CSE7101- Capstone Project

Review-1

A Sensory-Safe Game for Neurodiverse Players

Batch Number: CAI_25

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Content

- Problem Statement
- Objectives
- Background and Related work for title Selection
- Analysis of Problem Statement
- Innovation or Novel Contributions
- Git-hub Link
- Timeline of the Project
- References

Problem Statement Number: 155

Organization:

Category: Software

Problem Description: Individuals with neurodevelopmental disorders, particularly Autism Spectrum Disorder (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD), often face challenges in engaging with mainstream digital games. Popular endless runner games are designed with fast-paced action, sudden sensory inputs, complex visual effects, and punitive mechanics that can cause sensory overload, heightened anxiety, or difficulty sustaining attention for neurodiverse players.

This creates an accessibility gap in the gaming industry, where entertainment and cognitive benefits of gaming are not equally available to individuals with sensory sensitivities, attention regulation difficulties, and unique processing needs.

Objectives..

1. Creating a **sensory-safe gaming environment** with customizable sound, visuals, and pacing.
2. To provide a **low-stimulation mode** featuring calming audio and simplified visuals.
3. To design **attention-supportive gameplay** with short tasks, clear goals, and adjustable difficulty.
4. To encourage **positive reinforcement** using retry options, progress indicators, and rewards.
5. Ensuring **accessibility and inclusivity** with simplified controls and clear text/visual guidance.
6. Blend engaging gameplay mechanics with **soothing visuals and audio for relaxation**.
7. Deliver a **safe, enjoyable platform** that supports both entertainment and cognitive engagement.

Background and Related work for title Selection

Conventional fast-paced games can unintentionally create barriers for these populations by incorporating sudden sensory stimuli, complex multitasking demands, and punitive gameplay systems. This often results in sensory overload, frustration, and disengagement.

By integrating inclusive design principles, sensory safety, and positive reinforcement mechanics, serious games can serve both as recreational tools and as supportive interventions for neurodiverse players.

Games like DigiPlay and The Transporters use storytelling and interactive play to help children with autism recognize emotions and develop communication skills.

EndeavorRx, an FDA-approved video game, has been shown to help children with ADHD improve focus and attention through adaptive gameplay.

Analysis of Problem Statement

Technology Stack Components:

1. Frontend (Game Development Framework):

    Unity Engine (C#) – for cross-platform 2D/3D game development and animations.

2. Backend / Game Logic:

    C# (Unity scripting) – to implement gameplay mechanics.

3. Graphics & Design Tools:

    Blender – for creating and animating 3D models (characters, obstacles, environments).

    Adobe Photoshop / GIMP / Canva – for 2D textures, UI design, and icons.

4. Audio & Sensory Design:

    Audacity – for sound editing and customization of calming audio loops.

Analysis of Problem Statement (contd...)

Software Requirements:

