

CUSTOMIZABLE RHYTHM GAME WITH UNIQUE VISUALS

@Group 11

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WHY RHYTHM MUSIC?

Music is more than a backdrop—it shapes emotions, rhythm, and interactivity.

This project demonstrates how audio analysis can:

1. Synchronize game elements with music features
2. Enhance immersion through real-time responsiveness to musical dynamics.



KEY FOCUS AREAS

01

Audio Analysis

02

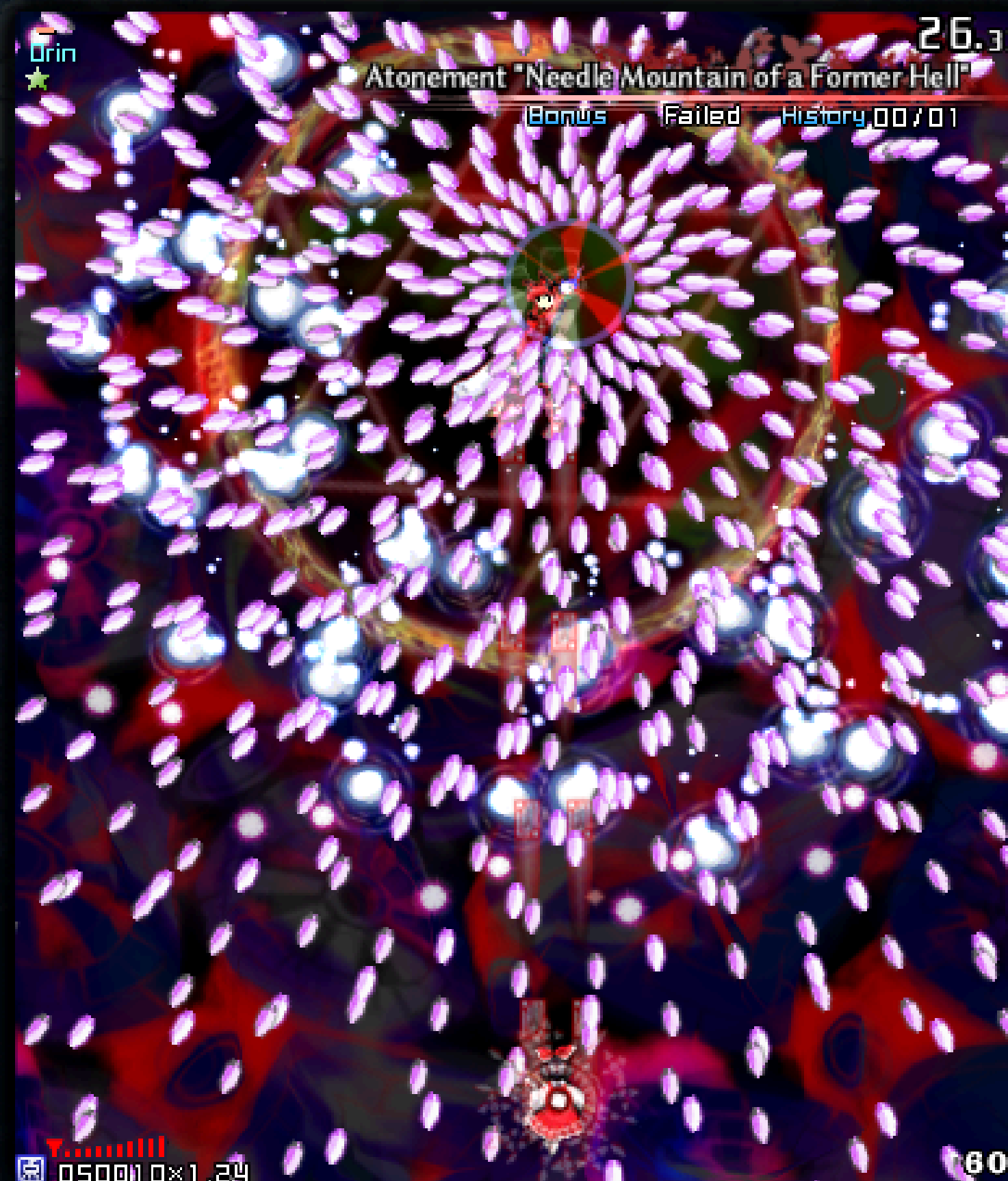
Visualization

