Exam Gameplay Programming 2021

The exam consists of two parts. Writing AI for a player agent in a simple zombie survival game provided to you by us and a small personal research project related to AI. These two can be either combined in one project or entirely separated. Together they make up the exam for this course which counts for 70% of the total grades (the percentages below represent exam grades only).

Part 1: Zombie survival game AI (60%)

Description

This first part is all about displaying your mastery of the various topics covered throughout the semester. You will program the AI for a player agent in a zombie survival game provided to you by us, the teachers. The agent has limited information about its surroundings. It has a rough knowledge about the world in general and the entities within its line of sight. It's up to you to put this information to good use. The goal of the agent is to survive for as long as possible and get a high score. Your success depends on your ability to collect and use the helpful items scattered throughout the world and the way you handle the threat of the roaming enemy zombies.

Use the tools given to you, the concepts you've seen during class and other topics you've researched on your own. Besides having a fully working agent you will also explain its architecture on your exam presentation. In this presentation you will explain to us how you've built your agent, what the agent is capable of and how well it performs.

Stages & score

The game consists of multiple stages, each more difficult than the last. Every stage lasts 60 seconds and has its own number and composition of enemies and items. Stronger enemies will become more likely to spawn in later stages and useful items less likely. Starting in stage 3, "Purge Zones" will start to spawn. These will kill everything within range after a delay. They add another layer of complexity to your exploration behavior, but possibly also opportunities to find areas without zombies!

Additionally, your agent will get a score based on a reward and penalty system. Both the score and the stage you've reached serve as an indicator for the quality of your AI and as a metric to compare and compete with your fellow students! There will be a high scores channel on the official Discord server to share your progress.

Some scoring tips:

- Positive score is added for the following actions:
  - Each second you survive: 1
  - Killing/Hitting zombies : 15 for each kill, 5 for each hit
  - Picking up items: 2
- Negative score is given for:
  - Missing shots: -5

Project Requirements

For the implementation of the AI agent you must use the following techniques:

- At least one decision making structure (FSM, Behavior Tree, ...)
- Movement logic (steering behaviors, combined behaviors, ...)

Students are permitted to use the framework implementations of the above techniques, however any custom implementations or extra's will be rewarded. A custom technique could count as a research topic (see second part of the exam on the next page).

Evaluation criteria

- Agent
    - World exploration
    - Item handling
    - Enemy handling
    - Decision making
    - Movement
    - Extra(s)
- Code quality & structure
- Answering questions about the written code and the topics covered in class

Part 2: Research topic (40%)

The second part is about expanding your knowledge in a direction of your choice and improving your ability to research, implement and describe techniques in the realm of (game) programming. This is one of the few chances in DAE to specialize, a potential stepping stone to your graduation work or a unique portfolio piece.

How does this work exactly? Here are a few steps you should follow:

1. **Look for a topic that is somewhat related to AI/Gameplay programming.**
    - We will provide some guidance in finding a good topic in the form of proposed topics and giving feedback on your choices (during the last week of class).
    - It's inevitable that some projects will be more ambitious than others. As such we will grade relative to the scope of your topic. This doesn't mean choosing a simpler topic means you fail, rather it means the highest grade you could possibly get is lower.

2. **Read up on the topic to improve your grasp on it and feel comfortable explaining it to someone else.**
    - It's important to know what you're getting into before you start programming.
    - Try to find and use good sources

3. **Make your own implementation of the chosen technique.**
    - Your implementation can be incorporated in the Zombie Game AI but doesn't have to be.
    - You're allowed to use Unity or Unreal (no blueprints, beware C++ in Unreal is challenging) **BUT DON'T COPY PASTE EXISTING CODE OR BLINDLY FOLLOW TUTORIALS!!!**
    - If you have a very difficult topic it's okay to have a rather simple implementation, if it's supported by a solid understanding of the theory displayed in your GitHub post (see below) and explanation during the presentation.

4. **Write a GitHub readme page describing your topic and your own application of it**
    - Here is where you prove to us that you understand what you're doing. In this blogpost you should briefly describe the theory behind your topic as well as your implementation. Make use of images/gifs/videos to make your description more digestible and describe any interesting design decisions or thoughts you may have had. Think of this as a portfolio piece that should help you land a job.
    - What is information that we would like to see on the readme-page:
        i. Description of the topic
        ii. Design/implementation
        iii. Result
        iv. Conclusion/Future work

<u>Evaluation criteria</u>

- Research topic
    - Scope

  - Difficulty
  - Implementation
- GitHub:
  - Readme / Explanation
  - Using GitHub appropriately
    - More than a single commit
    - Descriptive and informative commit titles/comments
    - Quality of readme page
- Code quality & structure
- Answering questions about the written code and chosen research topic

Hand in / Evaluation

How to submit:

Submit everything in a zip/rar file using the following naming convention

2DAEX_Lastname_Firstname_GPP-Exam2021.rar

The archive must contain:

ZombieGame:	The folder with all your source code of your Agent Remove redundant files/folders: bin, TempFiles and .vs
ResearchTopic:	The folder with all your source code of your Research Topic Remove redundant files/folders: bin, TempFiles and .vs
ReleaseBuild:	A **release** build of your application with the AI agent (+ dependencies). We should be able to run your application here, so **test it**!
Github_link:	Should be handed in on the separate Leho- Assignment as discussed in the minilectures ppt **Example1** **Example2**
GPP_Lastname_Firstname:	The PPT file describing your agent (!!***USE THE PROVIDED TEMPLATE AND DO NOT ADD SLIDES!!).*** Try to use schematics, gifs (Tip: ScreenToGif), videos, … to showcase your work and knowledge in a structured manner

Where to submit:

Submit everything via Leho – Assignments using your correct assignment (EN -> English groups, NL ->Dutch groups)

In case of any issues contact/questions:

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