SoundScape

Personalize Your Playlist

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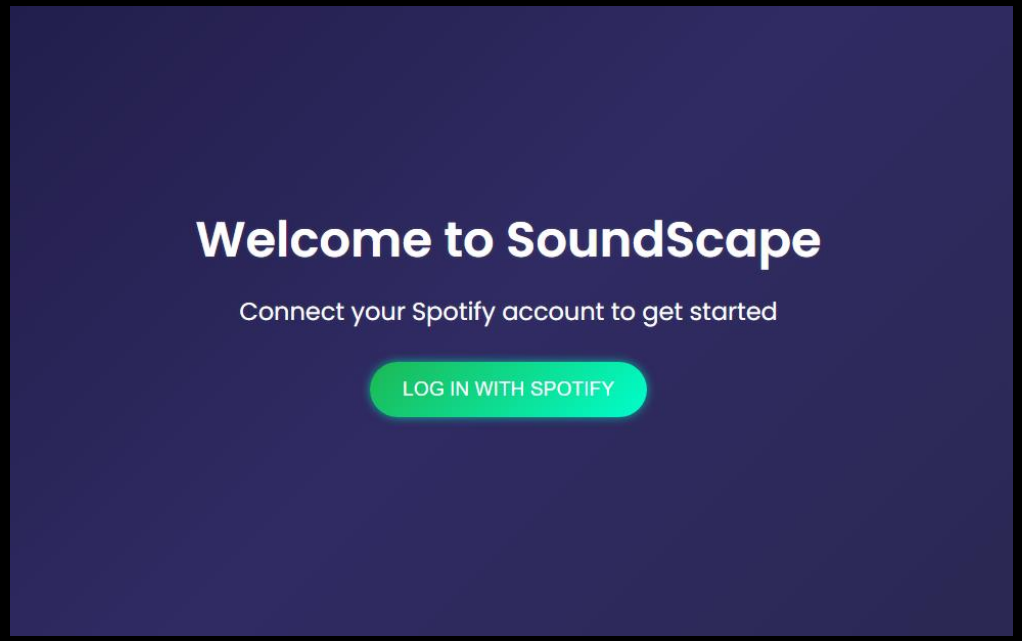
Advisor: William Hawkins

Project Description

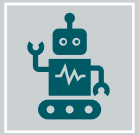
- SoundScape is an AI-powered music app that generates personalized playlists by integrating with the Spotify and OpenAI APIs. The app tailors music recommendations to each user's preferences by analyzing various factors such as listening history, current mood, location, weather, time of day, and connected devices like cars or speakers. What's unique about this app is how personalized the playlists will be that it creates. It lets users control how much new music they want to discover, blending familiar tracks with fresh selections and accounting for the right mood or timing that may influence what someone wants to hear. This app will aim to create a seamless listening experience that evolves with the user's context and preferences
- Some useful project links
  + GitHub: https://github.com/Jschnizer/Senior-Design
  + Application: https://senior-design-soundscape.vercel.app/
    - NOTE: To access the app, you must have a Spotify account and contact the developers (Austin, Derrick, or Joe) to have your email added to the approved users list



