

Introduction & Background

Video games have come a long way since their inception, and one aspect that has been continuously improved is the quality of non-playable characters (NPCs). NPCs are computer-controlled characters that interact with the player and the game world, and they play a crucial role in creating immersive and engaging gameplay experiences. However, despite the advances in graphics and animation, NPCs in most games still lack realistic behavior and social dynamics, which can detract from the overall experience.

Fortunately, recent developments in artificial intelligence (AI) offer new opportunities to improve NPC behavior and interaction. AI algorithms can be trained on large datasets of human behavior to mimic and even exceed human-like performance in various tasks. With the use of machine learning, natural language processing, and other AI techniques, NPCs can become more dynamic, responsive, and lifelike than ever before. This can lead to new levels of immersion and replayability, as well as more compelling storytelling and role-playing aspects in games.

In this report, we will explore the potential of AI-powered NPC behavior and interaction, and how it can solve the problem of limited NPC realism in video games. We will discuss the objectives, challenges, and implementation plan for this solution, as well as the positive impact it can have on the gaming industry and society at large.

Famous NPCs

1. Chocobros - Final Fantasy 15

- A group of four main characters who accompany the player throughout the game.
- Each character has unique personalities and abilities, working together to overcome obstacles and defeat enemies.



2. Toad - Super Mario

- A friendly and helpful character throughout the Super Mario series.

- In *Super Mario 64*, Toad acts as the player's guide, offering advice and hints on how to progress.



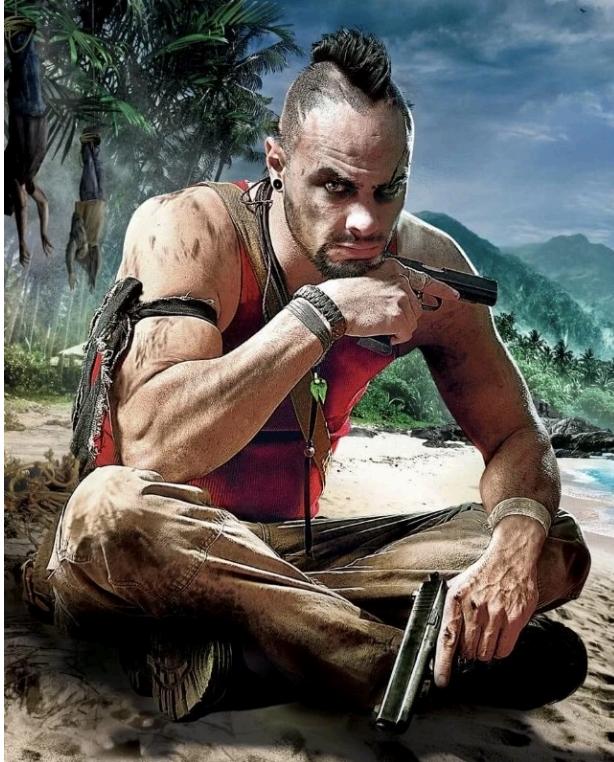
3. Ghost - Call of Duty

- A mysterious and iconic character, known for his distinctive skull mask and stealthy gameplay.
- A member of Task Force 141, Ghost is often involved in covert missions and assassinations.



4. Vaas - Far Cry 3

- One of the most memorable villains in video game history, known for his unpredictable and psychotic behavior.
- As the main antagonist, Vaas is responsible for kidnapping and torturing the player's friends. His portrayal by actor Michael Mando is widely praised.



5. Midna - The Legend of Zelda: Twilight Princess

- A mysterious and enigmatic character who assists the player throughout the game.
- Initially portrayed as selfish and manipulative, her true motivations and backstory are revealed as the game progresses.
- Midna is a fan-favorite and regarded as one of the best NPCs in the Zelda series.



