**Assignment 1 – Physics (Air Hockey)**

## Intro

The physics assignment will be a simulation of a game of air hockey with an artificial intelligent opponent. You are required to produce the game so that begin the game with:

* A countdown to prepare the player. 
* Allow the game to run between the player and the AI opponent.
* Each character (the player avatar, and the AI opponent) can score points against each other by moving past their opponent’s goal posts.
* Game ends when one of the opponents reaches five points.
* Communicate to the player that they have either won or lost.
* Allow the player to play again.

## Background

Air hockey is a game commonly found in arcades. It is similar to *Pong* (1927, Atari Inc.) with two axes of movement. The tables are deliberately low friction to allow for ease of movement on the puck, and the goal zone is reduced in size.

## Requirements

There are several requirements to producing a basic air hockey game which is illustrated:

* Movement of the player’s paddle.
* Application of forces based on direction and speed of paddle.
* AI will calculate the predicted position of the puck and move towards it at a consistent speed or limited acceleration.
* Both the player’s paddle and the AI's paddle are limited to their side of the arena.
* The puck should not be able to move outside of the arena.
* The puck should return to the arena after hitting a goal zone - you are welcome to decide how this happens.
* Either player loses point for hitting the puck more than once before the other player has made contact with the puck.
* You are required to add at least one additional feature to the game:
* Portals appear on the side of the board randomly throughout the session of the game, and last 15-20 seconds. Pucks will teleport into one portal and out another. Directional, momentum and velocity and are maintained when exiting the portal.
* Regions on the board that activate randomly on the board for extra points when the puck flows over them. This means that the system must track the player that hit the puck most recently.
* Regions on the board that change the direction of the puck. The visual communication should illustrate which direction the puck will go towards. Momentum and velocity should be maintained.

## Submission

You will submit on Ulwazi under the assignment tab. You are expected to submit a build folder and project folder ALL compressed and uploaded. You will be assessed in class from 14:15 – 17:00 by your tutor. You are expected to show your tutor your build and your project, and it is their discretion on how they go through your project.

### Submission Checklist:

* Compressed Build Folder
* Compressed Project Folder
* Reflection, half a page explaining your mistakes, issues and errors, and (if necessary) how you fixed those mistakes. These mistakes, issues and errors should only be related to the creation of the game itself.

You will also be assessed on your construction of your build artefact. If your submission does not have everything your require to run a build or open the project you will get zero.

As a comment you will also be expected to upload your build to [itch.io](https://itch.io) and place your project on [github.com](https://github.com/) and provide the links for both.

## Naming Conventions

There are two submissions:

1. A compressed folder containing:

* Unity Build
* Unity Project Folder (including scripts)
* Reflection Document (PDF)

StudentNumber\_StudentName\_A1 *FOLDER – compressed*  
|  
|  
|  
--------- Build *FOLDER*| || --------- GameName.exe  
| || --------- Other Build *Files* and *Folders*|--------- Unity Project *FOLDER*| || --------- UnityProjectFolderName *FOLDER*|   
|  
--------- StudentNumber\_StudentName\_ReflectionDocument.*pdf*

**Plagiarism is a severely punishable offence.**