Project Goals

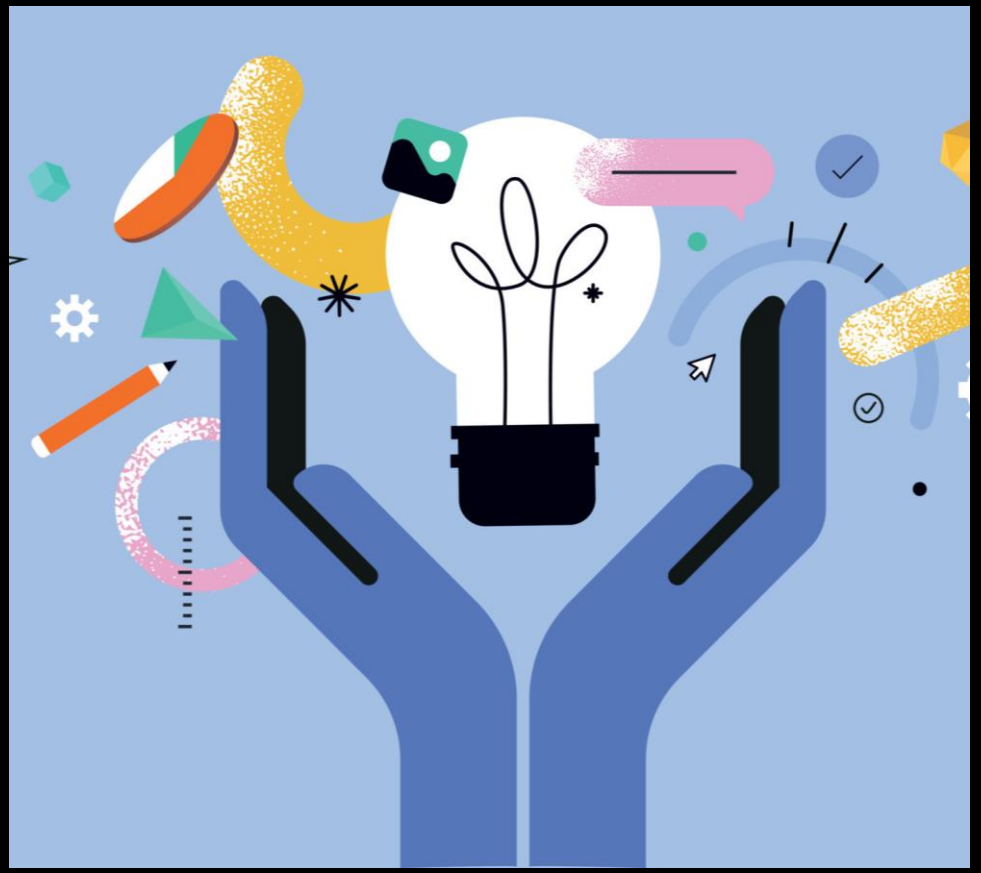
To develop an app that works with the user to provide personalized and accurate playlists based on various factors, ideally creating a playlist where the user will not want to skip any songs

