<p align="center">**4th Year Project Proposal**
B.Sc. (Honours) Degree in Games Design & Development</p>

Student Name: Conor Ryan   **Student Number:** K00286377

Working Title: Dynamic NPC Dialogue System with LLM Integration for Unity

Description: The aim of this project is to design and implement a reusable Unity package for dynamic, AI-assisted dialogue for NPCs. Using this system, the player's dialogue options would be prewritten lines to maintain a cohesive narrative, but the NPCs responses would be generated in real time with a Large Language Model. When it's triggered the dialogue system would collect contextual information like plot state, current scene, and character traits. This data would then be used to construct a prompt which could be sent to an LLM to generate a unique NPC response. This response would be displayed in-game to the player, giving them a more immersive and varied dialogue experience.

As a stretch goal and optional extension, prompts could include tags that are compatible with the ElvenLabs text-to-speech API. This would allow the generated response to be delivered in game with tone and emotion by producing an MP3 buffer which could be played alongside the text. This project addresses the limits of a fully prewritten dialogue system by combining static player choice with dynamically generated NPC responses, allowing for narrative control and enhanced replayability.

Reasons for selecting project: Most Unity dialogue systems are static, meaning that developers have script every individual line of a conversation manually. This is extremely time consuming and usually leads to repetitive interactions which effect the players immersion. With the broad and easy access to LLMs and text-to-speech tools, there is an opportunity to begin using them in games. I chose this project because it combines two areas of my interest, gameplay systems programming and AI-integration. It has good practical value, as a plug and play package which could be reused across multiple genres, reducing development time while enhancing the player's experience. It also allows the implementation of new technologies in procedural content generation.

Proposed research content: The research for this project will explore different prompt engineering solutions for balancing narrative control with creative responses. One of the main focuses will be how to format prompts in a way that NPC responses are consistent with plot, and character personality, while remaining varied. I will investigate usability for other developers by creating customizable templates, editor tools, and event-driven triggers for controlling dialogue. An offline development mode will be implemented using pre-written responses as a fallback to reduce the reliance online API calls. Stretch goals include adding support for different LLMs, integrating text-to-speech using the ElvenLabs API for emotional responses, and storing condensed conversation history for continuity.

Luke O Brien

External links (if applicable):

1. Technologies, U. (n.d.-b). *Unity - Manual: UI Toolkit*. https://docs.unity3d.com/6000.1/Documentation/Manual/UIElements.html

2. *Create speech | ElevenLabs Documentation*. (n.d.). ElevenLabs Documentation. https://elevenlabs.io/docs/api-reference/text-to-speech/convert

3. Technologies, U. (n.d.-b). *Unity - Manual: UnityWebRequest*. https://docs.unity3d.com/540/Documentation/Manual/UnityWebRequest.html

4. Openai.com. (2025). *OpenAI Platform*. [online] Available at: https://platform.openai.com/docs/api-reference/responses/create.

Hardware requirements: Laptop or PC capable of running Unity 2022+, and an internet connection for API calls when testing.

Software requirements: Unity 2022+, C++ and C# oriented, access to a Large Language Model like OpenAI, optional ElvenLabs text-to-speech integration.

Other requirements: API keys for selected LLM and text-to-speech services.

Signed: Conor Ryan   **Date:** 21/09/2025

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Approved/Not Approved: _____

Reasons for not approving project:

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Conditions attached to approving project:

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Name of supervisor: _____
Signed: _____   Date: _____

Luke O Brien