Objectives:

The objectives of creating an AI system that generates more realistic and engaging NPC behavior and interactions in video games and improving player immersion, storytelling, and replayability through AI-powered NPCs are interconnected and crucial in the gaming industry. The current state of NPC behavior in games is limited to pre-scripted actions and responses, which can feel repetitive and break player immersion. By using AI-powered NPCs, developers can create a more dynamic and realistic game environment that responds to player actions and choices. An AI system that generates more realistic and engaging NPC behavior and interactions in video games can also enhance the storytelling and role-playing aspects of games. NPCs that respond realistically to player choices and actions can contribute to a more immersive and emotionally engaging narrative experience for players. Furthermore, AI-powered NPCs can offer more replayability by providing different responses and outcomes based on player choices, which can create a more personalized experience for each player. In addition, the use of AI-powered NPCs can also improve game design and development by allowing for more efficient and effective testing of game mechanics and systems. AI-powered NPCs can simulate player behavior, which can help developers to identify and address potential issues before release, ultimately resulting in a better game experience for players. Overall, the objectives of creating an AI system for NPC behavior and interaction in games are essential for enhancing player immersion, storytelling, and replayability, and advancing game design and development.

Implementation Plan:

To implement the AI-powered NPC behavior and interaction system, the first step is to collect data on human behavior, emotions, and social dynamics through various means such as observations, surveys, and other methods. This data will be used as a basis for developing machine learning models that can simulate NPC behavior and interactions in a more realistic and engaging manner. Once the data is collected, the next step is to develop machine learning models that can simulate human behavior and interactions. This can be done using various techniques such as deep learning, reinforcement learning, and natural language processing. The goal is to create a model that can accurately predict and simulate human behavior in various scenarios. After developing the machine learning models, the next step is to integrate them into NPC behavior algorithms. This involves designing and implementing algorithms that use the machine learning models to generate NPC behavior and interactions in real-time. The algorithms should be able to generate behavior that is both realistic and interesting for players. To ensure that the AI system is effective, it needs to be tested and refined through iterative design and player feedback. This involves testing the system in various scenarios and adjusting the algorithms and machine learning models based on player feedback. The goal is to create an AI system that is both effective and engaging for players. Finally, the system needs to be optimized for performance and scalability in large, open-world games with many NPCs. This involves ensuring that the AI system can run efficiently on various hardware and software configurations and can handle large numbers of NPCs in complex environments. This can be achieved through various

optimization techniques such as parallel computing, distributed computing, and cloud computing. [1] As an example of the successful implementation of AI-powered NPCs, we can look to the game "Red Dead Redemption 2" developed by Rockstar Games. In this open-world game, the player takes on the role of a character named Arthur Morgan and interacts with a wide range of non playable characters (NPCs) throughout the game world. The NPCs in "Red Dead Redemption 2" are powered by a machine learning system developed by Rockstar Games called "Neural Network-based AI". This system allows the NPCs to react to the player's actions and environment in a more dynamic and realistic way than traditional NPC behavior algorithms. For instance, in the game, the NPCs will react to the player's presence based on their previous interactions. If the player has been kind to an NPC, they may react positively in the future, whereas if the player has been hostile or violent, the NPC may react negatively or even attack the player. The NPCs also have a daily schedule that includes activities such as sleeping, eating, and working, which adds to the realism of the game world.

Getting Started with the platform:

Prerequisites:

- Python 3.8+
- Game engine (Unity, Unreal Engine, etc.)
- AI libraries: TensorFlow, PyTorch, or similar

Installation

1. Clone the repository:
2. Install dependencies:
3. Set up API keys for NLP services (e.g., OpenAI, Hugging Face).

Integrate with Game Engines

1. Import the AI-NBT API into your game project.
2. Define NPC parameters, such as emotional state, decision logic, and behavior modules.
3. Use the token system to enable NPC responses based on player interactions.

All files will be released on Github on the same day as platform launch. Launch Date of platform is March 12, 2025.

AI Features in Development

- Advanced emotional intelligence using sentiment analysis.
- Procedural storytelling powered by AI.
- Scalable multi-NPC interaction models for open-world games.

