International Islamic University Chittagong

Department of Computer Science and Engineering

LAB REPORT

Course title	:	Software Engineering Sessional & Software Development 2
Course Code	:	**CSE-3638 & 3640**
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Report Title	:	Final Project Report

Submitted By

Name	:	**Ahanaf Tahmid**
ID No	:	**C223101**
Section	:	**6CM**
Semester	:	6th

Submitted To

Mohammad Arfizurrahman
Adjunct Faculty
Department of CSE, IIUC

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GitHub Repository: https://github.com/AhanafTahmid/Software-Engineering-6thSemester

Introduction:

With the rapid growth of digital media consumption, platforms like Spotify have revolutionized how people interact with music. However, there is untapped potential in integrating additional AI-powered features that go beyond simple music streaming.

SoundCast is a Spotify clone with extra capabilities such as **real-time chat**, **AI-powered podcast generation**, and **text-to-speech (TTS)**. It allows users to not only listen to music but also create personalized podcasts and convert text into natural-sounding speech using AI APIs.

This project provides a modern, interactive, and feature-rich environment for users while also serving as a technical demonstration of integrating multiple APIs and services in a full-stack application.

Objective:

The main objectives of **SoundCast** are to:

1. **Deliver a Streaming Experience** — Implement a responsive and intuitive UI for music playback and playlist management.

2. **Enable Real-time Communication** — Facilitate chat between users without leaving the streaming environment.

3. **Provide AI Podcast Creation** — Generate podcasts from text using AI models.

4. **Support TTS** — Offer diverse, natural-sounding voice outputs via Groq TTS.

5. **Ensure Secure Authentication** — Implement user authentication via Clerk.

6. **Build a Scalable Backend** — Integrate Node.js/Express with MongoDB for high-performance data handling.

7. **Leverage Cloud Storage** — Use Cloudinary for hosting generated audio files.

Key Features:

User Authentication

- Clerk-based sign in/sign up.
- Secure session handling and role-based access.

Music Streaming

- Spotify-style playback interface.
- Playlists, albums, and search functionalities.

Real-time Chat

- Live chat between users.

AI Podcast Generation

- Integrates **Nebius,Groq** and **Gemini** APIs.
- Generates AI-based podcasts from user text input.

Multi-Voice TTS

- Uses multiple **Groq TTS voices** to enhance realism and diversity.

Cloud Storage

- **Cloudinary** for secure and efficient file hosting.

Technology Stack:

Client Side (Frontend)

- **React + Vite** — for fast UI development.
- **Tailwind CSS, ShadCN** — utility-first styling.

- **React Router DOM** — client-side routing.
- **Axios** — API calls.
- And Many more Packages

Server Side (Backend)

- **Node.js + Express** — RESTful backend API.
- **MongoDB + Mongoose** — database.
- **Cloudinary** — media storage.

Authentication

- **Clerk** for secure user authentication and management.

AI APIs

- **Groq API** — Text to Speech generation using AI Voices.
- **Nebius API** — AI image Generation.
- **Gemini API** — script generating for TTS and Podcast.

Methodology:

1. Frontend Development:

- **Framework:** React with Vite for fast development.

- **Authentication:** Clerk authentication service for secure login/signup.

- **Design:** TailwindCSS for modern and responsive styling.

2. Backend Development:

- **Framework:** Node.js with Express.

- **Database:** MongoDB with Mongoose for storing user data, playlists, podcasts, and chat messages.

3. AI Integrations:

- **Podcast Generation:** Uses Nebius, Groq and Gemini APIs to generate AI podcasts from text input.

- **TTS:** Integrates Groq TTS models to produce speech in multiple natural-sounding voices.
- **Lyrics Generation**: Using Gemini, it generates Lyrics

4. Cloud Storage:

- **Cloudinary** for storing generated audio and podcast files and Images efficiently.

