**CSE 280/281 Project Proposal Form**

**Project Title:** Learning AI with the Unity Game Engine

**Project Advisor(s):** Jim Mikitka

**Group:** Austin Lordi, Tyler Hogue, Brad DeMassa, Sara Kiel, Anthony Blakely

We will be doing the project suggested by Prof. Hector Munoz-Avila, found here:

<https://coursesite.lehigh.edu/pluginfile.php/3245030/mod_folder/content/0/280_munoz_ai.pdf?forcedownload=1>

**Project Description:**

Designing projects for teaching Game AI is a difficult challenge. If we use sophisticated game engines, it requires a significant amount of student’s time to understand and setup the engine, leaving little time to actually implement the AI. If we use an in-house game engine, it typically lacks the sophistication of today’s game engines resulting in a lesser experience by the student. Unity Technologies, Unity game engine (https://unity3d.com/) promises a happy middle point where students can implement an AI on a sophisticated tool. In this project, students will design scenarios in Unity and implement several AI algorithms on those scenarios; the students will test the suitability of these algorithms for a course project. These algorithms will include:

● Pathfinding: A\* vs Dijkstra’s algorithm vs. transition tables

● Decision making: Finite-state machines vs. behavior trees

● Decision making and learning: reinforcement learning vs. hard coded AI

**Deliverables:**

The students are responsible for:

* Two scenarios and
  + A complete implementation of A\*, Dijkstra’s algorithm and transition tables on these scenarios
  + A suitable partial implementation for others to complete (e.g., as a project assignment)
* Two scenarios and
  + A complete implementation of Finite state machines and behavior trees
  + A suitable partial implementation for others to complete (e.g., as a project assignment)
* Two scenarios and
  + A complete implementation of a reinforcement learning solution as well as a hard-coded solution for these scenarios
  + A suitable partial implementation for others to complete (e.g., as a project assignment)
* A game putting the above together; suggested genres: RPG or MOBA game; but that will be a design decision made by the group.

**Skills Needed for Project Execution:**

Unity uses C#. It is not expected that the students know C#, but they should be willing to invest the time needed to master it to perform the project.

Important note: At various points of the project, each student in the group will be in charge of a distinct and clear programming task as agreed by the group. A significant portion of the grade of each student in the group will be based on the performance of these individual tasks. Very poor performance in these tasks will result in the individual student failing the course. On the flip side, this particular project has the potential to benefit many students at Lehigh and, possibly beyond, to learn Game AI.