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Student Project – Racing Launcher Game

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Abstract

We present a student group project, which takes a different spin on the driving game genre, turning it into a racing 'launcher' game. This undergraduate group project that students from different disciplines (ranging from 3D animation to software development) have worked on during the second year of their degrees not only aims for students to improve their teamworking skills but also to cultivate professional practice and demonstrate their creative skills. The presented project is a very good example of what our students can achieve in the limited time they have for their projects.

1. Introduction

The project presented here (Figure 1) has been developed within a 2nd year undergraduate course on 'Computer Animation Production' at the National Centre for Computer Animation (Bournemouth University, UK). This course (worth 20 credits, which translate into 10 ECTS) is delivered in the NCCA's undergraduate framework for computer animation, games and effects, which incorporates three distinct degree programmes [CMA10] that target different areas of the creative industries.

- an artists' computer animation degree (BA) that concentrates on the art of computer animation for students who want to work as artists in the effects and games industries
- a more technical degree in computer visualisation and animation (BA) for students who aim for employment as a technical director or technical artist
- a specialised computing degree (BSc) in software development for animation, games and effects for students who want to develop software in the creative industries

A few of the courses that students take are shared by all three degree programmes, the course that uses the group project for assessment being one of these. It includes workshops on advanced animation techniques and post production techniques with the group project running in parallel to these taught sessions, effectively giving students about 3 months for the completion of their projects.

Figure 1: *The racing game "Back on Track" with stylized visuals in a futuristic environment, created by the 2nd year undergraduate students Ramesh Balachandran, Callum James, Katrine Loraas, Elena Pagliei and Laurence Thomas.*

2. Course Aims

The group projects that our students embark on are a substantial piece of work that typically involves the production of an animation sequence or the development of a piece of software, such as an animation tool or a computer game. The aim of the project is for students to cultivate professional practice and to work as part of a heterogeneous team whose members have different areas of expertise and who come from different, though related disciplines, i.e. student groups will include members from all three degree courses of our undergraduate framework. This means that unlike other games degrees programmes [AP09] or game development courses that require cooperation between different departments or faculties [Bid11], the NCCA's multidisci-

plinary undergraduate framework provides students whose combined skillset includes all of the tasks that need to be completed for this type of project, during which the students are expected to demonstrate creative skills as well as advanced knowledge of computer graphics techniques.

2.1. Running the Group Project

In this project the students need to take responsibility for the complete work, including its conception, planning and implementation. At the start of the second year of their degree they have to present project ideas that have to fit into a few allowed categories (such as game prototype, 1 minute animation etc.), after which members of the faculty will select the project ideas that appear most promising and achievable. Depending on the skills the various students have and the skills required by the selected projects, a member of the faculty then distributes the students from the three degree programmes to the projects, which will then each be led by the student who proposed the project, with an average number of 5 students then working on each project. During the production the projects are supported by group tutorials with a member of the faculty who not only mentors the students but also assumes the role of the project's producer. After completion of the project the students are assessed on the quality of their individual contributions, as well as the teamworking of their group, however the quality of the final product is not assessed.

3. 'Racing Launcher' game

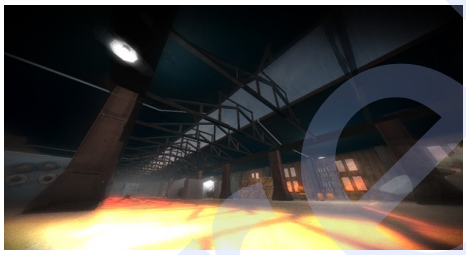

Figure 2: *The 'Terminus' game that provided the engine the students adapted for their racing game.*

The game project presented here shows an innovative take on racing games. At the start of the game the player's car is launched and then will lose speed along the track. The objective of the game is to collect objects (power-ups) that will increase the car's speed to allow the player to reach the end of the track, while avoiding collisions with various obstacles that will slow the car down. This is made even more interesting by sections of the track with reversed gravity, which are upside down, requiring the player to flip the car at the correct points on the track. The 'Racing Launcher' game was created by a group of 5 students: 3 software developers and 2 artists. They used an existing game engine, produced for previous student projects at the NCCA (Figure 2), which the students adapted for their game, the only engine component that was not changed being its OpenGL 3.2 based renderer. To make the game more interesting the students decided to have levels generated procedurally. The environment is constructed from a fairly large number of prefabricated meshes (for buildings and objects) and textures – all created for the game by the students – that are loaded in at program startup. The racing track itself is built from a randomly generated spline curve along which the road's cross-section is extruded onto which obstacles and power-ups are then placed by the procedural track generation algorithm. As the game logic and physics in the original engine were optimised for a first person action game, the students had to change these to fit their driving game, for example collision detection, which the original engine implemented as AABB trees, was changed to raycasting which is a better collision method for driving games. As the car was supposed to slow down over time, an appropriate physics model was developed, which also allowed for the 'reversed gravity' sections of the race tracks. The students also considerably optimised the engine's memory management and asset handling. Finally, to give the game a stylised look, the students created toon shaders, so rendered images do not appear photorealistic.

4. Conclusions

Apart from the innovative original idea, the students displayed much skill and creativity in their approach to the project. This required them to create a large number of art assets, get to grips with and modify an existing complex software system as well as develop a procedural method for game world generation, while at the same time making sure that the resulting game was playable, balanced and fun.

5. Acknowledgements

We need to acknowledge the students who worked on the 'Racing Launcher' game project (Figure 1), as well as the students who worked on the 'Terminus' game project (Simon Roth, Andy Abgottspon, Firuze Kiraz, Elliot Spence, Alex Poolton and Pete Smith) whose engine formed the basis of the project described here.

References

[AP09] ANDERSON E. F., PETERS C. E.: On the provision of a comprehensive computer graphics education in the context of computer games: An activity-led instruction approach. In *Eurographics 2009 - Education Papers* (2009), pp. 7–14. 1

[Bid11] BIDARRA R.: Interdisciplinary Game Projects: Opening the Graphics (Back) Door with the Soft Skills Key. In *Eurographics 2011 - Education Papers* (2011), pp. 9–16. 1

[CMA10] COMNINOS P., MCLOUGHLIN L., ANDERSON E. F.: Educating technophile artists and artophile technologists: A successful experiment in higher education. *Computers & Graphics 34*, 6 (2010), 780–790. 1