# Introduction

Tower Defence games are ubiquitous, popular, and engaging. This project proposes the development of our own Tower Defence game with a stretch goal of implementing educational elements to boost engagement both in the gaming aspect and the educational material. Our project takes a user centred-design approach to the development of requirements, objectives, and analysis. We present goals, objectives, and a method to successfully implement a Tower Defence game.

# Background

The recent pandemic, though devastating, has opened a lot of opportunities for distance work and distance collaboration. Now is a better time than ever to be collaborating remotely, as, not only have the tools for this become more readily available, but we, as individuals, are no doubt more experienced and used to this kind of work and collaboration by now. We therefore have the chance to develop computer-related products further.

Specifically, we want to focus on ‘Tower Defence Games’. We hope to create a new TD Game that especially belongs to us. Through our teamwork and collaboration, we intend to create our own version of the quintessential tower defence game. Our game will be themed around animals, with humans as their primary adversary. As such, our map / maps will be animal themed. Forests or farms or something with an animal connection.

We chose to create a tower defence game as it was a similar point of interest for us all. We expressed an interest in games and education. Our initial brainstorming make us decide to try and create and educational version of a tower defence game, using gamified elements to encourage thought and learning. However, we realized that, due to time constraints, this may be a difficult goal to achieve and it is not part of our minimum viable product. Given the chance, this is definitely a stretch goal. But it is not the sole theme of our project.

Our group has a varied skillset, from organizers to programmers. As such, we have proportioned our workload to allow each of us to levy our abilities and contribute to the project. We have planning set up, a GitHub and our slack channel.

We have decided to use JavaScript as our language of choice, considering our shared experience and classes. However, we have yet to decide on a physics engine for the game as we are still split between matter.js and phaser.io, both of which are excellent applications for our purposes.

# Scope

The scope for our project aims at a generalised audience, one which is at least passingly familiar with tower defence games and how they work. This would tend toward a younger audience, one which, if time allows, an educational angle would be effective on.

The scope of our project broadly encompasses the creation of a Tower Defence game in whole. With the minimum viable product being one which has a life system, an enemy, a tower, a map and a basic ai that would control the enemies pathing, the towers and the player’s lives.

The main limitations of our project is time and experience. While we may have grand ideas, it is important to keep the scope of our project reasonable as to be able to complete it with both the time and abilities which we collectively posses.

# Motivation

Our motivation for the project was initially to find a way to integrate education into a tower defence game. Educational games and tower defence games typically do not mix, however, by gamifying the educational aspect, we can make the action of learning easier, faster, and more enjoyable than simply reading from a book.

Another motivation for our choice was our mutual love of tower defence games and gaming in general. It will be easier for us to work on a project that is a labour of love. I, for one, while discussing what our project would be, made it clear that I had always wanted to make a tower defence game, having worked on a few of my own projects in Unity in the past. Another one of our team members, made it clear that they, too, wanted to work on a project like this. Another member revealed that he is in fact a game developer by trade, adding substantial knowledge experience to the group.

Through our brainstorming we have thought of a few methods that education could possibly be integrated: a question about history or math would appear, asking the player for a decision. Perhaps it asks the player to invest some of their money, giving two options which could in fact be formulas. Choosing the correct option would grant the player additional funds. Another question could reduce wave size or difficulty, or perhaps allow a tower to be upgraded.

We also had the task of deciding on an environment to developed in. What language, what physics engine. I was the one tasked with researching this information, more of which can be found in the research section of this proposal.