# Southampton Solent University

# Assessment Brief

# Assessment Details

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| Unit Title: | Artificial Intelligence for Games |
| Unit Code: | DAC619 |
| Unit Leader: | Mark Bennett |
| Level: | FHEQ Level 6 |
| Assessment Title: | Software Product |
| Assessment Number: | 1 |
| Assessment Type: | Project Output |
| Restrictions on Time/Length : | 1500 words |
| Individual/Group: | Individual |
| Assessment Weighting: | 100% |
| Issue Date: | 30th September 2017 |
| Hand In Date: | 19th January 2018 |
| Planned Feedback Date: | February 2018 |
| Mode of Submission: | On-line Solent Online Learning Page |
| Anonymous Marking | This assessment is exempt from anonymous marking as it falls within an exempt category under the University’s Anonymous Marking Policy |
| Grade marking | Grade marking is used in this assignment |

**Learning Outcomes/Objectives Assessed:**

C1 Appraise and justify the application of A.I. techniques to given problem domains.

P1 Apply A.I. techniques to given problem domains.

P2 Reflect and report upon the application of A.I. techniques in regards to more traditional software solutions.

T1 Use logical thinking to inform problem-solving and design decisions.

T2 Implement a software solution to an AI problem.

# School of Media Arts and Technology

# Artificial Intelligence for Games

# 2016/2017

## Introduction

You will be provided with a simple Unity level containing two agents acting as opponents as well as some health kits and power attacks which can be collected, in the case of power attacks, or used, in the case of health kits by going to their locations.

You are provided with a simple code framework with methods that allow an AI agent to move to a location within the AI’s visual range, randomly wander and attack using the most powerful attack available.

The only script file you need to edit is AI.cs which contains a framework for your AI code. This file has access to the AI agent actions through a member variable called 'agentScript' which is of type AgentActions which is a script component. The agent script 'agentScript' includes the following properties and methods:

|  |  |
| --- | --- |
| 'agentScript' properties | |
| public bool Alive | Check if the agent is alive |
| public bool PowerUp | Have we powered up |
| public int CurrentHitPoints | Our current hitpoints |
| 'agentScript' methods | |
| public void MoveTo(GameObject target) | Move towards a target object |
| public void RandomWander() | Randomly wander around the level |
| public bool IsInAttackRange(GameObject enemy) | Check if we're with attacking range of the enemy |
| public void AttackEnemy(GameObject enemy) | Attack the enemy |
| public void Flee(GameObject enemy) | Run away |
| public bool IsObjectInView(String name) | Check if something of interest is in range |
| public GameObject GetObjectInView(String name) | Get a percieved object, null if object is not in view |

You can use the game objects name to access a GameObject from the list of objects the AI can see. Thereafter all methods require the GameObject as a parameter.

You are required to design and implement a simple AI algorithm to control these agents and give them behaviors which will allow them to:

1. if no opponent in sight, randomly wander around the level
2. If a power attack is located pick it up
3. upon detecting the opponent, move towards and attack the opponent if your attack power is greater than or equal to your opponents or flee otherwise
4. if the opponent is fleeing resume random wander
5. if hit points fall below 25%, flee combat and locate and use a health kit if one is located

You may use any suitable AI algorithm you have been shown in the lectures or any AI algorithm you have researched yourself. All behaviors should be implemented and your code should be tidy, well-structured and properly commented. You may *not* use any external code for the AI itself, you must implement the AI logic yourself.

Ensure that your project will run on a machine other than the one used for development and that any required assets are included with your project.

You must also produce a report which includes a justification of your choice of algorithm and a discussion of the advantages and disadvantages of your chosen method. You must also compare your chosen algorithm with *at least* two other AI algorithms.

Your report should describe your design for your proposed solution. Your design should include any appropriate diagrams related to the chosen algorithm e.g. a state diagram if using a state machine. Your design should also include pseudocode and flowcharts where appropriate.

A test plan covering all the implemented behaviors should also be included in the report. The test plan should include an analysis of any problems and a description of the solution.

## Hand-in Details

Submit electronically using the Solent Online Learning page for the Unit. A link on the Unit page called ‘Assessment’ will be provided. The report document should be in .doc, .docx or .pdf format and the project files should be zipped. Ensure you allow sufficient time before the deadline to ensure that network problems don’t result in a late hand in.

Hand-in:

1. A copy of your report in either Microsoft Word or pdf format.
2. A zipped copy of your assignment project folder. Name the .zip file **"[LastName]\_[FirstName]\_[Student Number]\_** **DAC619\_Assignment"**. Ensure this project can be copied anywhere and still correctly compile and run.

