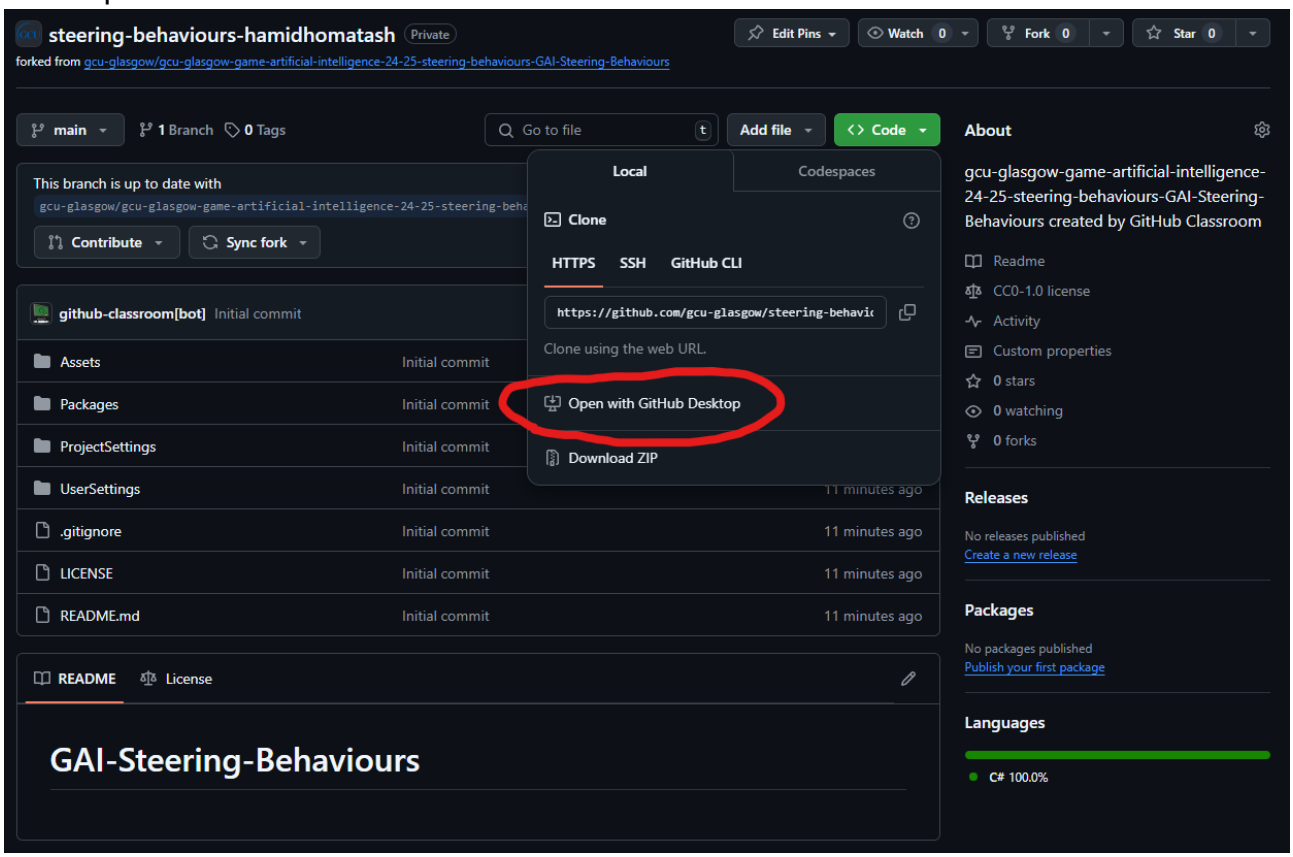
Steering Behaviours Practical

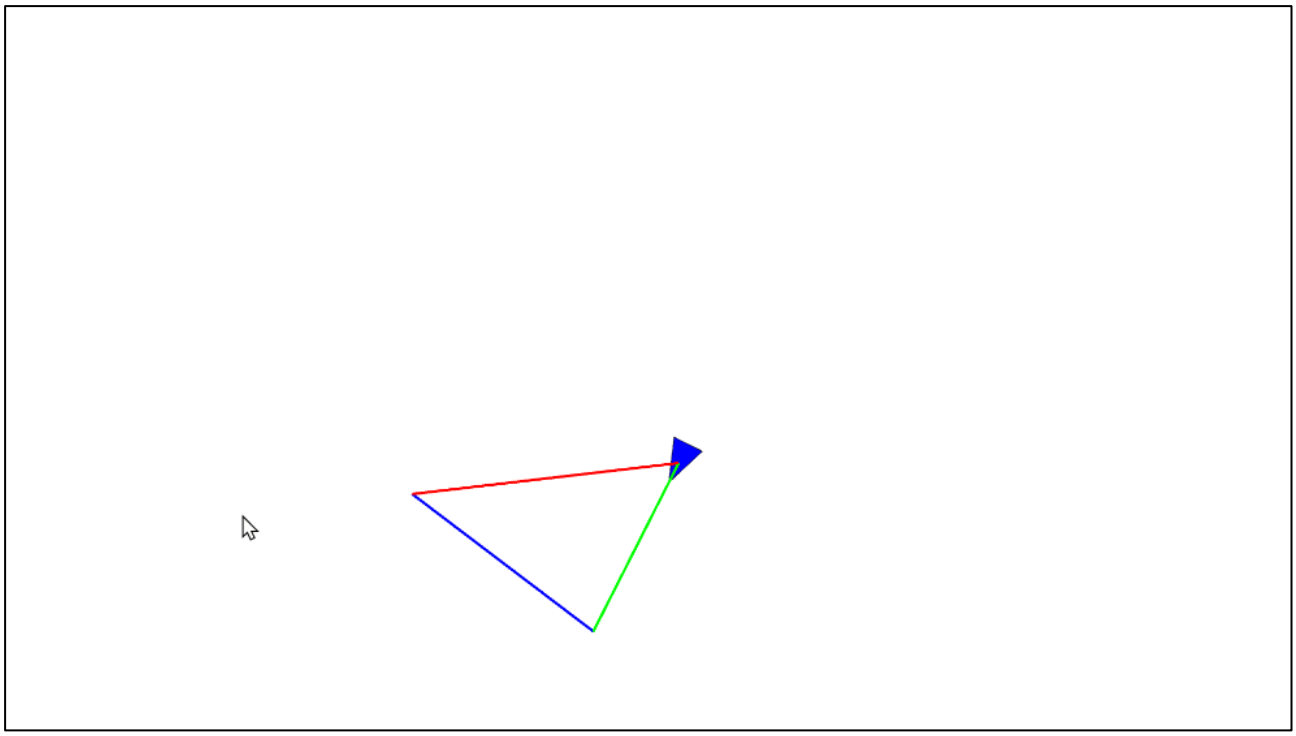
NOTE: This practical (and all practical for this module) use GitHub and GitHub classroom and therefore requires you to have a GitHub account.

To access the project files click the GitHub classroom link below and follow the instructions: https://classroom.github.com/classrooms/115539102-gcu-glasgow-game-artificial-intelligence-24-25

Once you have done this you should see your repository where you can open it via GitHub Desktop to clone it:



Once cloned open the project in Unity selecting the root folder of the practical. Then find the “Main” Scene and open this and press play.



The example will show the seek behaviour running (The mouse cursor is used as the target so make sure to hover over the game window - you may need to click on it for it to focus). Have a play with this demo to observe the behaviour.

Next find the code files in a folder called Scripts in the root of the project. This folder will contain 7 code files. Please have a look and try to understand how the code works in the following files SteeringAgent.cs, SteeringBehaviour.cs and Seek.cs (Most of the other files are placeholders for your own code that you will fill in with the questions below). Now you may not understand everything that is going on in the SteeringAgent.cs file and this is fine as there will probably be code you have never used before. However, try to understand how the above 3 classes all link together architecturally and how they pass data to each other in the code and from how they are setup in the Unity editor.

Note all the steering behaviours are already on the Agent GameObject in the "Main" scene, but only the Seek component is enabled. Initially when working on a new behaviour make sure to disable all the behaviours on the Agent except the one you are currently implementing.

Main Tasks

For the rest of the practical session and for homework try to do the following:

1. Read the definitive paper on steering behaviours by Craig W. Reynolds: https://www.red3d.com/cwr/papers/1999/gdc99steer.pdf
   For the practical just skip to Seek/Flee/Arrival/Wander, but at home make sure to read all of it. It will really help you understand steering behaviours more in general.
2. Implement the behaviour Flee in the file Flee.cs.
3. Implement the behaviour Arrival in the file Arrival.cs.
4. Implement the behaviour Wander in the file Wander.cs.

When complete the behaviours should look like the ones here.

Bonus Questions

5. Now you will have 4 steering behaviours and as you will have noticed you can turn on multiple steering behaviours at once. Try turning on Wander with either Seek, Flee or Arrival. This will show you the power of Steering Behaviours. Now turn on all the behaviours and you will see it is a bit of a mess. This is what cooperative arbitration is for to only have behaviours active that are needed or weighted so that one behaviour predominantly shows more than others. Research and implement a strategy for cooperative arbitration. A good guide to some strategies is here. Then try a strategy in the function CooperativeArbitration() in SteeringAgent.
6. Finally, if you get through all of that have a look into flocking which is the combined behaviours of Separation, Cohesion and Alignment. You will of course have to add multiple agents and figure out how to get these agents and manage them. This is a fun one :) Plus this will be useful for the coursework and will give you a head start.

It would be awesome if you could get through all the questions, but do not worry if you do not manage them all, but finish number 4. The key thing is to try them out and experiment. By doing this you will learn much more than in a lecture and you will really understand the topic area. If you manage to do everything then well done, you could maybe start to investigate the behaviour Obstacle Avoidance. This is a fun one as you can then start to funnel agents through geometry, and you will see them interact with world.