

***Errant: <description>***

***An iOS Fitness RPG***

A Major Qualifying Project Report

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**Abstract**

For design and development of

Errant: <Description>

By

Maxwell Perlman and Stefan Alexander

This report is focus on.

This document discusses…

Through the use of the iPhone’s new M7 chip, in conjunction with iBeacon Bluetooth devices, we created an iPhone role-playing game that is meant to encourage players to have a healthier lifestyle. The player engages in a real world role-playing game experience where the way they exercise in reality impacts their digital avatar’s traits and abilities. The goal of this game is to encourage exercise through in-game benefits to the player’s character, with the hope of eventually changing the player’s lifestyle to incorporate more exercise.

**Acknowledgements**

Our project could not have been completed without assistance from the following Ritsumeikan University students and faculty, as well as all of the Ritsumeikan University play testers as well as all Media Experience Design Lab members:

* Professor Noma:
* Wakao Asuka:
* Kohno Hitomi: Sprite art assets

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* Alex: User Interface and Background art assets
* Professors Lindeman:

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**Introduction**

**Project Proposal and Purpose:**

This project sought to provide a real world role-playing game experience with the purpose of encouraging exercise and a healthier lifestyle. Using traditional role-playing game concepts combined with real-world location and exercise monitoring of the M7 chip found on new iOS devices, we planed to create a unique gameplay experience where the player feels that they truly are the character being represented on their device. We hoped that this would inspire players to go out into the world to explore play with others, rather than sitting together inside.

**Gameplay Inspirations and Related Works**

This project takes inspiration, in terms of both its concept as well as its gameplay, from numerous sources. The following are the major inspirations and influences behind this game.

**RPG and JRPG Genres**

Some of the major inspirations for this game are games from the role-playing game (RPG) and Japanese role-playing game (JRPG) genres. From these genres we were able to determine the primary method of gameplay that our players would be engaging in (turn based combat). Games such as Bravely Default and games from the Final Fantasy series number among our major influences.

**Ingress**

Ingress is a multiplayer augmented reality game. Players are divided into two factions and these factions compete to take control of the world. Player use their cell phones in order to set up virtual towers and capture areas of the Earth. Players try to increase the potency and range of their factions control while waging war on the opposing faction. Ingress was a major inspiration for this project because of its excellent mapping and use of real-world locations in gameplay. Our goal was to provide an experience with a similar use of real-world locations while at the same time not allowing for some of the poor gameplay habits that Ingress gave rise to, specifically playing the game whilst driving.

**Dungeons and Dragons**

Dungeons and Dragons is tabletop fantasy role-playing game that is typically played by groups of four to eight people. Normally the game features very few physical resources, typically only a set of die and pieces of paper. Guided by a non-playing person (knows as the dungeon master) player’s band together to travel through elaborate worlds and dungeons, defeat monsters, discover treasure, and even communicate with non-player characters.

We found inspiration through Dungeons and Dragons due its high levels of immersion and cooperative gameplay, deep and dynamic character creation mechanisms, and dynamic difficulty. Our goal was to try and achieve this level of immersion, while not allowing for a gameplay session to consist of hours of sedentary gameplay, which Dungeons and Dragons lends itself to.

**Find Mii**

Find Mii is a game built into the Nintendo 3DS handheld system. By leaving their system in sleep mode and bringing it with them during their day-to-day activities, players can collect other 3DS users’ characters. Later, these players can be used to defeat monsters and obtain treasure, which can be flaunted at other players. We found Find Mii very inspiring in its multiplayer gameplay mechanics as well as its simplicity.

