# Proposal 1

ENG 4GA3

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Submission for Danny Papagiannis

Augmented Reality has been around for quite some time now, and although it is quite accessible there has not been much success with AR and gaming until most recently. With the enormous success of Pokemon GO it is evident that Augmented Reality and gaming can happen, as discussed in this article. Although a slow start, if companies can capture what Niantic did (developers of Pokemon GO) then this will begin to become more relevant for game developers.

In short I plan to build a tower defense game that uses Augmented Reality. The user will interact with their touch screen as well as perform actions in the AR world they perceive through phone screen (i.e. touching the AR surface).

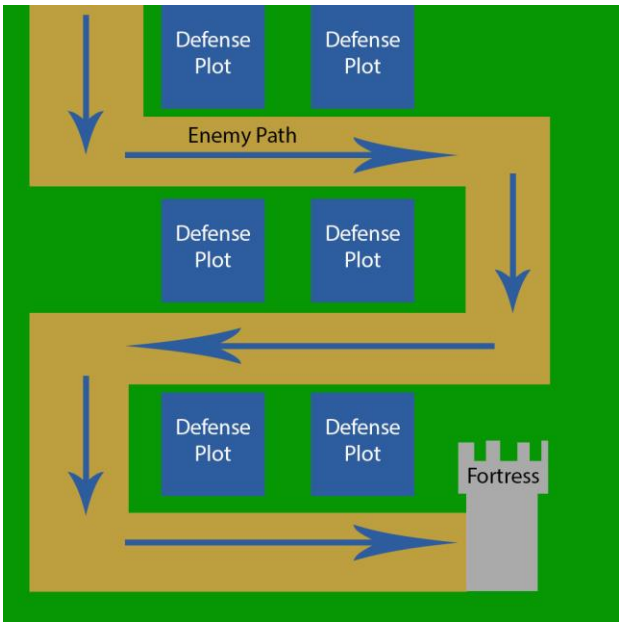
The goal is to survive waves of oncoming enemies that march towards the player's fortress. The player must prevent a large number of enemies from reaching and destroying the fortress, which results in a loss for the player. The player must defeat a certain number of enemies to progress to the next wave.

The player will select "plot" squares where defenses can be placed to attack oncoming enemies. The player will select a defense and a plot using a combination of the touch screen and interacting with the surfaces in which the AR objects are placed. Defenses will cost a certain number of points which are earned by defeating enemies with defenses or by advancing to the next wave.

