

DESIGN, DEVELOPMENT AND EVALUATION OF A SERIOUS GAME PROTOTYPE FOR ATTENTION-BASED INTERACTION INFORMED BY ASD RESEARCH

1 Introduction



Autism Spectrum Disorder (ASD) can affect attention, focus, and information processing. Serious games offer an engaging and interactive method for supporting cognitive engagement and measurable interaction.

This project investigates how a simple attention-based gameplay system can be developed using Unreal Engine to support measurable user interaction within a controlled gameplay environment.

2 Aim & Objectives

Aim: To design, develop and evaluate a serious game prototype that measures attention-based interaction through simple, engaging gameplay mechanics.

Objectives:

- Research cognitive traits of ASD related to attention.
- Design and develop an engaging game prototype.
- Implement systems for scoring, timing and data capture.
- Evaluate usability and engagement with users.
- Analyse results and identify areas for improvement.

3 Methodology



- Mixed methods approach combining software development, quantitative data and qualitative feedback.
- Prototype tested by participants using a questionnaire and in-game data collection.
- Iterative development informed by testing and feedback.

4 Design & Implementation

From Concept to Playable Prototype



Game Concept
A third-person environment where players collect target objects to increase score and avoid distractors which reduce score, within a time limit.



Architecture
Modular blueprint architecture created in Unreal Engine allowing systems to work together while remaining separate and manageable



Core Systems
Spawning, scoring, timing and UI systems built using Blueprints to ensure reliability and scalability.



Iterative Development
Prototypes were tested regularly and improved based on issues found.

