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| CMP302: Gameplay Mechanics Development |
| R-nader |
| Project Report |

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| LEWIS THOMSON  1601828 |

# Project Summary

The aim for the project was to create a gameplay mechanic which enabled the player(s) to interact with the world using their arsenal of specialised grenade types (R-nades) and their radar scan ability. The core of this design is based off of the systems used in 2009’s Manga Series ‘Btooom!’ (Junya Inoue, 1971). The core mechanics identified for this project were:

* Different R-nade types:
  + Impact Detonation.
  + Timed Detonation.
  + Pressure Detonation.
  + Tripwire Detonation. <Not Implemented>
  + Remote Detonation. <Not Implemented>
* Radar / Sonar Scan <Partial Implementation>
* R-nade swap system <Partial Implementation>

The main mechanics to be developed lies within the R-nades themselves. With each one having different, unique detonation conditions and different explosion sizes / effects.

# Requirements Specification

## Purpose

The gameplay I am aiming to produce is a first-person shooter style system where all firearms are replace with physics enabled grenade-type explosives (named, R-nades). The main objective for this project is to implement a variety of interesting weapon and tracking mechanics.

## Audience

In a real-world scenario, the target audience would be teens/adults for casual or competitive experiences. However for this being used as only a coursework submission, the audience I am targeting will be assessors and examiners who are familiar with the use of Unreal Engine and C-based coding.

## Scope

The project’s scope is already outlined in the brief provided as part of the CMP02 Coursework, thus I will not re-explain what is already written there.

However, my individual submission will focus primarily on combat mechanics with the use of explosive projectiles, as mentioned above in the summary. Aside from the mechanics and ‘weapons’ being implemented, there will also be a ‘testing range’ where it will be possible to demonstrate all of their functionality.

It is worth noting, that it is not a game that I am developing, but a foundation with functional mechanics that can be added to and built upon.

## Overview

The main submission will consist of the ~~5~~ 3 different types of functioning ‘R-nades’ (including basic models and visualisations), Radar / Scan system for gameplay mechanics regarding locating other players (though there will be no multiplayer functionality). There will also be NPCs with extremely basic pathfinding AI in the ‘test range’ to demonstrate weapon functionality. As previously stated, this is aiming to be a foundation for demonstrating the mechanics, rather than a full feature application.

All artistic-based objects in the application can be changed within engine without any prior knowledge of code. Each type of R-nade has been created in C++ through Unreal Engine, with a UE Generated Blueprint for designer use to change and tweak balancing values. All types of R-nades currently effect dynamic physics objects as well as effect enemy characters in terms of removing health.

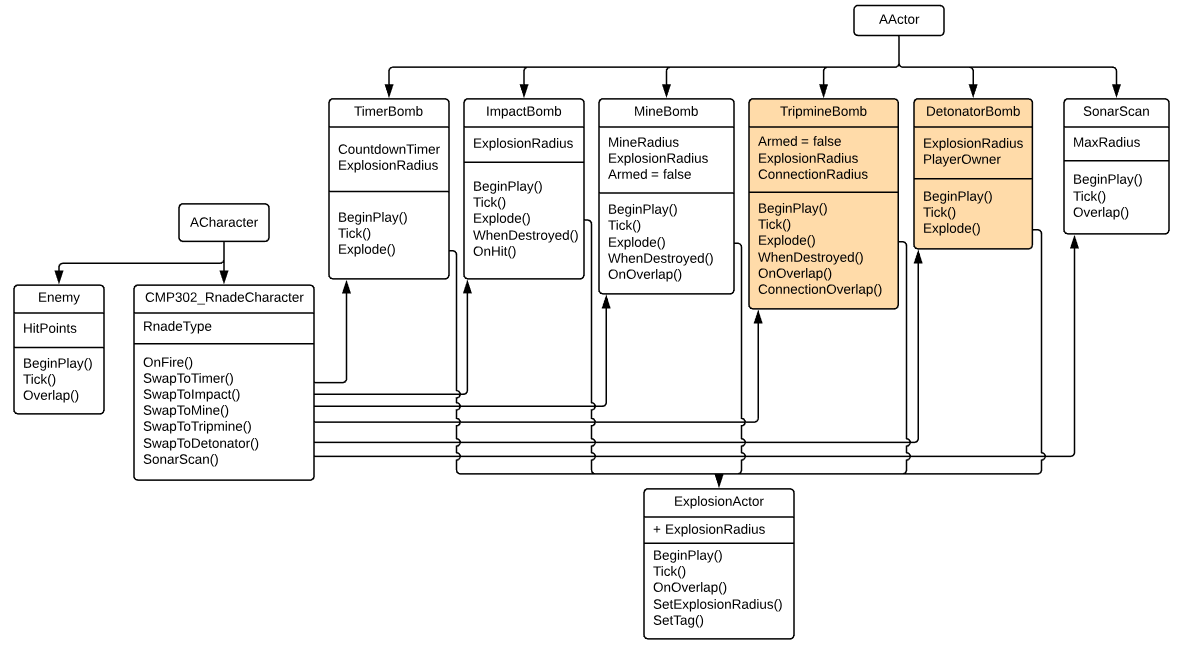
### Development Environment

The application was created and intended to be used within Unreal Engine v4.22, however it can be opened in future generation, however it may jeopardise functionality. All code was created in Visual Studio 2017.

All development is being performed by a sole developer, therefore there will be limited -if any- artistic creation for the project, and heavy use of Unreal Engine’s Sample Content packs.

# Design

Attached is a UML Diagram for the developed system that covers all the C++ classes created. The coloured classes were not implemented in time, but for proof of concept in design have been included.



In this section I will cover each class shown in the UML, each representing a component of the gameplay system created.