

PID – Project Initiation Document

Project Initiation Document

*“Investigating ARKit
player-friendly experience”*

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Introduction

Augmented Reality, AR, is becoming more popular in the recent months, with Apple releasing ARKit [3], and Google releasing ARCore [4], attracting developers to create and release new applications using AR. This technology is still being tested out with applications being developed in different genres, to find what works on AR and what doesn't, and which features take advantage of mixed world reality.

There are other AR toolkits available, such as: Vuforia [5], Kudan [6], Wikitude [7], and many more, each one having their own advantages and benefits over the other, however for the purpose of this project the ARKit toolkit will be used.

The aim of this project is to improve my skills in the Augmented Reality field and to explore user experience, UX, within the AR. As ARKit is relatively new, there are features and concepts that haven't been fully explored yet; therefore, what this project aims to accomplish is to investigate the platform further by creating a series of tests which represent different user experiences. By the end, the plan being to create a playable demo of a game, which illustrates capabilities and good user experience on the platform.

Background

Augmented Reality has been out for many years, however most of the time it required a marker to work properly and smoothly. One of the most popular games which does implement AR is "*Pokémon Go*" [8], where it used GPS to track the device location and alter the game based on where the device is.

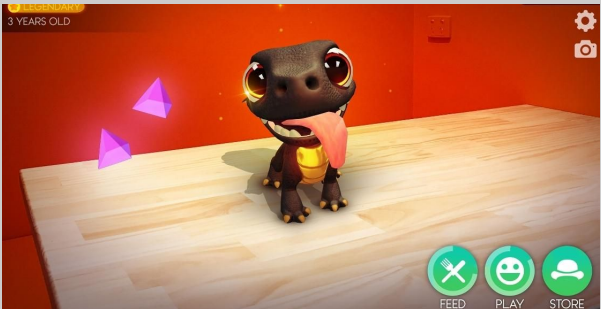
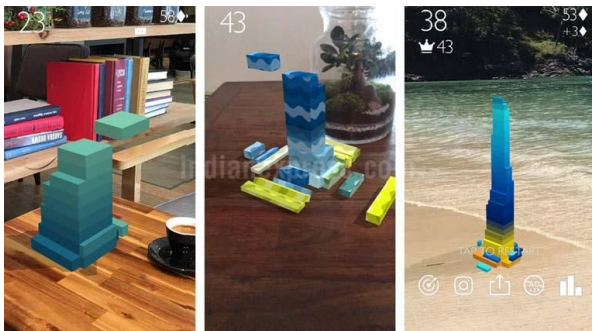
This being a successful game [1], having over 6 million downloads on Android market alone, shows that there is a market that is interested in AR games on mobile. With the succession of this game, developers saw potential in AR market, and ever since the AR has grown in popularity [2].

ARKit is a new technology introduced by Apple in September 2017, that developers are able to use and develop with for series of Apple products that have A9 chipsets or newer and installed iOS11 [3]. It allows virtual reality to be mixed with real world, which in principle allows for different style applications and experiences for the user. It is different to other Augmented Reality technologies, as it relies on plane detection instead of markers to display the virtual world.

ARKit was released with some exclusive titles such as "*AR Dragon*", which is a fun game of taking care of a dragon. It uses real time mechanic, which impacts the dragon and makes it grow. This encourages you to come back and play, otherwise dragon will fly away and player has to start again. This application just shows what the platform is capable of delivering, and it demonstrates how it is different to the competitors.

There are additional exclusive games for ARKit: "*Stack AR*" [9], "*The Machines*" [10], "*ARise*" [11], "*Splitter Critters*" [12], and more. Those games are exclusive on iOS, implemented in AR, they don't require a marker, and they use ARKit tracking to work. All of those games have similarities, even if they are in different genres, such as that they have bare minimum

UI (except for *The Machines*), to show as much as possible on the screen. *Table 1* shows comparisons between the games and the features that they have in common.

| Game Title | UI | Interactables | Visuals |
|------------|---|--|--|
| AR Dragon | <p>Minimalistic – indicative icons on top corners, and interactable buttons on bottom of the screen.</p>  <p>ARDragon gameplay image from: http://ostatus.org/wp-content/uploads/2017/09/AR-Dragon-Hack-Cheats-Tips-Guide-2.jpg</p> | <ul style="list-style-type: none">> Tap the screen, or drag to interact with dragon> Different objects, food, games available between dragon and player accessible through buttons on UI> On screen buttons for taking picture, menu button | <ul style="list-style-type: none">> Able to be positioned anywhere> Dragon will look at the position of the camera, giving impression of looking at you> Will change appearance with age - get bigger> Shows different reactions depending on mood> Collectibles and objects spawn around the environment to collect, clean up, play with |
| Stack AR | <p>Minimalistic – only showing indicative numbers to symbolise progress.</p>  <p>Stack AR gameplay image from: http://images.indianexpress.com/2017/09/apple_ios11_stack_ar.jpg</p> | <ul style="list-style-type: none">> Tap screen to play game> On screen menu buttons which are visible after losing the game> On screen directives, in the form of UI, to display game progress | <ul style="list-style-type: none">> Square spawn on each new level of the stack> If player doesn't allight the squares perfectly, the remainder gets cut off and falls down to the ground> Square colour changes depending on the stack level |