5. Project Management:

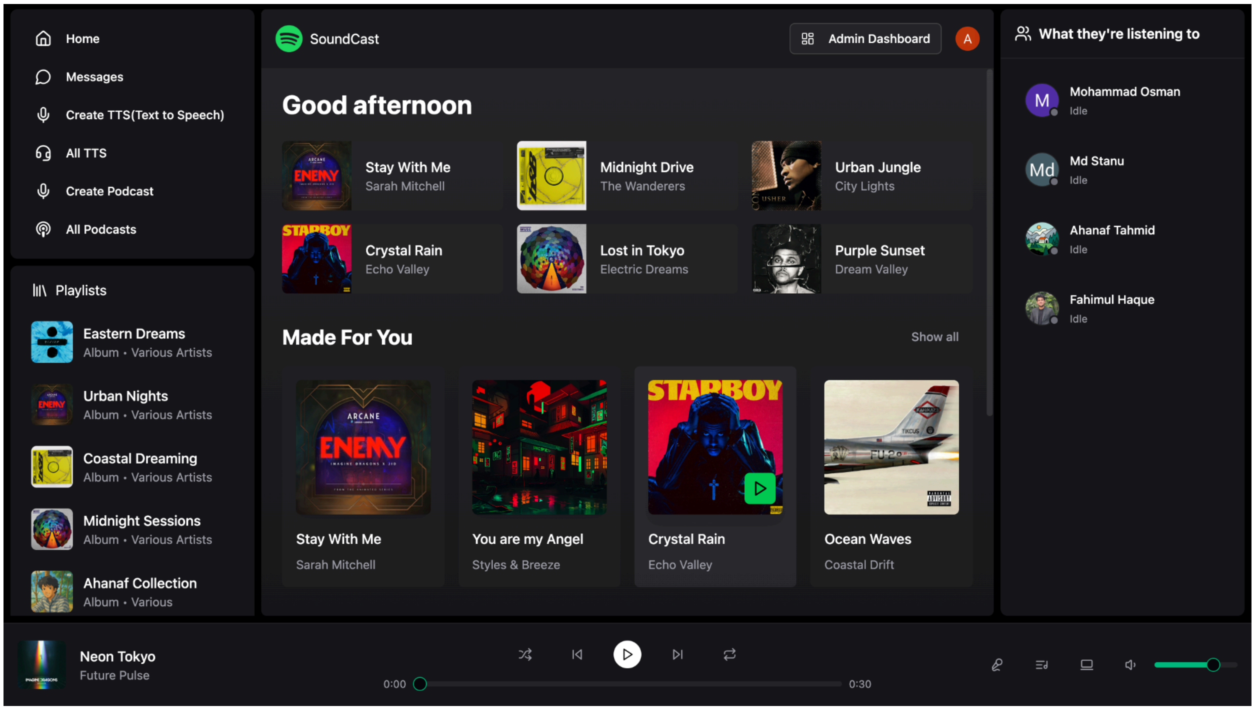
- Managed through **Trello** for task assignment, progress tracking, and sprint planning.

Challenge Faced:

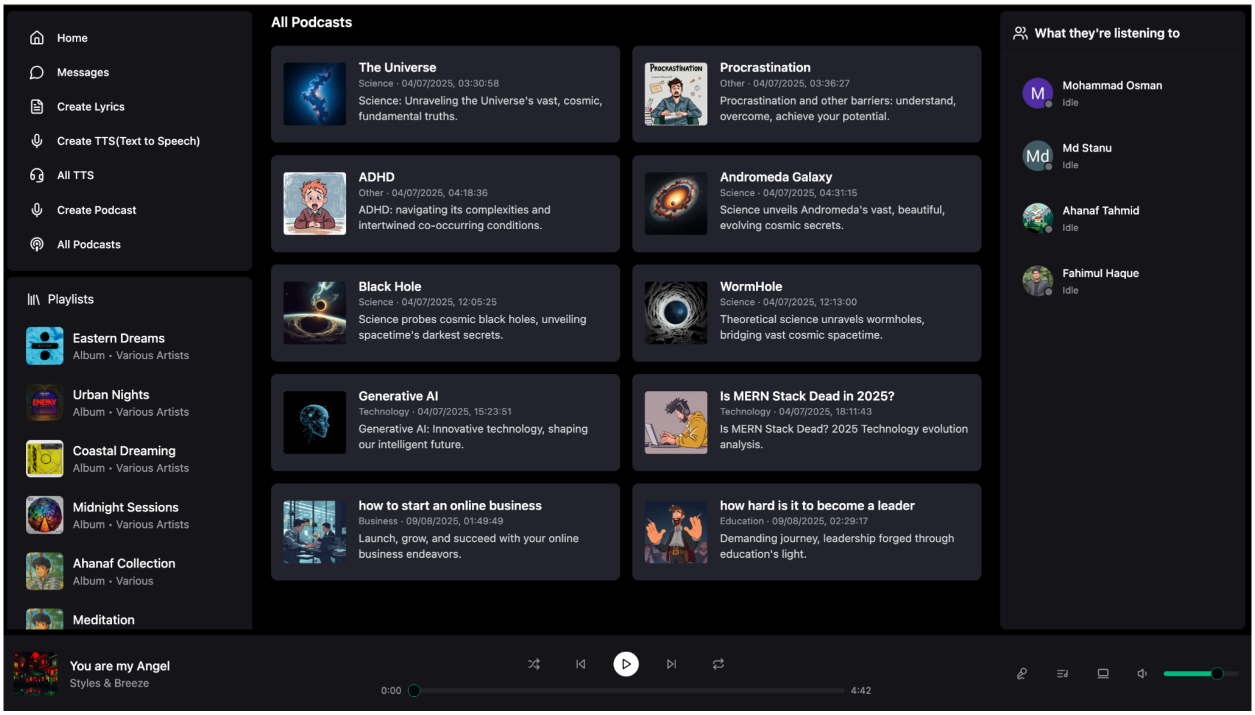
- **Multi-Voice Podcast Support:** Combining multiple Groq TTS outputs into a single podcast was technically challenging and required problem solving skills.
- **API Rate Limits:** Coordinating Groq API service without hitting request limits was a challenge.
- **Playback Synchronization:** Ensuring smooth playback while handling both music and generated podcasts in a single UI.

