.2. Prototype Functional Description

The primary functions of the War of Brawns prototype include the following: workout challenges, recommended daily caloric intake, diet journal, and gameplay. Workout challenges use simulated smartwatch ECG data to verify that physical activity is being completed by the gamer. The recommended daily caloric intake uses the gamer's personal information to calculate the daily caloric intake to reach their goal weight. The diet journal is used to log the food entries of the gamer and also displays the recommended daily caloric intake. Gameplay will provide an entertaining and interactive experience in the progression of the application. The gamer's stats will determine how far they will progress in the game. Descriptions and prototype implementations of all features of the application can be seen in Table 1.

Feature	Description	Prototype Implementation
UI/UX		
Account Creation page	Page users go to create an account.	Not functional - Only shows display of page
Login page	Page where users use their username and password to login to their personal account.	Functional
Home Page	Page that is seen when the user logs in. It displays the user's avatar, STATS, and navigation bar.	Functional
Options Page	Page that allows the user to customize all information within their account.	Partially functional - options will be displayed, but not active. Will allow input of the player's new current weight info.
Avatar Creation	Page where the default avatar is displayed.	Not functional - Default avatar will only be displayed to demonstrate prototype
Challenges Page	Page where the user is able to search, track, and complete workout challenges.	Partially functional - will include compiled exercises but not a whole database
Weight Progression Page	Page that shows the weight progression of the user in a line graph.	Functional - Fake data will be used to display functionality
Diet Journal Page	Page that allows the user to view suggested daily caloric intake and log meals.	Functional - no log of previous days intake
In-Game Menu	Menu that is accessed in-game that displays inventory and default avatar. Allows gamer to exit the game mode and also allows changes to armor and weapons	Partially functional - Display of inventory will only be displayed and will not be able to change items
Gaming HUD	Gaming interface that shows the character's vital statistics and movement controls.	Functional - limited display
Gameplay		
Store	In-game store that offers equipment in exchange for currency	Not functional - Only shows display of page

Gaming Controls	On-screen controls that enable avatar actions and movement	Functional
Combat System	Real-time combat system where the player battles enemy AI opponents	Functional
Character Inventory and Equipment	Display which enables the player's avatar to equip, use, and possess multiple items	Not functional - Only shows display of page
Enemy AI	Determines enemy behavior in dungeons	Functional
Integration of sound and music	Plays music and sound effects	Functional
Tracking in-game rewards (Ex. in-game currency) of gamer	Tracks current rewards in real-time while in dungeons	Not functional
Diet Tracking		
Suggests daily caloric intake	Daily caloric intake for the gamer to meet or maintain their goal weight.	Functional
Creation of custom meal entry	Caloric intake entry form that will store the custom meals name and calorie amount in the database.	Functional
Tracking of the gamer's diet journal data	Tracks the intake of the gamer for all meals for each day in the diet journal page and database.	Functional - Only stores log of intake that day
Usage of Nutritional database for food data in diet journal	Nutritional information of keyword searched food items will be displayed from the nutritional database on the diet journal page.	Partially functional - fake data will be used to display functionality
Workout Tracking		
Verification interpretation of accountability of gamer	Algorithm that uses simulated ECG data to verify that physical activity is being done.	Partially Functional - uses simulated data of the gamer's heart rate but won't use Google maps API
Post-exercise XP distribution for gamer stats	Post-exercise experience point distribution that uses a scaling	Functional

	progression system for leveling the Gamer stats.	
Usage of smartwatch ECG to track heart rate	Simulated smartwatch ECG data that will be used in the verification interpretation.	Simulated - use simulated data of smartwatch ECG
Database		
Input of gamer information into database	Gamer credentials and personal information stored in the database	Partially functional - Fake data is stored already, but only current weight can be inputted through options page
Stores player stats	Statistics of the gamer's avatar (e.g. Level, Strength, Endurance) stored within the database	Functional
Stores player inventory	Items acquired by the gamer are stored within the database	Not functional
Stores player credentials	Gamer's email, phone number, and password are stored within the database	Functional - limited using preset (two user) data
Stores body measurements	Gamer's weight and height used for calculating their daily caloric intake is stored within the database	Functional - Fake data is stored already, but only current weight can be inputted through options page
Tracks weight progress	Progression of the gamer's weight is updated by date and stored within the database	Functional - Fake data is stored already, but new data can be inputted through options page
Tracks calorie intake	Tracks the amount of calories the gamer has consumed with each meal and stores this in the database	Functional - limited with preset data

Table 1: War of Brawns Feature Description and Prototype Implementation

2.3. External Interfaces

2.3.1. Hardware Interfaces

War of Brawns will use a physical Android OS device for the real-world product. The hardware interface will allow data exchange between the application and the actual device.

2.3.2. Software Interfaces

Unity Interface: Unity is a software used to develop War of Brawns. It allows for easy development of the game and simulated execution of the application.

Cloud Storage for Firebase API Interface: Firebase is used to develop the WoB database of War of Brawns. The API is used for data exchanges between the application and the WoB database.

2.3.3. User Interfaces

The War of Brawns prototype will use the GUI to interface between the application and the user. The on-screen keyboard will allow for the input of information into input fields. The on-screen controls will be used to control the gamers avatar within gameplay. Different buttons such as attack and dodge are used to manipulate the gamer's avatar within gameplay.

2.3.4. Communications protocol and interfaces

The War of Brawns prototype will need internet capability to access the WoB database through the Firebase API.