**Other Related Works:**

* WhereIGo
* Chirp

**Team Members Roles**

Maxwell Perlman: Lead Designer and developer

Stefan Alexander: Lead Developer and designer

Asuka Wakao: Programmer

Kohno Hitomi: Sprite Artist

Alex Clemens: User Interface and Background Artist

**Development**

**Xcode and iOS**

**Swift and Objective-C**

**Frameworks**

**Google Maps**

**SpriteKit**

**CoreLocation**

**CoreMotion**

**M7 Chip**

**Darwin**

**Accounts**

**UIPickerViewDelegates**

**Local Push Notifications**

**NSUserDefaults**

**NSTimer**

**AppDelegate**

**iBeacon Devices and Multiplayer Gameplay**

**Server and Database**

**GitHub**

**Design**

This section will cover every aspect of the design and balancing of this game, from our initial design decisions to our final play testing results and how they impacted the design.

**Initial Design Decisions**

This subsection will address the initial design consideration that took place before development began.

**Understanding Our Audience**

The first major consideration when the design process began was to determine our target audience. We determined our audience to be between 17 and 60 years of age. Additionally, we concluded that there were two major subgroups of players that we would be focusing on: those who are looking for a multiplayer gameplay experience and those who are looking for encouragement to exercise more. Finally, we determined that the game would be targeted to both an American and Japanese audience.

**American and Japanese Audience**

In recent history, mobile games have become exceedingly popular, especially amongst our target audience. This, in conjunction with the omnipresence of iPhones on an international scale, informed our decision to develop a game for iOS.

Based on research we conducted of both the American and Japanese app stores for iOS, we were able to understand the types of applications that were currently popular. In fact, the research confirmed that we were developing the correct game for our target audience. In the American application market, amongst the most popular applications were those related to fitness, while in Japan, the most popular applications were games, specifically role-playing games.

**Violent vs. Non-Violent Gameplay**

We considered non-combat oriented gameplay, thinking combat possibly too violent. However, we concluded that due to the age group of our target audience, combined with the vast popularity of combat-oriented games in the Japanese market, that combat-oriented gameplay was not too mature of a concept for the game.

**Experiential Goals**

The primary experiential goal of this game is to create an engaging gameplay experience that encourages exercise through gameplay. The ultimate goal being that once players have stopped playing the game, that the game will have had a permanent effect on their exercise habits; hopefully encouraging the player to incorporate more exercise into their daily life. The secondary goal of this game is to encourage players to exercise and play games as a group, rather than alone.

**Combat System**

One of the two major gameplay elements of our game is the combat system. It is through combat that players test their characters development and further develop their characters traits and abilities. The goal of the level of complexity and depth for the combat system is one deep enough that a devoted player could learn how the different enemies act and develop their character accordingly, while at the same time being simple enough that a casual player would be able to play the game and understand enough to enjoy the gameplay. This following section will explain exactly how the combat system works.

**Entities**

Both players and enemies fall under the category of an entity. They share the traits that all combat is based off of. These traits determine the results of the actions they take and the order of who acts first.

**Traits**

Both players and enemies are made of the following traits. Though these trait values may change during combat itself, they are set to their initial values after combat has concluded.

* Level: A player’s level is used to indicate their characters progression through the game. When combat begins, the enemy the player encounters is approximately the same level as the player. The level of the enemy (in conjunction with other variables) is used to determine the other trait values of the enemy.
* Health: If the player’s health becomes 0, they lose their current fight. If the enemy’s health becomes 0, the player has won the fight and receives experience towards growing their character.
* Strength: Used to determine the power of physical attacks as well as the player’s resistance to physical attacks done by enemies.
* Magic: Used to determine the power of magic attacks as well as the player’s resistance to magic attacks done by enemies.
* Speed: Primarily used to determine the order of entities in combat. Additionally, is used for specific attack damage calculations.

**Player**

The following sections will explain how the player’s characters grow, learn abilities, and the impact of real-world exercise on the player’s character’s growth.

**Character Growth**

As the player plays the game, there are two different methods by which their virtual character can grow: through real-world exercise and through gameplay. The behavior we wish to encourage the player to engage in is exercise. For this reason, player growth is designed in such a way that exercising in order to grow becomes increasingly easier as the player grows, while trying to grow their character in a traditional role-playing way (through fighting enemies) becomes increasingly difficult.

