**PROJECT SPECIFICATION - Project (Technical Computing) 2018/19**

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| **Student:** | **Dan Scott** |
| **Date:** | **16/10/2018** |
| **Supervisor:** | **Jing Wang** |
| **Degree Course:** | **Software Engineering** |
| **Title of Project:** | **Automatic snooker scoring system using vision-based object tracking** |

#### Elaboration

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| The current scoring system that you will find in most (if not all) snooker clubs is a number board on the wall with a slider which you move up and down based on your score. This system makes it fairly easy for you to lose track of your score as it is a very manual process and combined with there being a separate slider for the tens unit of your score.  The proposed system will make scoring your game much more automatic, this will be achieved by tracking each ball on the table and detect when a ball has entered the pocket (and which colour it was) so the system can increase the score of the current player. The score will be visualised through a mobile app in which the users will be able to download.  The most essential part of the system will be the ball tracking on an actual pool/snooker table as without this the other parts of the system won’t really have much to use them - the ball tracking is fundamental to the entire system.  Possibly the most challenging will be the camera calibration process. The aim of this process is to automatically detect the size of the table/balls and to achieve this involves doing some complex mathematics. However, this process isn’t fundamental to the system working as proposed so it won’t be an issue if it doesn’t work correctly  To further extend the system, the mobile app will contain a set of mini-games that users can play such as who can pot most the balls within a set of amount of time. Seeing as there is no real points score in pool, these mini-games will be the main feature for pool. |

#### Project Aims

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| * Develop a computer vision system that accurately tracks each ball on a pool/snooker table and detect if they have been potted * Review and learn methods on how to correctly calibrate the camera to automatically detect the size of any snooker/pool table and their balls. * Develop a mobile app to interface with the computer vision program to provide a digital display for the score and a set of mini-games |

#### Project deliverable(s)

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| The final deliverable will be a two part system. The main, and primary, system will be a camera connected to a laptop containing the program for the ball tracking system; the camera will be placed above the table to provide a top-down view. The secondary system will be a mobile the app which will contain the score of each player and update in real-time when a ball is potted, the mobile app will also contain a set of mini-games. |

#### Action plan

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| **Task** | **Deadline Date** |
| Project Specification & Ethics Form | 26th October 2018 |
| Research potential computer vision frameworks | 2nd November 2018 |
| Research and identify a framework to create the mobile app | 6th November 2018 |
| Learn the fundamentals of computer vision and ball tracking | 9th November 2018 |
| Learn the chosen mobile app development framework | 16th November 2018 |
| Research different methods of ball tracking and ways to detect collision between static and dynamic objects | 23rd November 2018 |
| Investigate communications methods to link the mobile app and the computer vision system | 30th November 2018 |
| Start Information Review | 7th December 2018 |
| Start Development of prototype (using a miniature pool table) and mobile app | 7th December 2018 |
| Review prototype with the aim of moving the computer vision to a full size pool or snooker table | 15th February 2019 |
| Provisional Contents Page | 22nd February 2019 |
| System evaluation and testing | 15th March 2019 |
| Critical Evaluation Draft | 29th March 2019 |
| Sections of a Draft Report | 29th March 2019 |
| System optimisation | 31st March 2019 |
| Submit the body of the project report | 30th April 2019 (by 3pm) |
| Project report submission and deliverable | 1st May 2019 (by 3pm) |
| Demo Project | Before Friday 17th May 2019 |