To create an app that we would use regularly



Development of the group members' skills, particularly with training an AI model

Intellectual Merits



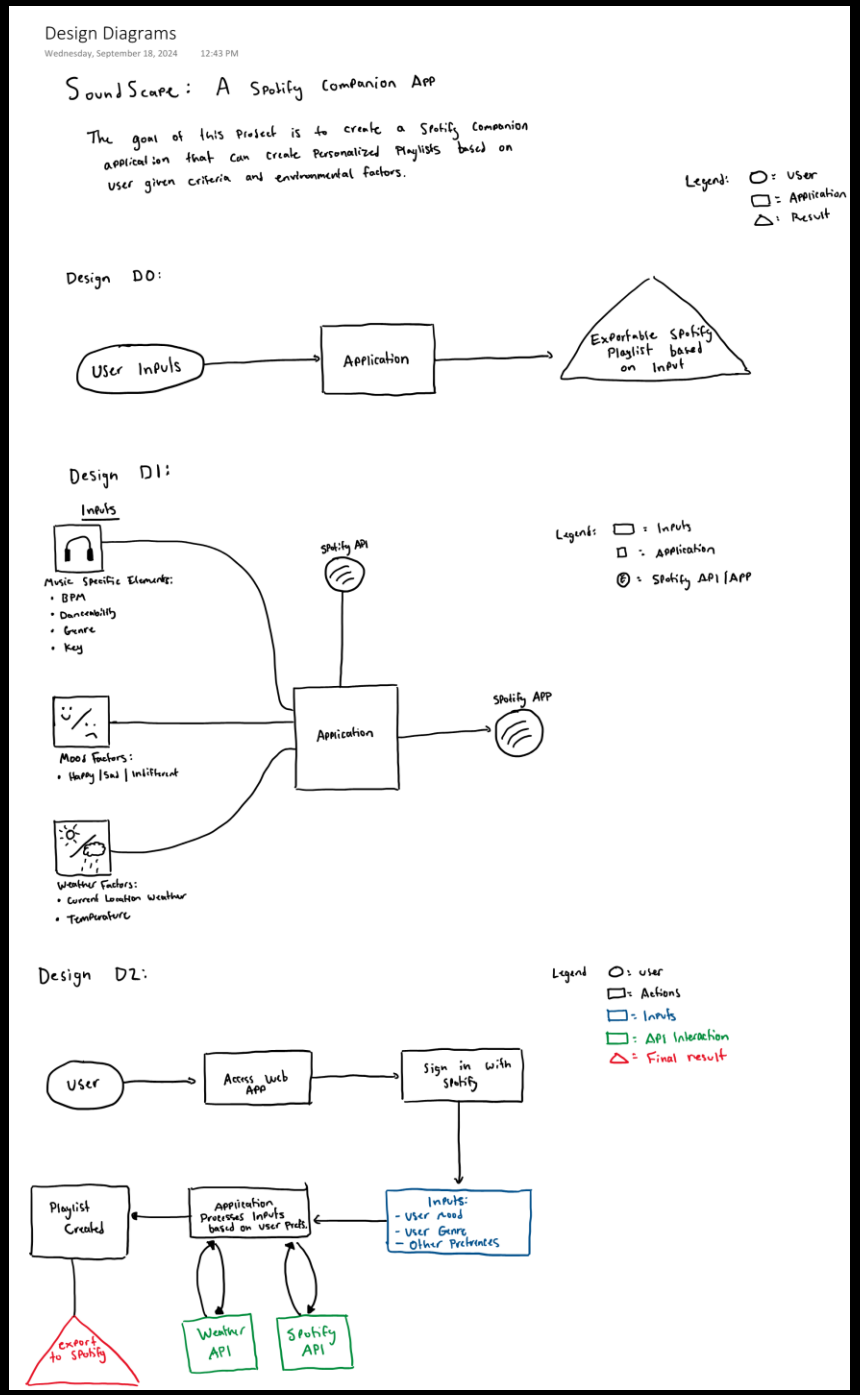
- Our project makes use of various APIs and data sources to gather data and produce personalized playlists
  - + Weather API
  - + Spotify API
  - + OpenAI API
  - + User data/input
- The team researched developing a custom AI model to handle playlist creation
  - + No model exists that accounts for all the contextual inputs we are using to produce playlists
  - + We ultimately shifted to using the OpenAI API, but much was learned in the process
- Our team has learned a lot about front-end frameworks, UI development, and making an app that integrates a back-end and a front-end
  - + Server development
  - + React
  - + AI development

