Final Year Project Proposal Department of Computing

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| Award | Computer Games Programming (Bsc) |
| Semester | 1 |
| Award Leader | Bob Hobbs |

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| Version | 2 |

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| Change History | Version | Date |
| * Merged the bullet points in coherent paragraphs in the objectives section * Resources are more detailed | 1 | 22/10/2019 |

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| Project Title |
| Efficient Implementation of Destructible Environments in Games |

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| Background |
| A decade or so ago, a game world that aimed at a realistic look was enough. These days, players expect to not only admire visually appealing environments but also interact with them in a way that the environment behaves realistically as well. That phenomenon is increasingly appearing particularly in VR games, where one of the first actions that a player usually takes is to interact with the objects around them. If any object does not behave as expectedly or at all it breaks that realism that weakens the overall immersion factor of the game. Is this because there is a limitation due to processor power/efficiency of the programming techniques and algorithms used?  I have chosen this project to boost my knowledge in this area as I found it especially intriguing due to how well implemented physics can enhance the player’s experience ultimately being a welcoming addition to a game.  Destructible environments refer to the environments in a video game where every object or construction can be broken down into smaller pieces as a result of a large impact i.e. launching a rocket into a skyscraper or smashing furniture inside a house.  Need to research about popular approaches employed by different game engines that implemented a destructible environment in a video game. To do that, will need to first analyse popular games that took the concept of destructible environments seriously and understand the challenges they had to overcome.  By the end of this project I hope I will have gained a significant amount of research methods experience, project planning skills and a deeper understanding in how destructible environments are implemented.  Developing an artefact that will implement some key ideas from current research and attempt to improve them or combine them into a new approach. |

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| Objectives |
| The scope of the project includes identifying the main issues regarding destructible environments in games in relation to the requirements of an offline and online setting. Analysing those issues will enable further investigation into the methodologies and approaches used to address them. More importantly, to study those approaches and compare them in terms of efficiency and suitability to a games programming scenario will entail the development of an artefact that will implement several scenarios such as the demolition of a structure that varies in complexity and size. Before any development takes place, a specification needs to be produced that will describe the application’s intentions and design. At the last phase of development, performance tests will be run to examine how much processing power is needed to carry out such simulations at runtime while keeping reasonable frame rates.  The artefact produced will implement a simple game environment for testing several approaches from available research and attempt to design and develop an approach that is relevant in a computer games programming scenario by combining some of the reviewed techniques. The selected development environment will be Visual Studio 2019 utilizing the DirectX 11 API.  The artefact will be developed and executed in a computer. All aspects of the BCS code of conduct that are applicable to this project will be closely adhered. All applicable aspects of the Data Protection Act will also be adhered to, clarifying that all participants of this project will be informed if any information is behind held about them. They have the rights to ask me to withdraw any information held about them and will be done so at their discretion.  Before asking any persons to participate in this project, in any possible way, I will ensure they fully understand the reasons of the project and explain they have the rights to withdraw at any stage.  The research into selection of appropriate methodology is influenced by research into the domain knowledge i.e. types of destructible environments.  By the end of the project, a professional report of all project activities and research outcomes will be produced as well as a critical evaluation of the undertaking project.  The success of the project is determined by the efficiency of the algorithms used and test strategies that will evaluate the algorithm’s performance based on the complexity of the setting and high frame rate.  Research:   * Simulation of destruction using a fast method and generation of dust and debris * Voxels – Volumetric boxes * Physics engine * Soft and rigid bodies * Collision handling |
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| Resources |
| Hardware:  Using a computer system that contains enough processor and graphical power to develop and carry out multiple physics calculations in real time.  Software:  Windows x64  Visual studio.net 2019  Direct 11 API  Access of Information:  Access to the Internet (This is available)  Access to Staffordshire University Library (This is available) |

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| Deliverables |
| * Application * Project Documentation - Meeting the requirements and standards of Staffordshire University * Report * Conclusion/evaluation * Gant chart * Ethics statement * Risk assessment form * Project plan * User documentation * Logbook |