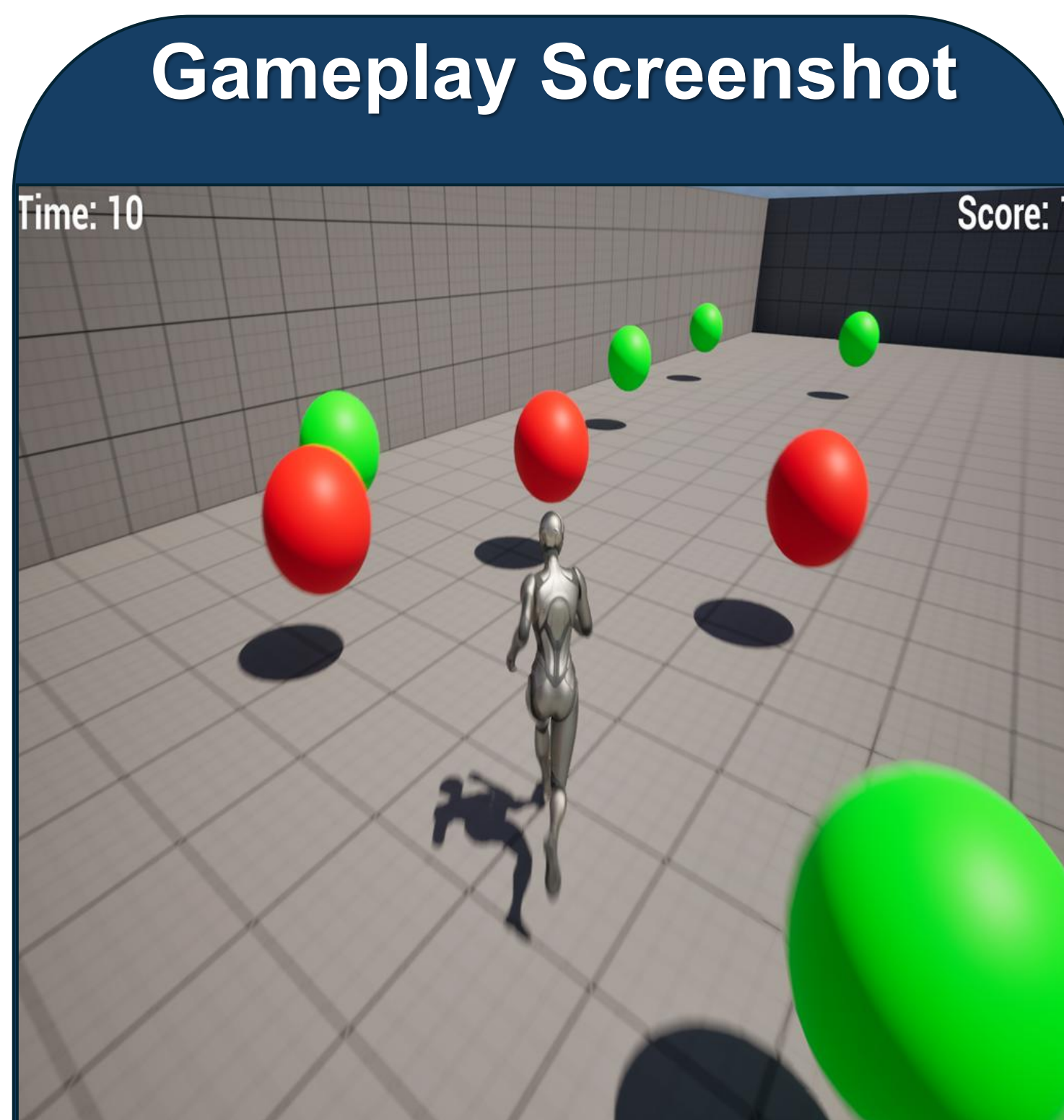
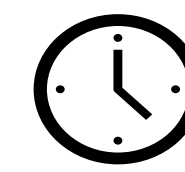