Broader Impacts

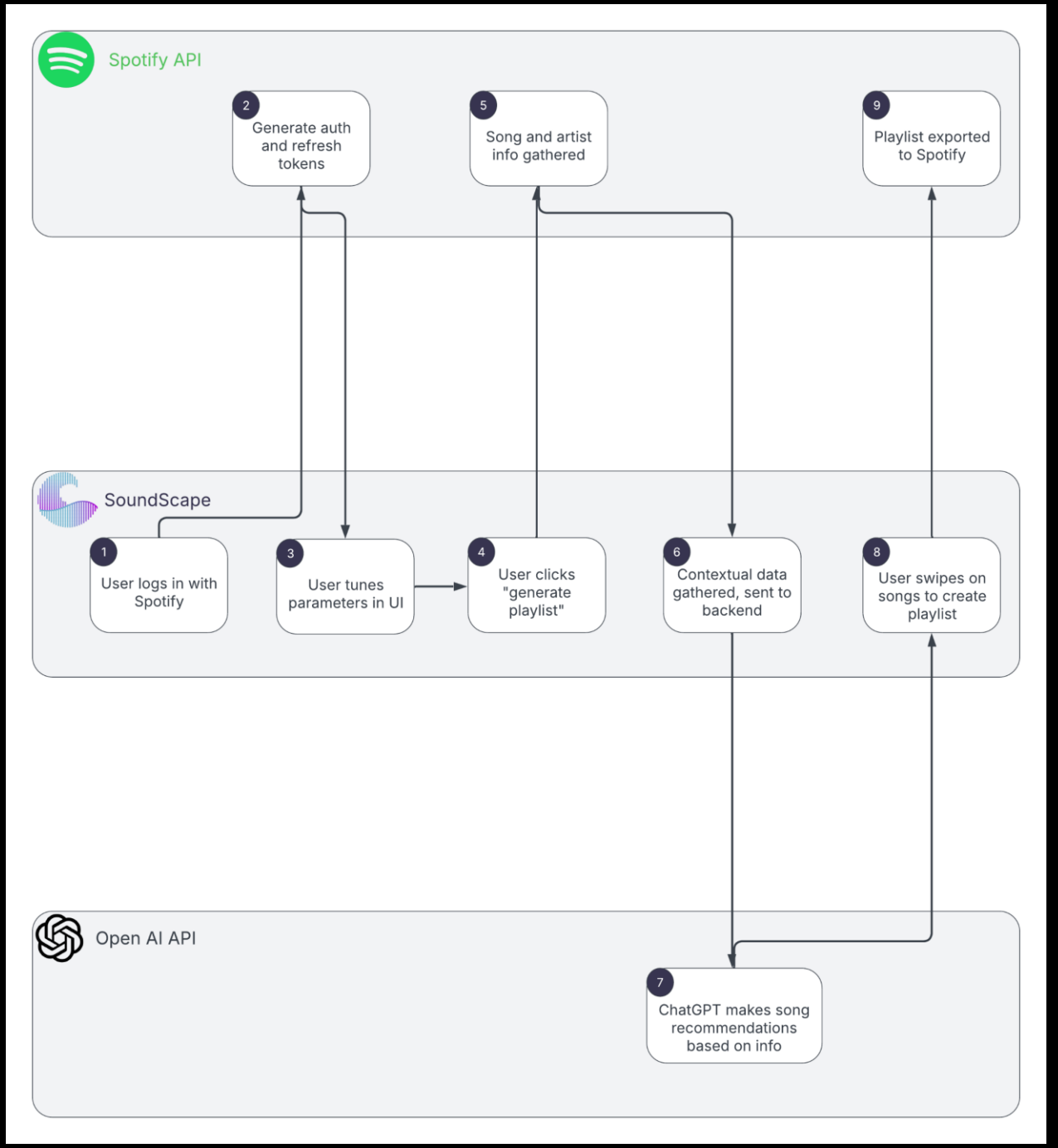
- We believe that this app will make creating personalized playlists more accessible to the average user and that it will allow users to explore new music that they may like and have otherwise not been exposed to
- We think that users of our app will be able to easily create a playlist at any time that suits their current mood and situation
- We hope that our users will have their horizons expanded when it comes to what kinds of music they listen to

Design Specifications

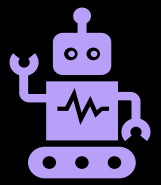
- SoundScape is built on three main components
  - + Front-end UI built using React
  - + Back-end server running using Node.js and Express which forwards all necessary API requests to and from the front-end
  - + AI model in the form of OpenAI API
- General flow
  - + The user logs into the app using their Spotify login
  - + The user tunes the parameters in the UI to customize their playlist and then clicks “generate playlist”. The app will then make various API requests to get all the necessary data and trigger the AI to make recommendations. All API requests currently go through the back-end and then out to the various 3rd parties and the AI model
  - + The user data is sent in the request to OpenAI, and then it makes recommendations, which are displayed to the user
  - + The user views these recommendations, decides which ones to add to their playlist, and exports the playlist to Spotify, where they can listen to it



Flow Diagram



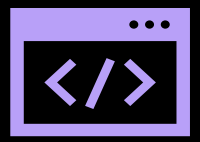
Technologies



AI

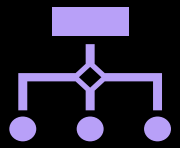
SoundScape uses OpenAI API calls as the AI system to make music recommendations

It was originally intended that a custom model would be developed, but many issues arose that could not be resolved