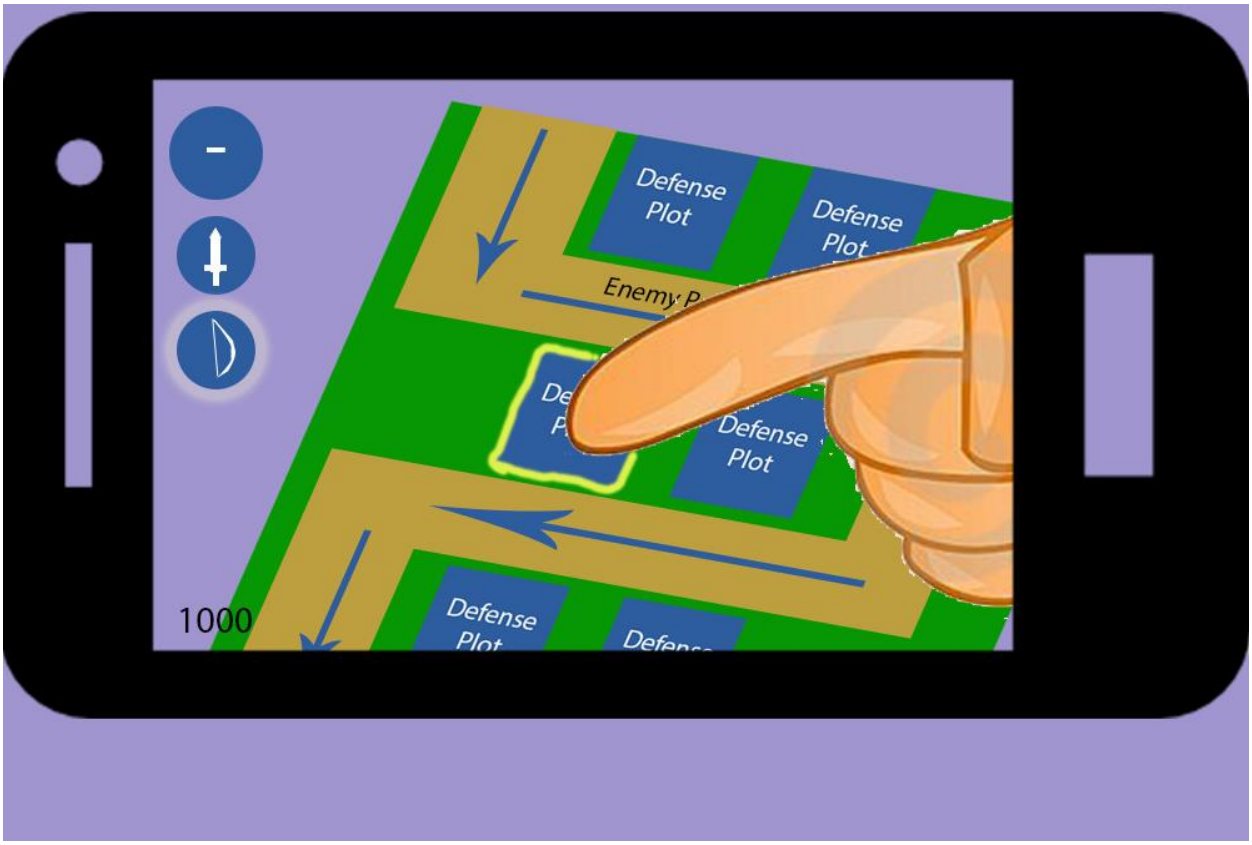
For the prototype there will be 6 selectable plots where defenses can be placed. There will be two types of defense units that can be placed: one that has a short attacking range and is powerful, and another that has a long attacking but is weak. Each of these defense units can be upgraded to increase their capabilities at the cost of points.

The prototype will feature three waves, of increasing numbers of enemies. There will be a single type of enemy featured.

This is a sample diagram of a top-down view of the game:



This is a sample view of what the User Interface may look like:




The main reason I want to create this prototype is that it recruits a lot of different components in working with Augmented Reality. Surface detection, animated models, touch screen interaction, and real world interaction. Also this project has many scalable factors that I can use to create a feasible short term prototype or a longer term full working version.

I will be using the Unity game engine to construct the prototype and will use the C# programming language to implement game logic, AI and behaviour. Using the Vurforia Unity extension API and tools I will be able to add the Augmented Reality aspect to my game. Along with this I will be using some models and objects from the Unity Asset Store.

From a gameplay perspective this prototype can be extended to a full working version by scaling different elements inherent to the prototype. This can include the following:

- Size of map
- Different maps
- Number of defense plots
- Complexity of map
- Different type of defense units
- Advanced unit upgrade
- Multiple enemy types
- More waves

- Difficulty multipliers
- Improved models
- Improved model animations

I believe that a fair evaluation could be conducted with evaluating closeness to the desired prototype along with project complexity. The following criteria could be considered:

- User-friendliness:
    - Quality of touch screen interaction
    - Quality of real world interaction
    - Can view AR surface easily
    - UI Design
- Functionality:
    - Enemies move on path correctly
    - Loss conditions work correctly – destruction of fortress results in loss
    - Win conditions work correctly – defeating all enemies results in win
    - Can manipulate units

**References:**

https://arc.applause.com/2016/07/16/augmented-reality-pokemon-go/