Output:

Below are some of the screenshots of the project.
HomePage:



Podcast Creation



All Podcasts

The Universe
Science · 04/07/2025, 03:30:58
Science: Unraveling the Universe's vast, cosmic, fundamental truths.

Procrastination
Other · 04/07/2025, 03:36:27
Procrastination and other barriers: understand, overcome, achieve your potential.

ADHD
Other · 04/07/2025, 04:18:36
ADHD: navigating its complexities and intertwined co-occurring conditions.

Andromeda Galaxy
Science · 04/07/2025, 04:31:15
Science unveils Andromeda's vast, beautiful, evolving cosmic secrets.

Black Hole
Science · 04/07/2025, 12:05:25
Science probes cosmic black holes, unveiling spacetime's darkest secrets.

WormHole
Science · 04/07/2025, 12:13:00
Theoretical science unravels wormholes, bridging vast cosmic spacetime.

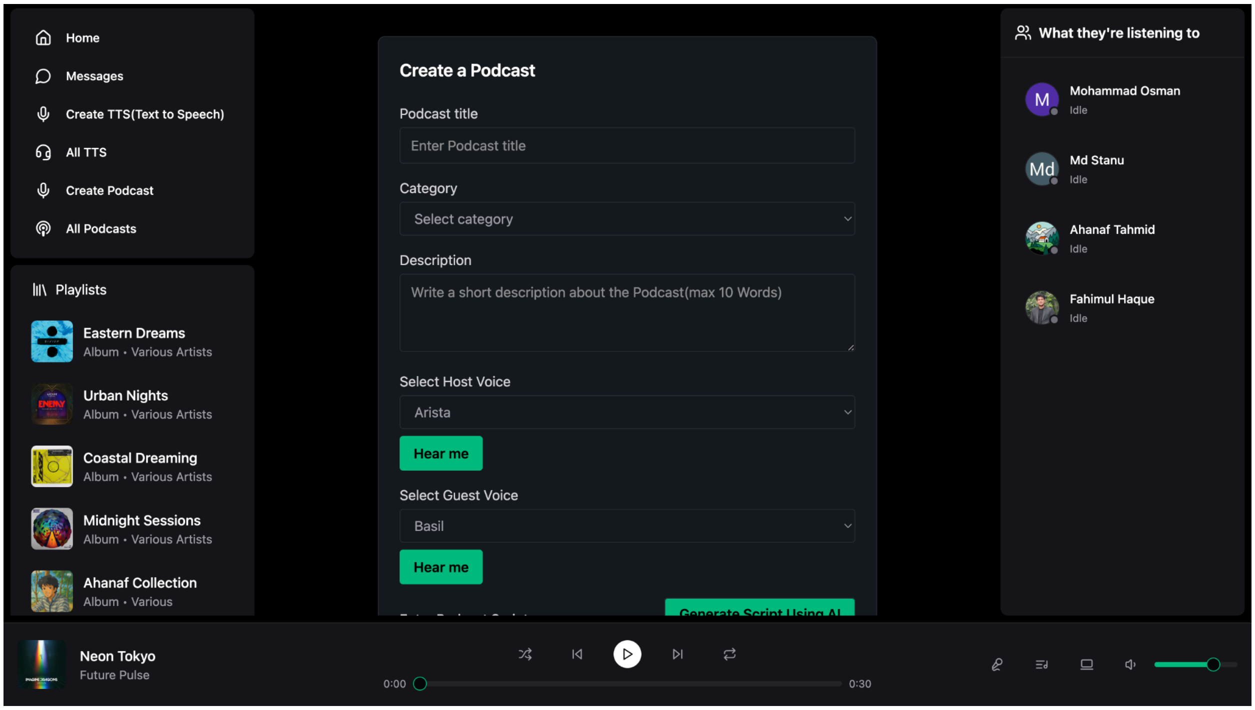
Generative AI
Technology · 04/07/2025, 15:23:51
Generative AI: Innovative technology, shaping our intelligent future.

Is MERN Stack Dead in 2025?
Technology · 04/07/2025, 18:11:43
Is MERN Stack Dead? 2025 Technology evolution analysis.

how to start an online business
Business · 09/08/2025, 01:49:49
Launch, grow, and succeed with your online business endeavors.

how hard is it to become a leader
Education · 09/08/2025, 02:29:17
Demanding journey, leadership forged through education's light.

Podcast Page



Create a Podcast

Podcast title: Enter Podcast title

Category: Select category

Description: Write a short description about the Podcast(max 10 Words)

Select Host Voice: Arista

Select Guest Voice: Basil

Future Work:

1. Implement mood based music recommendation.
2. Integrate a recommendation engine powered by AI to suggest content based on user preferences.
3. Support offline podcast downloads.

Conclusion:

SoundCast demonstrates how a modern streaming platform can be extended with AI to provide richer user experiences. By combining familiar music streaming features with real-time chat, TTS, and AI-generated podcasts, this project showcases the possibilities of blending entertainment with cutting-edge AI.

Despite many challenges, SoundCast offers a strong foundation for future development into a fully-fledged AI-powered media platform.