UI

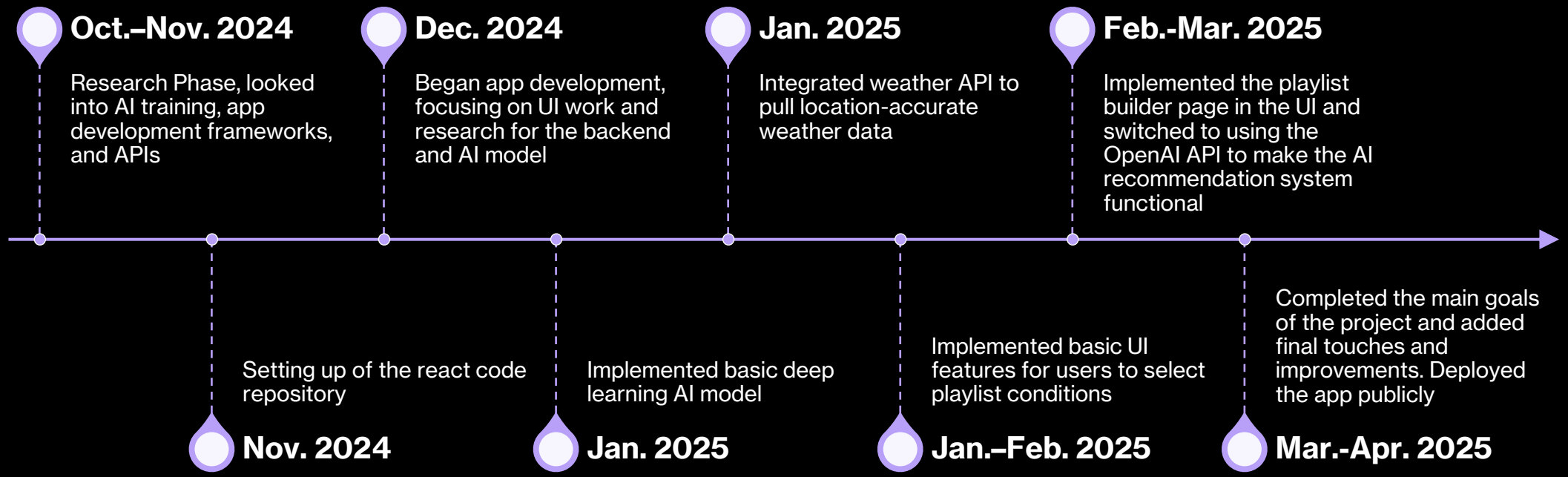
The front-end of SoundScape is developed using the JavaScript framework React. Some other libraries for specific UI components such as the cards were used