03

Interactivity



DEMO



Touhou (東方) project

HiScore 260223540
Score 062646090
Player ★★★★★★
Power 0.75 / 4.00
Graze 2491

東方
地
靈
殿

ERRANEAN ANIMISM
SUBTERRANEAN ANI
NISM SUBTERRANE
N ANIMISM SUBTER

59.1fps

DEMO

Plan A

????????????????

Plan C

Google drive



Plan B



CIRCULAR SPECTRUM VISUALS

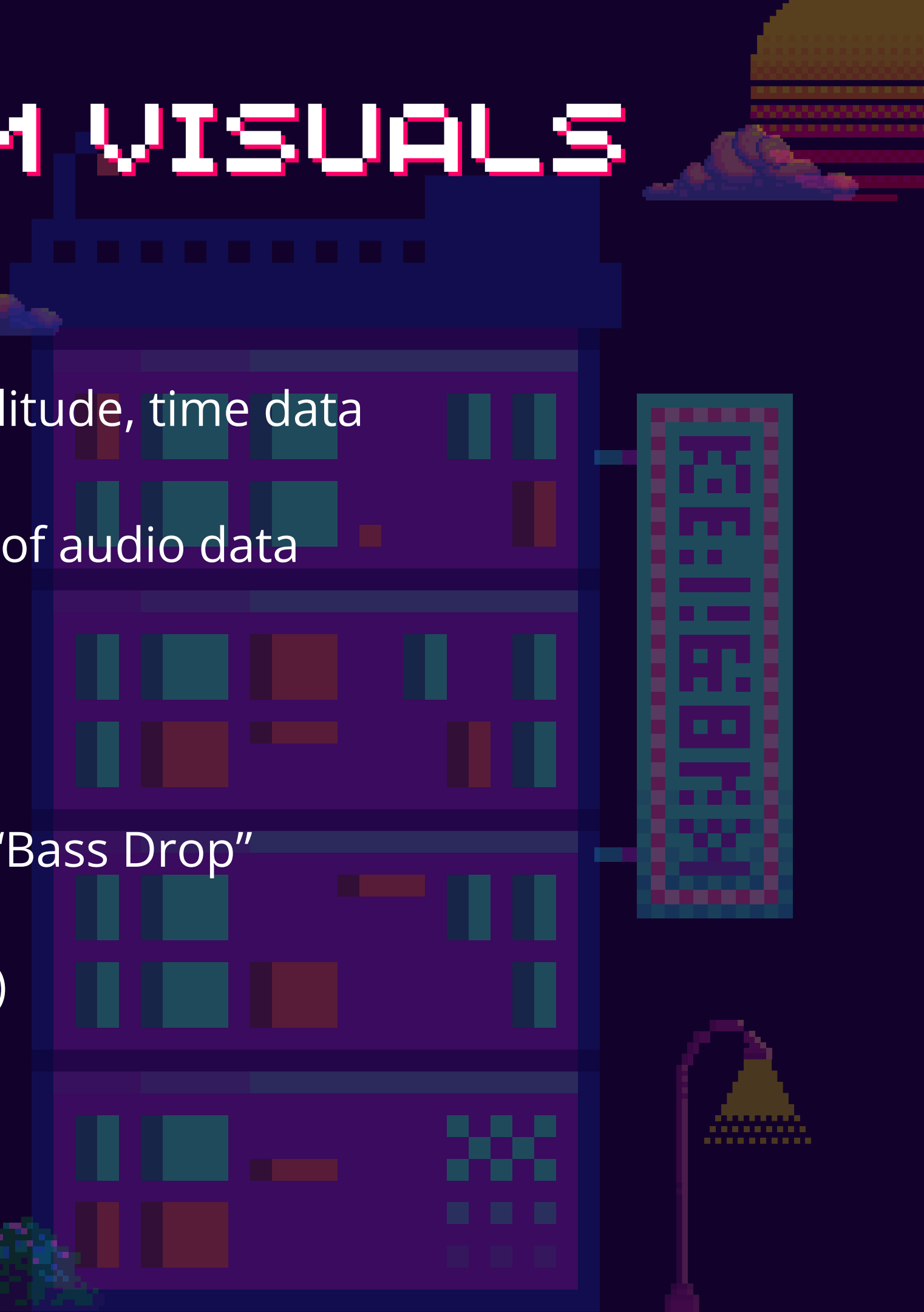
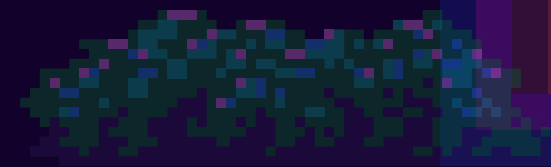
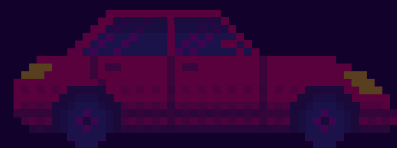
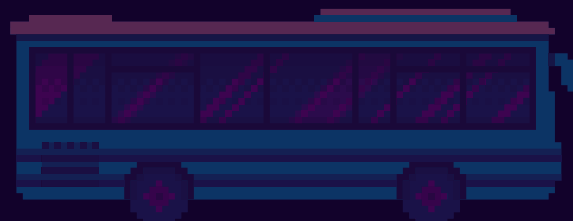
LIBRARY TOOLS