The Machines

Medium – There exists a whole UI in front of the game screen, which is interactable by the player, and the main way of playing the game. As it is strategy game, it is required for the genre to play efficiently, however it feels packed when compared to other titles.



The Machine gameplay image from:

<https://i.vtime.com/vi/1aNpmZ078Ac/maxresdefault.jpg>

- > Tap on screen, menus, UI, to interact with the game
- > Move the camera to adjust the location where you want to fire, spawn, move characters
- > Move camera to see the map from different perspective, player is able to plan out strategy how to play the game
- > On screen directives to show game progress

- > Map spawn on the plane
- > Map changes as the game progresses, more characters, particles
- > Different position of player gives different viewpoint for the game
- > Marker on the map shows the location where camera is pointing at, the location of the player choice of action will take place

ARise

Minimalistic – Only two menu buttons which are positioned at the bottom left of the screen.



ARise gameplay image from:

<https://cdn3.macworld.co.uk/cmsdata/slideshow/3664321/arise.jpg>

- > Camera movements and position affect the game - player movement required
- > Position the camera to connect the symbols, which create a path for character to move through
- > Tap screen to access menus, in UI, positions on bottom corner of the screen

- > Whole map gets generated - able to see following obstacles, progress
- > Moving around to enable new paths for character to walk through, progress with game
- > Symbolic icons on the path to connect to create path - shine up when connected and working

Splitter Critters

Minimalistic – Only two menu buttons available on the screen. One on top right and one on bottom left.



Splitter Critters gameplay image from:

<https://venturebeat.com/wp-content/uploads/2017/09/screen-shot-2017-09-19-at-4-14-49-pm.png?w=800&resize=800%2C500&strip=all>

- > Player interacts with the game by swiping or dragging a cutting line in the game to create walk path for character to reach the goal position
- > Player is able to walk into the game, enabling player to see layers inside the game
- > Tap on screen menus, in UI, to access game menus and options

- > Game presented inside the box - on a first look it looks like an image
- > Map changes with every cut player makes
- > Able to walk inside the box to see the inside of the game - giving illusion of being in the game

Relevant features from the examples in *Table 1*, and other relevant AR games, can be used to be implemented in this project AR game, to provide good user experience, given those game success. Feedback will be gathered throughout implementation to have it improved based on the game being implemented.

Motivation

Motivation for this project is to improve my skillset in the field of AR and in user experience, UX. As ARKit and AR is interesting topic and it is area which hasn't been fully explored yet. ARKit being a new toolkit, testing its features and finding limitations sounds promising and interesting.

Previously being part of a team creating AR game, in AINT354, there are a lot of user experience issues with the game which could be improved. UX is big part of why that project didn't do as well as it should, and in this project my goal is to create AR game that will have improved user experience, compared to my previous project.

Having iOS and MacOS available for development, it only seemed suitable to choose this platform and kit to explore in.

Project Objectives

Table 2

| UX FEATURE NAME | PROTOTYPES |
|-----------------|--|
| UI | Prototypes for different UI for the game. |
| INTERACTION | Prototypes for different player inputs, game interacting with player - sounds, interactables (buttons, world...) |
| VISUALS | Prototypes to different representation of the world, directives, information provided in game |

In this project, the objectives are:

1. Create series of prototypes to test different features for UX, from *Table 2*.
2. Gain feedback on the prototypes created, with ideas for improvement.
3. Using gathered feedback, create a game demo using ARKit.

Initial Scope

1. Create prototypes to test out following features: player input (swipe, point and click, on screen movement controls), visuals (floating on screen, UI, toggle on/off), player feedback (colour change, sounds), progression (visuals, UI), UI.
2. Gather feedback on the prototypes created, and gather potential improvements.
3. Improve the prototypes based on feedback.
4. Implement a demo for a game, involving features from feedback and implement it in ARKit. Aim being to create visually pleasing, positive user experience demo.

Resources and Dependencies

This project is dependent on hardware, as it needs to be created on MacOS and have iOS 11 (and A9 chip) to be able to test and implement this project.