**Growth through exercise**

Each of the player’s traits has a method by which it can grow based on the player’s exercising habits. Health: For every 5000 steps a player takes in a day, their health trait’s value is increased by 1. Strength: For every three enemies the player encounters (approximately 3000 steps in addition to emerging victorious in the encounters they engage in) the player’s strength trait’s value is increased by 1. Magic: At the start of every day, the player is assigned a specific hour of the day, between the hours of 8 am and midnight. For every 1000 steps the player takes during this “magic hour” their magic trait’s value is increased by 1. Speed: For every half of an hour that the player spends running will increase their speed by 1.

**Growth through gameplay**

In order for the player to increase their trait values through traditional role-playing game means, they must defeat enemies. Specifically, in order for their character to grow a single level, they must 10 enemies times their current level (ex. If they are level 9, they must defeat 90 enemies in order to get to level 10). Once a player character grows a single level though this method, they are given an opportunity to assign 10 points to any of their traits as they see fit.

**Player Attacks and Abilities**

As the player’s trait values increase, they learn new abilities that they can use in combat. The following will explain all of the moves that the player is capable of using. The format of the following explanations will be as follows: an explanation of what the what the action does, denoted by an equation for damage-based actions or by a text based explanation for non-damage based actions.

Formulae: The following formulae are consistently used throughout the following section. They are the formulae off of which most combat-related actions are actions are based. Additionally, if for some reason any of these formulae were to produce a final value of 0 damage (to be dealt to the target), 1 point of damage is dealt instead. Any damage done to an enemy is subtracted from their current health.

* Physical Damage:
* Magic Damage:

Physical Abilities:

* Uppercut:
  + Strength required to use Uppercut: 5
  + Deals physical damage to the enemy.
* Charged Strike:
  + Strength required to use Charged Strike: 17
  + Deals 135% physical damage to the enemy at the cost of 10% of the user’s total strength.
* Meditation:
  + Strength required to use Meditation: 30
  + Increases the user’s strength by 25% of their total strength and their speed by 25% of their total speed.
* Leg Sweep:
  + Strength required to use Leg Sweep: 43
  + Deals 90% physical damage to the enemy and their strength lowers by 10% of their total strength.
* Turbo Strike:
  + Strength required to use Turbo Strike: 56
  + Deals damage based on the user’s speed rather than their strength.
  + Damage =
* Heart Strike:
  + Strength required to use Heart Strike: 68
  + Deals damage equal to 10% of the target’s total health.
* Muscle Training:
  + Strength required to use Muscle Training: 81
  + Increases the user’s current strength by 50% of their total strength at the cost of 50% of their total health.
* Stomp:
  + Strength required to use Stomp: 94
  + Deals physical damage to the enemy in addition to damage equal to 16.6% of the enemy’s total health.
* Sacrificial Strike:
  + Strength required to use Sacrificial Strike: 107
  + Lowers the user’s health to 1, then deals damage equal to the health it lost as damage in addition to regular physical damage.
* Overpower:
  + Strength required to use Overpower: 120
  + If the sum of the user’s health and strength is greater than the sum of target’s strength and health, the user deals damage to the enemy equal to the user’s current strength plus it’s current health; otherwise the target deals damage to the enemy equal to the user equal top the target’s current strength plus it’s current health.