Back-End

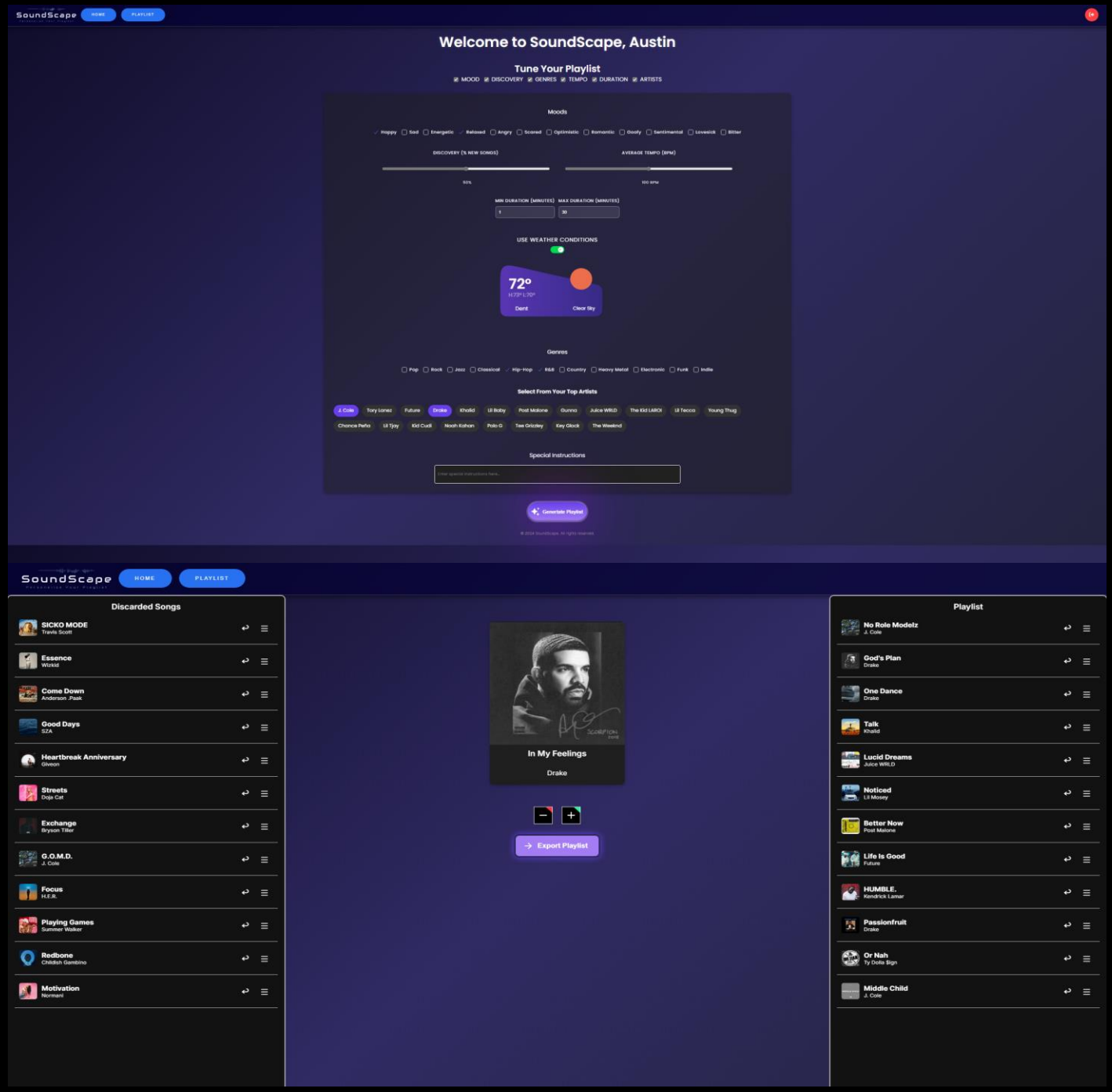
The back-end of the app uses various technologies including Node.js and Express to run the servers that make the API requests to get necessary data

Milestones


Oct.–Nov. 2024
Research Phase, looked into AI training, app development frameworks, and APIs
Nov. 2024
Setting up of the react code repository
Dec. 2024
Began app development, focusing on UI work and research for the backend and AI model
Jan. 2025
Implemented basic deep learning AI model
Jan. 2025
Integrated weather API to pull location-accurate weather data
Jan.–Feb. 2025
Implemented basic UI features for users to select playlist conditions
Feb.-Mar. 2025
Implemented the playlist builder page in the UI and switched to using the OpenAI API to make the AI recommendation system functional
Mar.-Apr. 2025
Completed the main goals of the project and added final touches and improvements. Deployed the app publicly

Results

- App features
  - + Login page for Spotify integration
  - + Webpage running on a server using Node.js and express
  - + Functioning UI that allows the user to select preferences for several variables, as well as accept or reject each suggested song using an intuitive swipe left or right mechanic
  - + API calls to OpenAI to handle the AI music recommendation system
  - + Validation system that ensures recommended songs exist in Spotify
  - + Pulling location-accurate weather data from a weather API
  - + Ability to export playlist to Spotify for listening
- Some images on the right show the UI of the app
- Our final deliverable was the functional, publicly available app that was available for anyone to use at the expo



Challenges

A significant challenge that we faced was obtaining track data to feed to our AI model. Near the start of development, we discovered that Spotify had removed the ability to obtain users' listening data from their API, so we needed to find an alternative. After we switched to using the OpenAI API, this was no longer an issue

An additional challenge we faced was trying to develop and implement the AI model that would make music recommendations. We needed to figure out how to make an AI model and have it be available to use in our application. Unfortunately, although we were able to learn a lot when trying to do this, we ultimately decided to use the OpenAI API to handle our AI music recommendations instead of a custom model due to the challenges we faced

Another challenge we faced was creating the UI since none of the group members had much experience with React or UI work. We were able to utilize various resources to learn about React and create a user interface that works well for our app

We also had to navigate around our very busy work and school schedules during our senior years that made making time to develop the project difficult