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|  | **Faculty of Computing, Engineering and Science** | Final mark awarded:\_\_\_\_\_ |

**Assessment Cover Sheet and Feedback Form 2017-18**

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| Module Code:  CS4S764 | Module Title:  Advanced Real-time Rendering | | Module Lecturer:  Carl Jones |
| Assessment Title:  Real-Time Shadows | | | Assessment No.  2 |
| No. of pages submitted in total including this page:  Completed by student | | | Word Count of submission  (if applicable): Completed by student |
| Date Set:  10-Nov-2017 09:00:00 | | Submission Date:  15-Dec-2017 23:55:00 | Return Date:  12-Jan-2018 23:55:00 |

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| ***Part A: Record of Submission (to be completed by Student)*** | |
| **Extenuating Circumstances**  If there are any exceptional circumstances that may have affected your ability to undertake or submit this assignment, make sure you contact the Advice Centre on your campus prior to your submission deadline. | |
| **Fit to sit policy**:  The University operates a fit to sit policy whereby you, in submitting or presenting yourself for an assessment, are declaring that you are fit to sit the assessment. You cannot subsequently claim that your performance in this assessment was affected by extenuating factors. | |
| **Plagiarism and Unfair Practice Declaration:**  By submitting this assessment, you declare that it is your own work and that the sources of information and material you have used (including the internet) have been fully identified and properly acknowledged as required[[1]](#footnote-1). Additionally, the work presented has not been submitted for any other assessment. You also understand that the Faculty reserves the right to investigate allegations of plagiarism or unfair practice which, if proven, could result in a fail in this assessment and may affect your progress. | |
| **Intellectual Property and Retention of Student Work:**  You understand that the University will retain a copy of any assessments submitted electronically for evidence and quality assurance purposes; requests for the removal of assessments will only be considered if the work contains information that is either politically and/or commercially sensitive (as determined by the University) and where requests are made by the relevant module leader or dissertation supervisor. | |
| **Details of Submission:**  Note that all work handed in after the submission date and within 5 working days will be capped at 40%[[2]](#footnote-2). No marks will be awarded if the assessment is submitted after the late submission date unless extenuating circumstances are applied for and accepted (Advice Centre to be consulted). | |
| You are required to acknowledge that you have read the above statements by writing your student number(s) in the box: | Student Number(s): |

**IT IS YOUR RESPONSIBILITY TO KEEP RECORDS OF ALL WORK SUBMITTED**

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| **Part B: Marking and Assessment**  **(to be completed by Module Lecturer)** |
| This assignment will be marked out of 100%  This assignment contributes to 50% of the total module marks.  This assignment is bonded |
| **Learning Outcomes to be assessed** (as specified in the validated module descriptor <https://icis.southwales.ac.uk/> ):  *1) Demonstrate the ability to critically evaluate techniques for multi-threaded rendering and the management of low-level resources to maximise GPU / CPU usage 2) Demonstrate the ability to analyse techniques and construct and evaluate GPU shaders in order to render effects in real-time* |

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| **Feedback/feed-forward** (linked to assessment criteria):   * Areas where you have done well: * Feedback from this assessment to help you to improve future assessments: * Other comments | | |
| **Mark:** | **Marker’s Signature:** | **Date:** |
| * **Work on this module has been marked, double marked/moderated in line with USW procedures.** | | |
| *Provisional mark only: subject to change and/or confirmation by the Assessment Board* | | |

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| **Part C: Reflections on Assessment**  **(to be completed by student – optional)** | |
| **Use of previous feedback:**  In this assessment, I have taken/took note of the following points in feedback on previous work: | |
| **Please indicate which of the following you feel/felt applies/applied to your submitted work**   * A reasonable attempt. I could have developed some of the   sections further.   * A good attempt, displaying my understanding and learning, with   analysis in some parts.   * A very good attempt. The work demonstrates my clear   understanding of the learning supported by relevant literature and  scholarly work with good analysis and evaluation.   * An excellent attempt, with clear application of literature and   scholarly work, demonstrating significant analysis and evaluation. | |
| **What I found most difficult about this assessment:** |  |
| **The areas where I would value/would have valued feedback:** |  |

