Comp30540 Assignment 2 - Aero Educate

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Aero Educate is a flying history education game developed in Unity. It runs on both Windows standalone and WebGL.

The player traverses an aerial obstacle course while also answering questions about the history of aviation. Given that the future spaceships will be travelling through space, it is important that the colonists learn the history of humanities aviation endeavours. The game takes place from a third-person perspective, with the player's avatar being a spitfire.

Controls

The game can use both a keyboard and a PS4 controller for input.

- Roll – Rolls the plane – A/D or Left/Right on the Dpad
- Pitch – Pitches the plane up and down – W/S or Up/Down on Dpad
- Yaw – Turns the plane left and right – Q/E or L1/R1 on controller
- Throttle – Speed of the plane – LShift/LCtrl or X and Square on controller
- AI assistance - Activates the AI to help the player – Space or Circle

Physics

The physics used were from the unity standard assets pack. Aeroplane 2 Axis Control and Aeroplane Controller scripts were used and expanded upon. Initially, the scripts only dealt with Pitch and Roll, however, this felt too imprecise. To aid in controlling the plane, yaw and throttle control was added. Yaw allows the player to rotate the plane around its Y-axis, this allows for tighter, more precise turns. In the standard asset scripts there was some minor throttle control in the form of an airbrake, this was rebound, and proper throttle control was added. The player can now adjust the throttle to increase/decrease their speed.

Another aspect of the physics that was adjusted was the Time scale. Upon approach to a question point, the user will need time to read the question and make their selection. To do this, the time scale is adjusted. When a trigger is crossed, the time scale will decrease over the subsequent frames until it hits a value of $1/20^{th}$ normal time. When the player passes a second trigger, time is increased again over the subsequent frames until it is back to normal.

AI Co-learner

The AI co-learner takes the form of "Danny Boy", a fellow pilot who introduces the game to the player in a cutscene and who can help answer questions in the game's "Easy" level. When in the slow-mo state, the user can activate the AI assistance, and "Danny Boy" will swoop down through the correct answer. The player must still fly through the correct checkpoint themselves.

Quiz

The quiz is embedded into the game loop as opposed to being a separate entity. On each level, there are three question points. These question points receive a random question from a pool of available questions that depends on the level difficulty. The question point has three answer checkpoints, and

flying through the correct one will award 500 points. There is no penalty to flying through an incorrect checkpoint, but you only get one answer per question, so you cannot fly back and change your answer.

There are two pools of questions depending on the level: easy and hard. Each question has a correct answer and a pool of wrong answers. Randomising both the questions and the answers allows for more replayability as the course cannot be learned off.

Game Loop

The game loop consists of flying through an obstacle course to gain points. Every four obstacles a question appears. As the user approaches the question, the slow motion gets activated to allow them time to read the question and make their selection. Each checkpoint grants 100 points and each correct question gives 500 points. The objective is to score as high as possible. It is not mandatory to hit checkpoints, but you are able to turn around if you miss one. Checkpoints can only be activated once to avoid players being able to accumulate infinite points.

Collisions

As this is a kid's game, there is no penalty for hitting the ground, the plane simply collides with it. I chose to remove collisions for checkpoints due to it being more difficult with them active. There are bounds on the level to ensure that the player does not stray from the play area. The bounds line up with the mountains in the terrain to provide a visual indicator as to where they are. If a player hits a bound, they are respawned just beyond their last activated checkpoint or question point.

Level Difficulty

There are two levels of difficulty in the game, easy and hard. The easy "plains" level has an easier pool of questions and the level design is less intense. The player can also activate Danny Boy to provide assistance with questions. The harder "desert" level has a more demanding course layout and the question pool contains harder questions. The player also cannot activate the AI to assist them.

Sound Effects

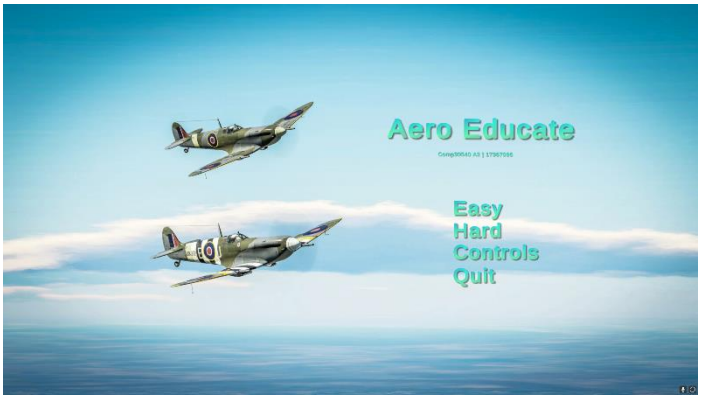
The players plane has an engine sound that is relative to the plane's throttle, increasing and decreasing in pitch and volume as the throttle changes. Wind sound effects are also played, these change pitch and volume relative to the player's airspeed.

When time is slowed both of these sounds are altered in pitch to reflect the change in time speed.

"Danny Boy" has voice lines that play upon his activation.

Expandability

I created both the checkpoints and question points as prefabs. This allows for them to be added to levels with ease as the setup is already done and therefore, new levels can be created quickly without difficulty.



Menu Screen

Aero Educate WebGL build

Question point on "easy" plains level

Checkpoint on "hard" desert level

Sources

Unity tutorial series used: https://www.youtube.com/watch?v=j48LtUkZRjU&list=PLPV2KyIb3jR53Jce9hP7G5xC4O9AgnOuL

Menu image: https://imgur.com/r/warthunder/ZwVlb

Slow Motion code adapted from here: https://www.youtube.com/watch?v=0VGosgaoTsw&t=604s

Unity Cutscene adapted from: https://www.youtube.com/watch?v=G_uBFM3YUF4

Sound manager code adapted from: https://www.youtube.com/watch?v=6OT43pvUyfY&t=305s

Spitfire asset: https://assetstore.unity.com/packages/3d/vehicles/air/super-spitfire-53217

Skyboxes: https://assetstore.unity.com/packages/2d/textures-materials/sky/fantasy-skybox-free-18353

Standard assets: https://assetstore.unity.com/packages/essentials/asset-packs/standard-assets-for-unity-2018-4-32351