1. **Software:**

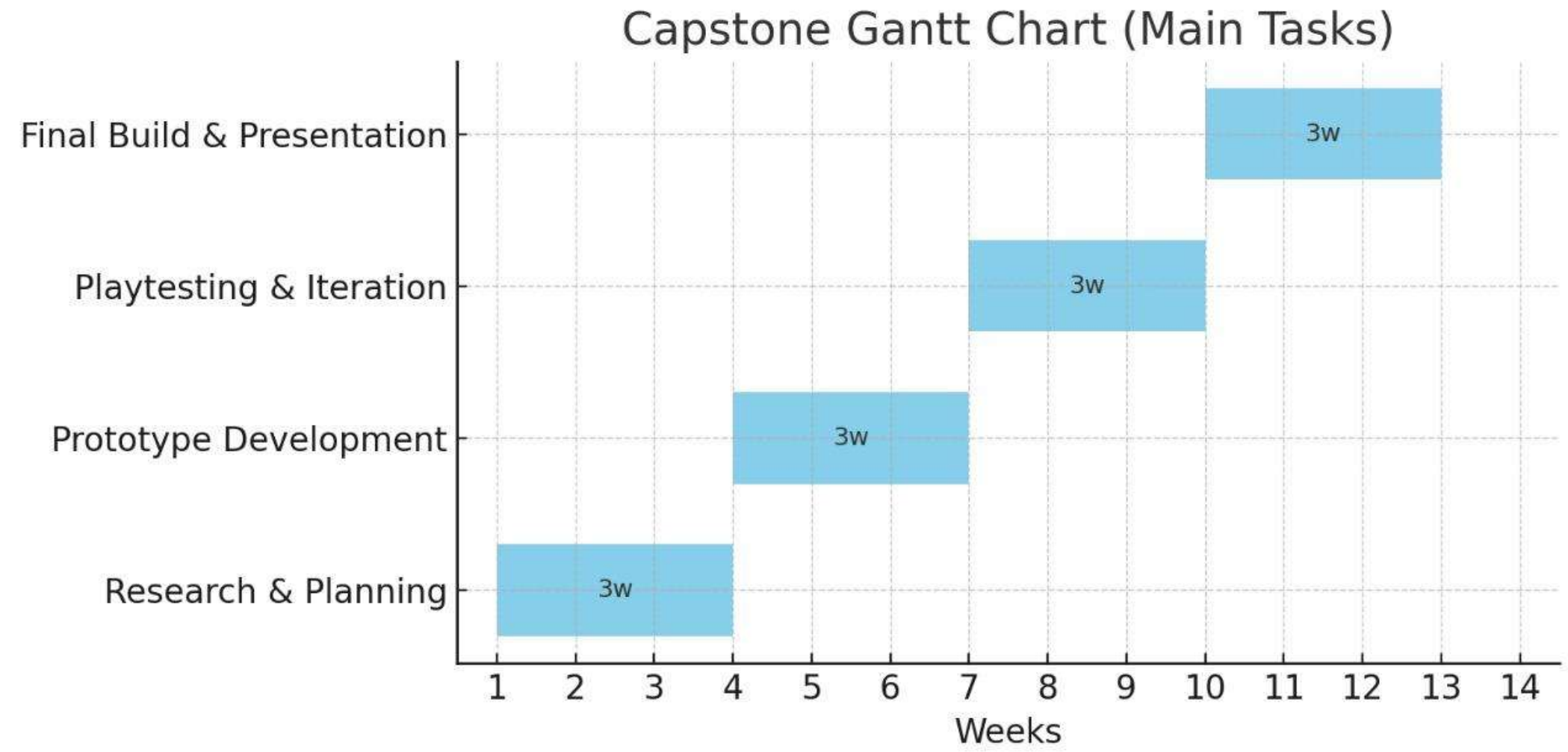
- **VS Code** → For game development, coding, and project debugging.
- **GitHub** → For version control, collaboration, and maintaining the project repository.
- **Android Studio** → For building and testing the mobile version of the platform.
- **Figma / Canva** → UI/UX design, wireframing, and graphics creation.
- **Blender** → For creating 2D/3D game assets and animations.

Analysis of Problem Statement (contd...)

- ADHD players may struggle with maintaining focus in overstimulating environments or games with unclear objectives.
- Time-bound mechanics and complex controls can cause frustration and disengagement.
- Conventional endless runners use “Game Over” screens, punishments for failure, and escalating difficulty.
- Such approaches can discourage neurodiverse players, leading to reduced motivation and negative self-perception.

Github Link

Github Link:
https://github.com/Sahanasoudri/CalmQuest


Capstone Gantt Chart (Main Tasks)
Final Build & Presentation
Playtesting & Iteration
Prototype Development
Research & Planning
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Weeks

References (IEEE Paper format)

[1]. *M. A. Ocaña Pretel and L. Andrade-Arenas, "Video game prototype to improve Mental Health problems," 2021 2nd Sustainable Cities Latin America Conference (SCLA), Medellin, Colombia, 2021, pp. 1-6, doi: 10.1109/SCLA53004.2021.9540151.*

[2]. *C. Piazzalunga, P. Molino "Development and Validation of an iPad-based Serious Game for Emotion Recognition and Attention Tracking towards Early Identification of Autism," 2023 11th International Conference on Affective Computing and Intelligent Interaction Workshops and Demos (ACIIW), Cambridge, MA, USA, 2023, pp. 1-8, doi: 10.1109/ACIIW59127.2023.10388145.*

[3]. *F. Sanuki, N. Nakphu, A. Tahara "Comparison of brain activity in success and failure in single and multitask game," 2021 13th Biomedical Engineering International Conference (BMEiCON), Ayutthaya, Thailand, 2021, pp. 1-5, doi: 10.1109/BMEiCON53485.2021.9745233.*


Thank
You!