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|  | Fail | Narrow Fail | 3rd Class / Pass | Lower 2nd Class / Pass | Upper 2nd Class / Merit | 1st Class / Distinction |
| 1. Model import and scene setup 15% | * No objects in scene | * Only basic scene is implemented with no animation | * Only basic scene is implemented with limited animation of objects | * A reasonable scene is implemented with limited animation of objects | * A comprehensive scene is created with numerous elements animated | * A comprehensive and coherent scene is created with numerous elements animated |
| 2. Implementation of shadow algorithm 35% | * No working shadow algorithm is given | * No working shadow algorithm is given but an attempt has been made | * The shadow algorithm is not working correctly and only a limited scene has been used to demonstrate the effectiveness of the algorithm | * A working shadow algorithm is given with only a limited scene to demonstrate the effectiveness of the algorithm | * An effective shadow algorithm is given with a complex scene created to demonstrate the effectiveness of the algorithm | * An efficient shadow algorithm is given. The scene created clearly demonstrates the advantages and disadvantages of different shadow algorithms |
| 4. Code demo 20% | * No understanding of the code is evident in the code demo | * Little to no understanding of the code is evident in the code demo | * Only a basic understanding of the code is evident in the code demo | * A reasonable understanding of the code is evident in the code demo | * A good understanding of the code is evident in the code demo | * An excellent understanding of the code and shadow algorithms is evident in the code demo |
| 3. Report Research into shadow mapping and shadow volume algorithms including discussion of results and conclusions 30% | * No research with to no discussion or conclusions is given | * Only basic research with little to no discussion or conclusions is given | * Only basic research and limited discussion and conclusions are given with limited use of referencing | * Only basic research and limited discussion and conclusions are given | * Detailed research, discussion and conclusions are given | * Detailed research given with insightful discussion and conclusions |
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# Real-Time Shadows

Shadows are an emergent property of rendering algorithms such as ray tracing. However with real-time algorithms such a direct lighting model shadows must be added to the rendered scene explicitly.

Algorithms such as shadow volumes and shadow mapping can be used to add shadows to a scene in real-time. For this assignment you are required to implement a shadow mapping algorithm. The CGImport3 library has been provided to load in 3D mesh objects which are represented as Model objects. This has been setup in the “DX11\_CS4D764\_Tutorial 6 sln” project which can be downloaded from BB (you can use your own import code and base project if you prefer). Use this project to perform the following tasks

1)Load 3D objects and arrange them to form a scene with animated elements.

2)Add dynamic shadows to your scene.

3)Experiment with different configurations and different mesh objects to observe any shadow artefacts that might occur.

4)Write a report detailing your research into real-time shadowing algorithms which should include a description of your shadow algorithm\s and a discussion of the advantages and disadvantages of shadow mapping compared to alternative algorithms such as shadow volumes. The report should be no longer that 2000 words and should include diagrams where appropriate.

5)You will also be required to explain your algorithm and implementation in a short 5-10 minute code demo which will take place in the tutorial sessions after the assignment has been submitted. As part of the code demo you will be required to discuss different aspects of your implementation and any problems you faced during the development of your implementation and how you addressed these problems.

## Deliverables

1)A zip containing the source code, executable of your implementation and report. This is to be submitted to Blackboard no later than the submission date shown on the assignment front sheet. Please name your zip file with your enrolment number (e.g. 12345678.zip) and use the Windows zip utility to create the zip file. To do this, right click on the folder containing your submission, select Send to and then select Compressed (zipped) folder.

2)A 5-10 minute code demo discussing your implementation, the results obtained and the problems you faced in implementing the assignment.

1. University Academic Misconduct Regulations [↑](#footnote-ref-1)
2. Information on exclusions to this rule is available from the Advice Centre at each Campus [↑](#footnote-ref-2)