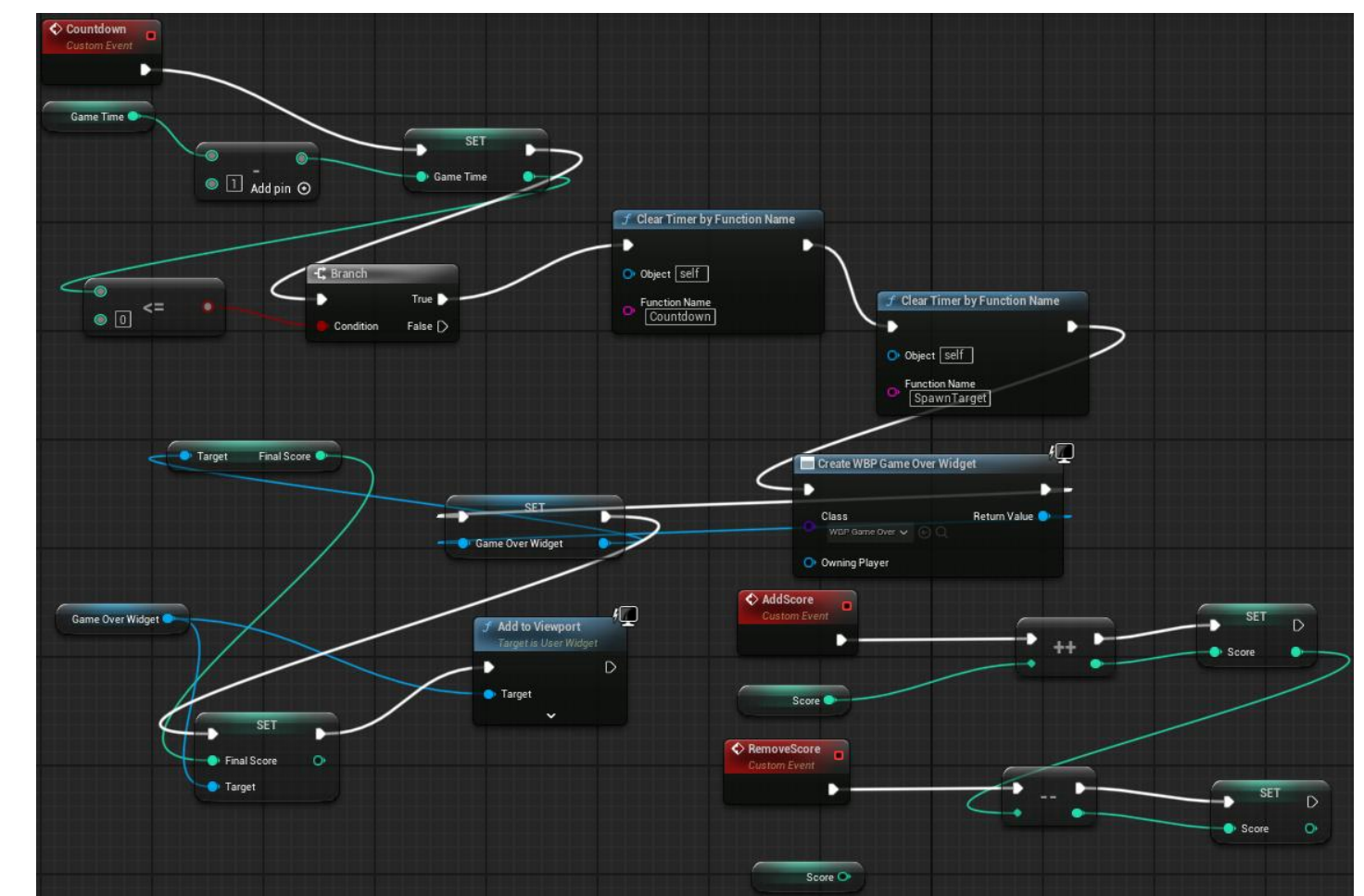
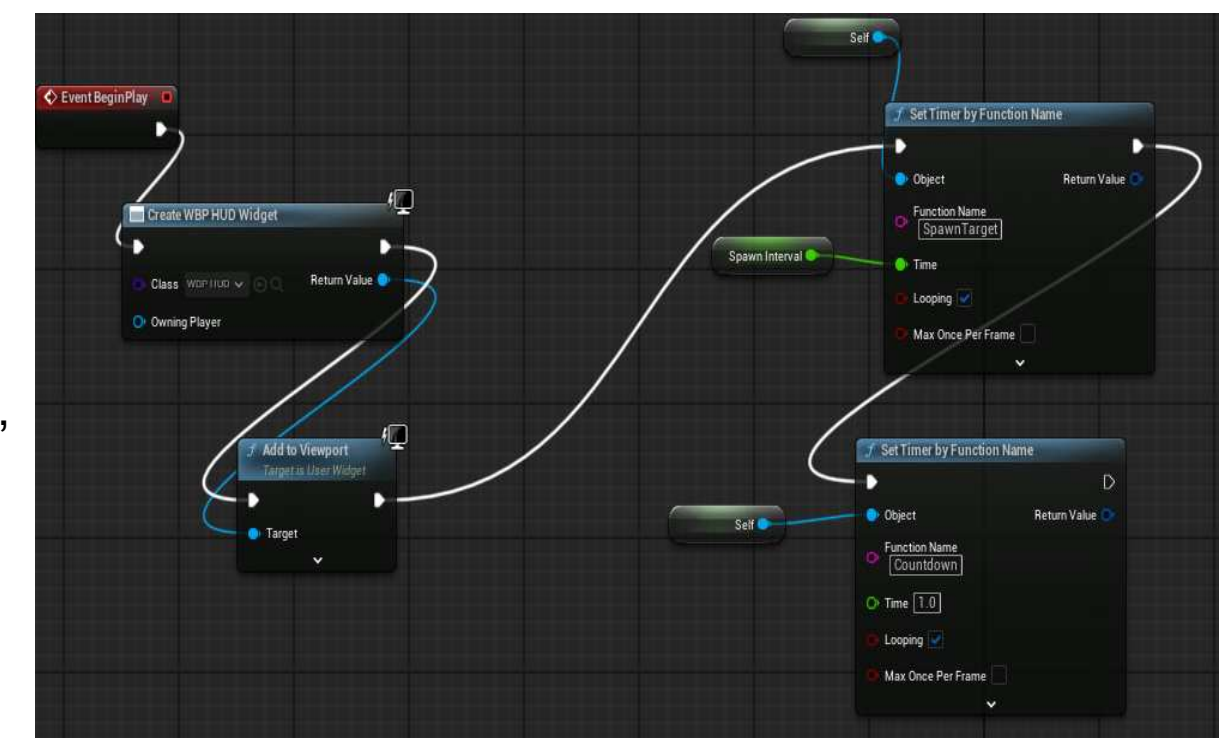