Project can be implemented on Mac computers in Babbage 210 lab, as well as personal MacBook. Tested on personal device iPhone 7.

Method of Approach

The production of the prototypes and tests will follow an Agile Methodology.

Initially prioritise the features that prototypes will be created for, this will be priorities by: ease of implementation, existing understanding/knowledge on the feature.

By the use of User Story Mapping, the sprints will be created to set deadlines and have a clear direction what is being implemented at each stage. Each sprint will have specified information with functionality and how it affects the game.

After the sprints are specified, the prototype will be created, followed by quality assurance. Quality assurance will test out the prototype to see if it is suitable for use. Proof of concept will be performed afterwards, which will involve demonstration of the prototype to interested parties and project supervisor to get feedback and make sure prototype is performing as it should.

This method of approach will be repeated, once the technology is successful in testing. The process will be repeated until all agreed features are created. Followed by testing from colleagues and have public testing, where the objective being to get as much feedback as possible.

Possible technologies are Unity3D, C#/Swift, Xcode, although a full evaluation will take place during the project.

Project Plan

| Project Plan | | | |
|-----------------------|--------------------------|--------------------------|--|
| Stage | Expected Start Date | Expected Completion Date | Products/ Deliverables/ Outcomes |
| 1. Initiation | | 2 nd February | PID |
| 2. Sprints | 3 rd February | 7 th February | Have a plan and order of implementation which project will follow. |
| 3. Prototypes / tests | 8 th February | 2 nd March | Weekly brief update, prototypes and tests completed |
| 4. Testing | 5 th March | 7 th March | Present prototype to other people and gather feedback |
| 5. Improvements | 7 th March | 11 th March | Improve the prototypes based on feedback gathered |
| 6. Playable game | 12 th March | 3 rd May | Weekly brief update, playable game combining previously created and tested features. |
| 7. Draft Report | | 04 th May | PRCO304 Draft Report |
| 8. Final Report | | 17 th May | PRCO304 Report |

Control Plan

Majority of the project management will be done through Trello, an online project management software. Supervisor will be invited to the project board to keep a closer view on the project progress.

Weekly brief reports will be produced which will be reviewed with project supervisor and have weekly meeting with supervisor to make sure that the project is on track.

Communication Plan

Weekly meetings will be set with supervisor to go over project progress and any improvements that can be implemented. Also, any concerns and plans moving forward will be discussed at the meetings as well. Those will be documented in weekly brief documentations that are submitted weekly.

Initial Risk List

| Initial Risk List | |
|---|--|
| Delays in deliverables | Constant meetings with tutor will be used to negotiate pragmatic solutions. There will be two weeks implementation time available at the end of the project, to make up for any delays during the project. |
| Difficulty learning/ using the development technologies | Prototypes and testing is achieved early in project which is used to upscale necessary skills for further on in the project. |
| Technology failure | At situation where testing (or implementation) device breaks down, the alternative project implementations will be discussed with supervisor. |

Quality Plan

| Initial Quality Plan | |
|----------------------|---|
| Requirements | Requirements will be validated to ensure that they are correct, relevant (i.e., traceable to the business objectives), complete, achievable and demonstrable. Prototyping will be employed. |
| Design validation | The design will be approved between myself and project supervisor. It will be made certain that what is being made is feasible given the time left. |
| Testing | In-house testing will be performed for each increment. |
| Public testing | Exposure of the project to the students in university. Feedback will be collected by Google Forms. |

Legal, Social, Ethical and/or Professional Issues

Copyrighted content – In the project everything will be either created by myself or clearly stated the source where it is coming from, to avoid breaking copyright laws.

Social and Ethical issues – space that the prototype may cover when it is in use.

Plymouth University Ethics Policy – place where the project will be tested on.

No other issues can be found at this stage of project.

Reference:

- [1] https://play.google.com/store/apps/details?id=com.nianticlabs.pokemongo&hl=en_GB
- [2] <http://uk.businessinsider.com/ar-vr-2017-8>
- [3] <https://developer.apple.com/arkit/>
- [4] <https://developers.google.com/ar/>
- [5] <https://www.vuforia.com>
- [6] <https://www.kudan.eu>
- [7] <https://www.wikitude.com>
- [8] <https://www.pokemongo.com/en-uk/>
- [9] <https://itunes.apple.com/gb/app/stack-ar/id1269638287?mt=8>
- [10] <https://itunes.apple.com/gb/app/the-machines/id1280682965?mt=8>
- [11] <https://itunes.apple.com/us/app/arise/id1281550152?mt=8>
- [12] <https://itunes.apple.com/us/app/splitter-critters/id1107320261?mt=8>