**Assessment criteria**

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| --- | --- | --- | --- | --- | --- |
| ***Component*** | ***Grade S, F3 – F1*** | ***Grade D3 – D1*** | ***Grade C3 – C1*** | ***Grade B3 – B1*** | ***Grade A4 – A1*** |
| **Implementation**  **50%** | Code not implemented or incorrect and non-functional  No behaviors implemented  Very crude approach e.g. just if statements  Code is unreadable and poorly structured | Code implemented but very basic, may have major errors  Few behaviors functional  Very simple AI algorithm used  Code does not follow best practice | Code implemented, may have a few major errors  Most behaviors functional  Moderately sophisticated approach taken  Attempt made at best practice | Code fully implemented, may have a few minor errors  All behaviors functional  Sophisticated approach taken  Best practice followed | Code fully implemented and fully functional, very few minor errors  All behaviors fully functional  Sophisticated approach taken  Best practice followed |
| **Report**  **50%** | No design included  No justification for algorithm choice  No discussion of  algorithm or comparison  No test plan  Little or no critical evaluation | Few behaviors designed  Little or no justification for algorithm choice  Basic discussion of  algorithm and basic comparison  Basic test plan  Limited critical evaluation | Most behaviors designed  Some justification for algorithm choice  Very brief discussion of  algorithm and comparison  Test plan with results  Good critical evaluation | All behaviors designed  Some justification for algorithm choice  Detailed discussion of  algorithm and detailed comparisons  Thorough test plan with analysis and results  Thorough critical evaluation | All behaviors correctly designed  Thorough justification for algorithm choice  Detailed discussion of algorithm and detailed comparisons made  Detailed test plan with full coverage, analysis and results  Detailed critical evaluation |

# Assessment Rubric

The Assessment Criteria describes the qualities of the submitted work and how grades align with the goals of each criteria section. Points awarded according to the rubric, which identifies key attributes of the student's work to be assessed, are an indication of the quality of that aspect of the work.

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| --- | --- | --- | --- | --- | --- | --- |
| **Design (50 points)** | **10** | **8** | **6** | **4** | **2** | **0** |
| 1. Design quality (detail and diagrams) |  |  |  |  |  |  |
| 1. Discussion and comparison |  |  |  |  |  |  |
| 1. Justification for choice of algorithm |  |  |  |  |  |  |
| 1. Critical evaluation |  |  |  |  |  |  |
| 1. Formatted test plan with analysis |  |  |  |  |  |  |
| **Implementation and Functionality (50 Points)** | **10** | **8** | **6** | **4** | **2** | **0** |
| 1. Correctness, the algorithm works |  |  |  |  |  |  |
| 1. All behaviors implemented |  |  |  |  |  |  |
| 1. The algorithm demonstrates sophistication e.g. not just using the simplest algorithm available |  |  |  |  |  |  |
| 1. Reusable implementation e.g. use of abstraction e.g. design patterns, classes or functions |  |  |  |  |  |  |
| 1. Code quality (readability, comments, naming) |  |  |  |  |  |  |

# Late Submissions

Students are reminded that:

1. If this assessment is submitted late i.e. within 5 working days of the submission deadline, the mark will be capped at 40% if a pass mark is achieved;
2. If this assessment is submitted later than 5 working days after the submission deadline, the work will be regarded as a non-submission and will be awarded a zero;
3. If this assessment is being submitted as a referred piece of work (second or third attempt) then it must be submitted by the deadline date; any Refer assessment submitted late will be regarded as a non-submission and will be awarded a zero.

<http://portal.solent.ac.uk/documents/academic-services/academic-handbook/section-2/2o-assessment-policy-annex-1-assessment-regulations.pdf?t=1411116004479>

# Extenuating Circumstances

The University’s Extenuating Circumstances procedure is in place if there are genuine circumstances that may prevent a student submitting an assessment. If students are not 'fit to study’, they can either request an extension to the submission deadline of 5 working days or they can request to submit the assessment at the next opportunity (Defer). In both instances students must submit an EC application with relevant evidence. If accepted by the EC Panel there will be no academic penalty for late submission or non-submission dependent on what is requested. Students are reminded that EC covers only short term issues (20 working days) and that if they experience longer term matters that impact on learning then they must contact a Student Achievement Officer for advice.

A summary of guidance notes for students is given below:

<http://portal.solent.ac.uk/support/official-documents/extenuating-circumstances/extenuating-circumstances.aspx>

# Academic Misconduct

Any submission must be students’ own work and, where facts or ideas have been used from other sources, these sources must be appropriately referenced. The University’s Academic Handbook includes the definitions of all practices that will be deemed to constitute academic misconduct. Students should check this link before submitting their work.

Procedures relating to student academic misconduct are given below:

<http://portal.solent.ac.uk/support/official-documents/complaints-conduct/student-academic-misconduct.aspx>

**Ethics Policy**

The work being carried out by students must be in compliance with the Ethics Policy. Where there is an ethical issue, as specified within the Ethics Policy, then students will need an ethics release or an ethical approval prior to the start of the project.

The Ethics Policy is contained within Section 2S of the Academic Handbook:

<http://portal.solent.ac.uk/documents/academic-services/academic-handbook/section-2/2s-university-ethics-policy.pdf>

**Anonymous Marking**

A copy of the University’s Policy on Anonymous Marking, process details and student guidance on submission sheet completion can be found on the following links, which are also uploaded on the Student Portal.

Fact Sheet:

<http://portal.solent.ac.uk/documents/academic-services/policies-procedures-guidelines/anonymous-marking-fact-sheet.pdf>

Process:

<http://portal.solent.ac.uk/documents/academic-services/policies-procedures-guidelines/anonymous-marking-process.pdf>

**Grade marking**

The University uses a letter grade scale for the marking of assessments. Unless students have been specifically informed otherwise their marked assignment will be awarded a letter grade. More detailed information on grade marking and the grade scale can be found on Solent Online Learning.

Policy:

<http://portal.solent.ac.uk/documents/academic-services/academic-handbook/section-2/2o-assessment-policy.pdf>

Fact sheet:

<http://portal.solent.ac.uk/documents/academic-services/academic-handbook/section-4/4o-grade-marking-briefing-for-students.pdf>