Figure 1: Gameplay environment showing targets (green) and distractors (red) with score and timer UI.

Blueprint System Overview



Game Manager
Handles timer, score, game state and overall flow of the game.



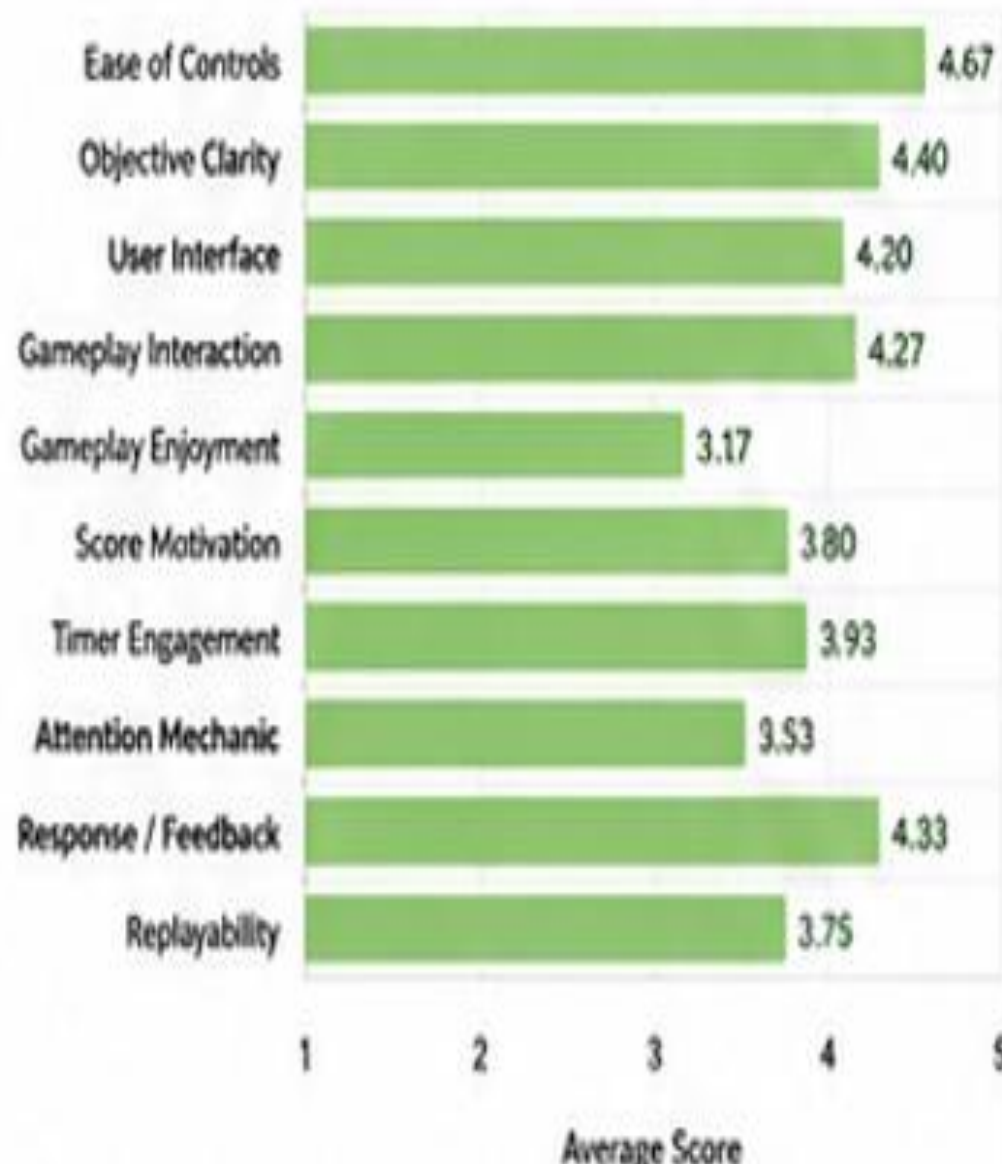
5 Design & Implementation

5 Participants

Questionnaire

In-Game Data

Questionnaire Results (Average Score out of 5)



Key Findings

- Controls and UI were clear and easy to understand.
- Players understood the objective quickly.
- Engagement was moderate to high, with scoring and feedback being motivating factors.
- Attention-based mechanics were effective but could be improved with variation and adaptive difficulty.

6 Conclusions



The prototype successfully demonstrates that simple gameplay mechanics can produce measurable engagement and attention-based interaction.



Participants Responded positively to the usability, controls and core gameplay loop



Limitations include a small sample size and lack of testing with individuals with ASD

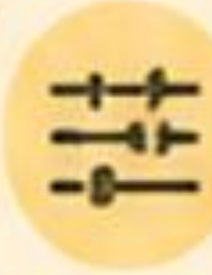


Future work should include testing with ASD participants, adaptive difficulty, more varied cognitive tasks and longer-term evaluation.

7 Future Work



Test with individuals with ASD to assess effectiveness and accessibility.



Implement adaptive difficulty to maintain optimal challenge.



Introduce more varied cognitive tasks to target multiple skill areas.



Expand evaluation with larger sample and longer testing periods.

Technologies Used



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This project provided valuable experience in full game development, system design and evaluation, and highlighted the importance of user-centered design in creating engaging and meaningful experiences.

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