1. Librosa
 - Extract frequency, amplitude, time data
2. Numpy
 - Real-time computation of audio data

RESULTS

Four frequency groups:

1. Bass range (50-100Hz) --> "Bass Drop"
2. upper bass (120-250Hz)
3. low midrange (250-2000Hz)
4. midrange (2000-6000Hz)



CIRCULAR SPECTRUM VISUALS

USAGE

Amplitude extraction

- Detect “bass drop” and rhythmic peaks
- Pulsating effect
- Trigger bullet emission

“Circular Spectrum Visualization” Design

- Ascending frequencies along circumference
- Bar heights show amplitudes



MUSIC INTEGRATION INTO GAMEPLAY



Rhythm-Based Bullet Generation:

- Bullets triggered by bass energy spikes (20-100 Hz range).
- Randomized patterns for variety, synchronized to rhythm.

Curved Trajectories:

- Bullets follow curved paths for realistic motion

CHALLENGES & FUTURE WORK

01

Real-Time Analysis

Processing music data for immediate feedback is computationally intensive, potentially causing delays

Enhance: Precompute frequency groups and balance accuracy with performance to ensure real-time responsiveness

02

Synchronization Between Audio and Visuals

Maintaining sync between visuals and audio can be disrupted by timing mismatches or computational delays

Enhance: Use precise time-based synchronization, implement visual interpolation, and optimize performance to ensure seamless alignment

MORE FUNCTIONALITIES

01

Adaptive Gameplay

Adjust bullet patterns and visual intensity based on the difficulty level chosen, creating a tailored challenge

02

Enhanced User Interaction

Let players upload their own music tracks, with gameplay adapting seamlessly to the chosen songs

03

Customizable Themes

Provide pre-designed themes and allow customization of player and boss characters, backgrounds, and visual styles

A pixel art illustration of a city at night. The sky is dark blue with a large, pixelated yellow and orange burger moon in the center. There are several small, pixelated clouds. In the foreground, there are two small, pixelated buildings with green roofs and white walls. A blue bus is parked on the left, and a red car is parked on the right. A wooden bench is in the center. The background features tall, pixelated skyscrapers with yellow windows.

THANK YOU!