# Mini-Project

**Project Name**: Subway surfers, but worse

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**Link to Project**:

Overview of the Game:

The idea of the project is a collection arena game in the vein of PACMAN or Snake. The player guides a rat in a closed off arena freely in a 2D plane using keyboard controls, while being able to rotate and zoom the camera around to see the field. The goal of the game is to maximize the score by gathering food, while escaping from cats trying to catch the player. The game becomes progressively harder with time by increasing the number of cats and their speed. Genre of the game is a reflex-based arcade game.

The main parts of the game are:

* Player – rat, moved with the keyboard WASD or arrow keys
* Camera – pivoting around the center of the playfield and rotated around with the mouse. Zooming is done with the mouse scroll
* Food – cheese objects are spawned on the field – one in the beginning and then another one each time a player gathers the previous one. Each cheese gives 1 point to the player.
* Enemies – cats, they are spawn in random places at the edge of the play field and moved towards the position of the player at the time of their spawning. Take 1 live from the player on collision and are destroyed if they touch the edges of the play field
* Play field – close off space where the player can freely move. They player cannot go out of the field.
* Lives – the player starts with 3 lives, once all lives are removed the game ends

Game features:

* Positions of food and enemies are randomly selected each time helping with replayability.
* The difficulty of the game changes with time, making it harder
* The game keeps track of a score

How were the Different Parts of the Course Utilized:

The contains a character and camera movement scripts that use the Unity implementations of affine transformations for moving the character and rotating and zooming the camera. The enemies are spawned at random positions of the level, together with the scoring cheeses using the randomization functionality in Unity calculated for the intervals between the size of the playfield. The interactions between the character, the pickups and the enemies are facilitated by the collision system utilizing the onCollisionEnter and on CollisionExit for capture different points of the object’s interactions. The character and the level were prototyped using the ProBuilder level editor and the designed level is a simple arena. The cheese pickup has a imported 3D model and texture, while the character and enemies are only made with primitive objects and materials containing different colors. The cheese pickups have rigidbodies to give their spawning in the world a more randomized feel.

Project Parts:

* Scripts:
  + CameraMoving – used for rotation and zooming of the camera
  + ChangeScore – used for updating the UI
  + EatFood – used to keep track of collisions with the food and updating score
  + EnemyBehaviour – used for enemy movement and tracking enemy collisions with the player and the world
  + MoveCharacter – used for moving the character using rigidbody physics and rotate the movement based on camera position
  + ObjectSpawner – used for spawning enemies, keeping tracking of a timer and changing the difficulty of the game
  + ScoreKeeper – keeps reference to the player lives, the score and if the game ending is triggered.
* Models & Prefabs:
  + A model of the cheese downloaded from <https://sketchfab.com/3d-models/cheese-78642517ca7e43b495e73509810fbbe1>
  + Rat and cat models made with Unity primitives
* Materials:
  + Basic Unity materials for cat fur, rat fur, cat eyes, rat eyes, ground, walls.
* Scenes:
  + Game consists of one scene
* Testing:
  + Game was tested on Windows, game cannot be currently played on a mobile platform

Time Management

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| **Task** | **Time it Took (in hours)** |
| Setting up Unity, making a project in GitHub + making word report document | 2 |
| Research and conceptualization of game idea | 1 |
| Searching for 3D models – Houses, animals, | 0.5 |
| Building 3D models from scratch -cat, rat, field | 1 |
| Making camera movement controls and initial testing | 1 |
| Player movement | 0.5 |
| Combining player movement with camera orientation, bugfixing | 1.5 |
| Building the random spawning of cheeses and fixing spawning bugs | 1 |
| Building enemy random spawners, randomizing starting positions | 2 |
| Making timers and connecting enemy spawning and game difficulty | 1.5 |
| Making UI elements and research into TextMesh Pro | 1.5 |
| Collisions and bugfixing error with multiple collision all at once | 0.5 |
| Playtesting and bugfixing fringe cases in rigidbody incorrect physics | 1.5 |
| Code documentation | 1 |
| Making readme | 0.5 |
| **All** | **15.5** |

Used Resources

* How to make RTS Camera Movement in Unity - <https://www.youtube.com/watch?v=cfjLQrMGEb4&t=1s&ab_channel=Brackeys>
* Game Architecture Tips – Unity Timer - <https://www.youtube.com/watch?v=pRjTM3pzqDw&ab_channel=DapperDino>
* Spawning objects in only a certain area - <https://forum.unity.com/threads/spawning-objects-in-only-a-certain-area.611167/>
* Moving character relative to camera - <https://forum.unity.com/threads/moving-character-relative-to-camera.383086/>