Magic Abilities:

* Energy Ball:
  + Magic required to use Energy Ball: 5
  + Deals magic damage to the enemy.
* Icy Wind:
  + Magic required to use Icy Wind: 17
  + Deals 90% magic damage to the enemy and their magic lowers by 10% of their total magic.
* Barrier:
  + Magic required to use Barrier: 30
  + Increases the user’s current health by 25% of their total health
* Fireball:
  + Magic required to use Fireball: 43
  + Deals 135% magic damage to the enemy at the cost of 10% of the user’s total magic.
* Sharpen Mind:
  + Magic required to use Sharpen Mind: 56
  + Increases the user’s current magic by 35% of their total magic.
* Curse:
  + Magic required to use Curse: 68
  + Decreases the target’s current strength by 25% of their total strength, decreases the target’s current magic by 25% of their total magic, and decreases the target’s current speed by 25% of their total speed.
* Life Drain:
  + Magic required to use Life Drain: 81
  + Deals magic damage to the enemy and increases the user’s current health by 75% of the damage dealt to the enemy.
* Decay:
  + Magic required to use Decay: 94
  + Deals 70% magic damage to the enemy, decreases the target’s current strength by 10% of their total strength, decreases the target’s current magic by 10% of their total magic, and decreases the target’s current speed by 10% of their total speed.
* Full Heal:
  + Magic required to use Full Heal: 107
  + Increases the user’s current health to be equal to their total health.
* Instant Death:
  + Magic required to use Instant Death: 120
  + Has a 20% chance to instantly kill the enemy, otherwise the attack does nothing.

Examine: The player’s “examines” the enemy and find’s out their trait values at the cost of a turn.

**Enemies**

Encountered approximately every 1000 steps

**Possible Growth Rates**

**Trait Values vs. Level**

**Types**

**Testing Procedure**

**Computer Automated Testing**

**Player Based Testing**

**Future design areas and expansion possibilities**

Very Low:

* Offset =
* Minimum =
* Maximum =

|  |  |  |  |
| --- | --- | --- | --- |
| Level | Offset | Minimum | Maximum |
| 1 | 0 | 0 | 1 |
| 2 | 1 | 1 | 2 |
| 3 | 1 | 2 | 3 |
| 4 | 2 | 3 | 4 |
| 5 | 2 | 4 | 5 |
| 6 | 3 | 5 | 6 |
| 7 | 3 | 6 | 7 |
| 8 | 4 | 7 | 8 |
| 9 | 4 | 8 | 9 |
| 10 | 5 | 9 | 10 |

Low:

* Offset =
* Minimum =
* Maximum =

|  |  |  |  |
| --- | --- | --- | --- |
| Level | Offset | Minimum | Maximum |
| 1 | 1 | 0 | 2 |
| 2 | 2 | 2 | 4 |
| 3 | 3 | 4 | 6 |
| 4 | 4 | 6 | 8 |
| 5 | 5 | 8 | 10 |
| 6 | 6 | 10 | 12 |
| 7 | 7 | 12 | 14 |
| 8 | 8 | 14 | 16 |
| 9 | 9 | 16 | 18 |
| 10 | 10 | 18 | 20 |

Medium:

* Offset =
* Minimum =
* Maximum =

|  |  |  |  |
| --- | --- | --- | --- |
| Level | Offset | Minimum | Maximum |
| 1 | 2 | 0 | 3 |
| 2 | 4 | 3 | 6 |
| 3 | 6 | 6 | 9 |
| 4 | 8 | 9 | 12 |
| 5 | 10 | 12 | 15 |
| 6 | 12 | 15 | 18 |
| 7 | 14 | 18 | 21 |
| 8 | 16 | 21 | 24 |
| 9 | 18 | 24 | 27 |
| 10 | 20 | 27 | 30 |

High:

* Offset =
* Minimum =
* Maximum =

|  |  |  |  |
| --- | --- | --- | --- |
| Level | Offset | Minimum | Maximum |
| 1 | 3 | 0 | 4 |
| 2 | 6 | 4 | 8 |
| 3 | 9 | 8 | 12 |
| 4 | 12 | 12 | 16 |
| 5 | 15 | 16 | 20 |
| 6 | 18 | 20 | 24 |
| 7 | 21 | 24 | 28 |
| 8 | 24 | 28 | 32 |
| 9 | 27 | 32 | 36 |
| 10 | 30 | 36 | 40 |

Very High:

* Offset =
* Minimum =
* Maximum =

|  |  |  |  |
| --- | --- | --- | --- |
| Level | Offset | Minimum | Maximum |
| 1 | 4 | 0 | 5 |
| 2 | 8 | 5 | 10 |
| 3 | 12 | 10 | 15 |
| 4 | 16 | 15 | 20 |
| 5 | 20 | 20 | 25 |
| 6 | 24 | 25 | 30 |
| 7 | 28 | 30 | 35 |
| 8 | 32 | 35 | 40 |
| 9 | 36 | 40 | 45 |
| 10 | 40 | 45 | 50 |

For the following equations, the value of “random” is a randomly generated random number between the minimum and maximum values (inclusive). The range of numbers generated is noted in the following form: (minimum : maximum).

Logarithmic:

* Formula:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | Very Low | Low | Medium | High | Very High |
| 1 | 2:3 | 3:5 | 4:7 | 5:9 | 6:11 |
| 2 | 4:5 | 6:8 | 9:12 | 12:16 | 15:20 |
| 3 | 6:7 | 10:12 | 15:18 | 20:24 | 25:30 |
| 4 | 8:9 | 13:15 | 20:23 | 27:31 | 34:39 |
| 5 | 8:9 | 15:17 | 24:27 | 33:37 | 42:47 |
| 6 | 10:11 | 18:20 | 29:32 | 40:44 | 51:56 |
| 7 | 11:12 | 21:23 | 34:37 | 47:51 | 60:65 |
| 8 | 12:13 | 23:25 | 38:41 | 53:57 | 68:73 |
| 9 | 13:14 | 26:28 | 43:46 | 60:64 | 77:82 |
| 10 | 14:15 | 28:30 | 47:50 | 66:70 | 85:90 |

Linear:

* Formula:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | Very Low | Low | Medium | High | Very High |
| 1 | 1:2 | 2:4 | 3:6 | 4:8 | 5:10 |
| 2 | 4:5 | 6:8 | 9:12 | 12:16 | 15:20 |
| 3 | 6:7 | 10:12 | 15:18 | 20:24 | 25:30 |
| 4 | 9:10 | 14:16 | 21:24 | 28:32 | 35:40 |
| 5 | 11:12 | 18:20 | 27:30 | 36:40 | 45:50 |
| 6 | 14:15 | 22:24 | 33:36 | 44:48 | 55:60 |
| 7 | 16:17 | 26:28 | 39:42 | 52:56 | 65:70 |
| 8 | 19:20 | 30:32 | 45:48 | 60:64 | 75:80 |
| 9 | 21:22 | 34:36 | 51:54 | 62:72 | 85:90 |
| 10 | 24:25 | 38:40 | 57:60 | 76:80 | 95:100 |

Exponential:

* Formula:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | Very Low | Low | Medium | High | Very High |
| 1 | 0:1 | 1:3 | 2:5 | 3:7 | 4:9 |
| 2 | 3:4 | 5:7 | 8:11 | 11:15 | 14:19 |
| 3 | 5:6 | 9:11 | 14:17 | 19:23 | 24:29 |
| 4 | 9:10 | 14:16 | 21:24 | 28:32 | 35:40 |
| 5 | 12:13 | 19:21 | 28:31 | 37:41 | 46:51 |
| 6 | 17:18 | 25:27 | 36:39 | 47:51 | 58:63 |
| 7 | 21:22 | 31:33 | 44:47 | 57:61 | 70:75 |
| 8 | 27:28 | 38:40 | 53:56 | 68:72 | 83:88 |
| 9 | 32:33 | 45:47 | 62:65 | 79:83 | 96:101 |
| 10 | 39:40 | 53:55 | 72:75 | 91:95 | 110:115 |

**Gameplay Guide**

**First gameplay experience**

**Subsequent gameplay experiences**

**Production Timeline**

**Produced Materials**

**Code**

**Art**

**Reference Materials and Tools**

**Original Design and Proposal**