HACK KRMU 5.0 : THE VIBE

MELODYFY

PROBLEM STATEMENT ID : OPEN INNOVATION (MUSIC)

TEAM NAME: SEMICOLON

TEAM ID : HK090

TEAM MEMBERS : VAIBHAV , VAIBHAV , RONIT , APURVA

WHERE RHYTHM, SOUND, AND ENERGY COME ALIVE

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PROBLEM

MUSIC COLLABORATION TODAY IS FRAGMENTED AND MESSY. PRODUCERS RELY ON EMAILING MASSIVE ZIP FILES, NAMING FILES "FINAL_MIX_V2_REAL_FINAL.MP3", AND HAVE NO WAY TO TRACK CHANGES.

DISCONNECTED AI TOOLS (GENERATE HERE, EDIT THERE).

ZERO VISIBILITY INTO *WHAT* CHANGED IN A MIX.

SOLUTION

MELODIFY

A UNIFIED "GITHUB FOR MUSIC" THAT COMBINES A DIGITAL AUDIO WORKSTATION (DAW) WITH INTELLIGENT VERSION CONTROL AND GENERATIVE AI.

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MELODIFY

FLOW OF SOLUTION

1. GENERATE

USER INPUTS PROMPT OR HUMS A MELODY. AI GENERATES STEMS (DRUMS, BASS, HARMONY) IN REAL-TIME.

2. ARRANGE

USE "LIQUID ARRANGEMENT" SLIDERS TO VERTICALLY MIX INTENSITY. POSITION AUDIO IN THE 3D SOUNDSTAGE.

3. COMMIT

SNAPSHOT THE PROJECT STATE. THE SYSTEM HASHES AUDIO BLOBS TO DEDUPLICATE STORAGE EFFICIENTLY.

4. MERGE

COLLABORATORS REVIEW CHANGES USING THE VISUAL AUDIO DIFF VIEWER AND MERGE BRANCHES.

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TECH STACK & APPROACH

FRONTEND

REACT + TONE.JS

THE INTERFACE USES WEB AUDIO API FOR LOW-LATENCY PLAYBACK AND THREE.JS FOR THE 3D SOUNDSTAGE VISUALIZATION.

AI ENGINE

GENERATIVE MODELS TRAINED ON STEMS TO OUTPUT DISTINCT INSTRUMENT TRACKS BASED ON TEXT/HUMMING PROMPTS.

BACKEND

FASTAPI + LIBROSA

THE INTERFACE USES WEB AUDIO API FOR LOW-LATENCY PLAYBACK AND THREE.JS FOR THE 3D SOUNDSTAGE VISUALIZATION.

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INNOVATION FACTORS

1. COMMUNITY AI MUSIC LIBRARY

- A SHARED MUSIC LIBRARY CONTAINING AI-GENERATED BEATS CREATED BY USERS.
- WORKS LIKE AN OPEN MARKETPLACE OF AI SOUNDS, SIMILAR TO EPIDEMIC MUSIC BUT COMMUNITY-DRIVEN.
- USERS CAN PUBLISH, EXPLORE, REMIX, AND REUSE BEATS CREATED BY OTHERS.

2. GENRE-BASED BEAT GENERATOR

- AI TOOL THAT GENERATES BEATS ACROSS MULTIPLE GENRES SUCH AS:
  - TRAP
  - LO-FI
  - ELECTRONIC
  - AMBIENT
- INSPIRED BY MODERN PRODUCTION STYLES (FOR EXAMPLE, ELECTRONIC TEXTURES SIMILAR TO FRED AGAIN-STYLE PRODUCTION).
- DESIGNED FOR FAST BEAT PROTOTYPING IN SECONDS.

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FEASIBILITY & CHALLANGES

STORAGE COSTS

CHALLENGE: AUDIO FILES ARE HEAVY (50MB+ PER STEM). VERSIONING EVERY SAVE WOULD BANKRUPT THE STORAGE BUDGET.

MITIGATION
: WE USE DEDUPLICATION. IF TWO USERS USE THE EXACT SAME KICK DRUM SAMPLE, WE STORE IT ONLY ONCE AND REFERENCE THE HASH.

AUDIO LATENCY

- CHALLENGE: REAL-TIME MIXING IN THE BROWSER CAN GLITCH IF THE INTERNET IS SLOW OR THE CPU IS THROTTLED.
- MITIGATION:
- WE USE CLIENT-SIDE PROCESSING (TONE.JS) AND WEBASSEMBLY (WASM) TO RUN DSP LOCALLY, MINIMIZING SERVER ROUND-TRIPS.
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01. SOURCE CODE

"ACCESS OUR FULL SOURCE CODE, INCLUDING THE REACT FRONTEND AND FASTAPI BACKEND LOGIC."

🔗 HTTPS://GITHUB.COM/SHARMARONIT/MELODYFY.GIT

02. CORE LIBRARIES

- TONE.JS: FOR REAL-TIME IN-BROWSER AUDIO SYNTHESIS.
- THREE.JS: FOR THE 3D IMMERSIVE AUDIO VISUALIZATION.
- LIBROSA: FOR SERVER-SIDE FEATURE EXTRACTION AND BEAT DETECTION.

03. RESEARCH & ACKNOWLEDGEMENTS

- AI ASSISTANCE: RESEARCH SUPPORTED BY GOOGLE GEMINI & CHATGPT.
- KNOWLEDGE BASE: WIKIPEDIA & OPEN SOURCE DOCUMENTATION.