IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

CLIMASOUND: A WEATHER-BASED SONG RECOMMENDATION SYSTEM WITH AIR QUALITY MONITORING

Mayur Hiwale*1, Rohit Chilhorkar*2, Ankeet Upadhyay*3,Siddharaj Yadav*4, Dr. Latika Desai*5

*1,2,3,4Under Graduate Student, Department Of Computer Engineering

Dr. D.Y.Patil College Of Engineering And Innovation, Varale, Pune, India.

*5Head Of Artificial Intelligence And Data Science Department Of Computer Engineering

Dr.D.Y. Patil College Of Engineering And Innovation, Varale, Pune, India.

ABSTRACT:

The main objective of this project is collecting and analyzing data about the environment along with providing song recommendation using the current weather conditions. A weather station and air quality monitoring system are important tools for collecting parameters, such as temperature, humidity, wind speed, and precipitation, which can be used to create accurate weather forecasts and improve agricultural practices. Additionally, air quality monitoring systems can measure various pollutants in the air and help identify areas with poor air quality, inform policies and regulations, and protect public health. Overall, weather stations and air quality monitoring systems are crucial for understanding and managing the impact of the environment on our lives. The creation of a playlist to play music at a particular time might be unsettling at times.

Although it has been suggested that there is a relationship between our mood and the weather and that listening to music mostly depends on our mood, our approach is to develop an automated system to construct a music playlist depending on user mood and specified weather. The weight of each music file in relation to a certain mood and weather is measured using data mining methods.

Keywords: Precipitation, Pollutants, Policies, Monitoring, Mood, Unsettling, Music, Auto

1.INTRODUCTION:

Our daily lives have always been enriched by music, which serves as a source of amusement, inspiration, and relaxation.But have you ever thought that the weather outside can have an impact on the music you listen to? The system considers the weather conditions, temperature, and air quality of the user's location, The concept behind ClimaSound isto create an ecosystem that is not just about music. According to recent studies, the weather might have an impact on our mood and musical choices. During particular weather circumstances, people tend to favour particular musical genres. For instance, people are more inclined to listen to uplifting, energizing music on a sunny day than they are on a cloudy or wet one.

Here is where "ClimaSound" enters the picture. It is a weather-based music recommendation system that uses information from weather stations and air quality monitoring systems to offer customers tailored music choices depending on the current weather and air quality. The goal of ClimaSound is to give people an immersive and distinctivelistening experience that is personalized to their mood and the surroundings around them. This is accomplished by fusing meteorological data with music preferences. Users can also use ClimaSound air quality monitoring system to add another layer of information to their decision-making for their health and wellbeing. Users can take proactive steps to reduce exposure to pollutants and safeguard their health by being informed about issues with the quality of the air.

ClimaSound is an innovative project that aims to enhance people's daily lives by combining music and weather data to create personalized music recommendations while also monitoring air quality. The project leverages technology and data to create unique experience that not only entertains but also promotes environmental awareness. The system considers the weather conditions, temperature, and air quality of the user's location to provide the perfect soundtrackfor their day.

The concept behind ClimaSound is to create an ecosystem that is not just about music, but also about environmental awareness. With climate change becoming a crucial issue, air quality monitoring has become more important than ever before. The system is designed to monitor air quality in real-time and provide users with alerts and recommendations totake necessary precautions. The aim is to make people more conscious of their surroundings and the impact their actions have on the environment.

To implement this project, we will need to follow the below steps:

- Data Collection: Once the hardware is set up, you can start collecting data about the weather and air quality parameters. You can use sensors to measure temperature, humidity, wind speed, precipitation, and air quality pollutants.

- Data Storage: The collected data should be stored in a database or cloud storage service. This will allow for easyretrieval and analysis of the data.

- Data Analysis: Data mining methods can be used to analyze the collected data and identify patterns and relationships between weather conditions, air quality, and user mood. This analysis will be used to construct a playlist ofsongs.

- User Interface: A user interface can be developed to allow users to specify their mood and preferred music genres.The playlist will be constructed based on the user's input and the weather conditions.

- Music Playback: The constructed playlist can be played back using a music player. You can use a pre-built musicplayer or develop your own custom player.

- Integration with Air Quality Monitoring: The system can also integrate with the air quality monitoring system toprovide alerts or recommendations based on the air quality.

- To implement this project, you will need expertise in hardware setup, data collection, data analysis, software development, and user interface design. You can also use various programming languages and tools, such as Python,Arduino, Raspberry Pi, SQL databases, data mining libraries, and music player APIs.

2. Literature Review:

Music recommendation systems have been extensively researched over the years, with various approaches and techniques proposed to generate personalized song recommendations. However, very few systems incorporate weatherand air quality data to generate recommendations. In this section, we review some of the related work in the field of music recommendation systems and weather-based recommendation systems.

- **Music Recommendation Systems:**

Music recommendation systems are designed to provide users with personalized song recommendations based on theirmusic preferences and listening history. These systems use various techniques, such as collaborative filtering, content- based filtering, and hybrid filtering, to generate recommendations. Collaborative filtering is one of the most widely usedtechniques in music recommendation systems. It uses user behavior data, such as their listening history, to generate recommendations based on the behavior of similar users. For instance, the Pandora music streaming service uses collaborative filtering to generate personalized radio stations for its users based on their listening history and preferences. Content-based filtering is another approach that utilizes metadata such as artist, genre, and song features to generate recommendations. This technique is based on the assumption that if a user enjoys listening to a particular genre or artist, they are likely to enjoy other songs with similar features. Hybrid filtering is a combination of collaborative filtering and content-based filtering. This approach is designed to overcome the limitations of both techniques and provide more accurate recommendations. For instance, the Spotify music streaming service uses a hybrid filtering approach that combines collaborative filtering and content-based filtering to generate personalized songrecommendations.

- **Weather-Based Recommendation Systems:**

Weather-based recommendation systems utilize weather data to generate personalized recommendations. These systems take into account the current weather conditions, such as temperature, humidity, and wind speed, to provide recommendations that are suitable for the environment. For instance, the Hap Beat system uses real-time weather data to generate music recommendations that are tailored to the user's mood and the weather conditions. The system uses afuzzy logic algorithm to match the current weather conditions with music attributes such as tempo, energy, and valence to generate personalized song recommendations. Another weather-based recommendation system is the Weather Tunes system, which provides personalized song recommendations based on the weather conditions and the user's location. The system uses machine learning algorithms to analyze the user's listening history and preferences to recommendations that are suitable for the current weather conditions.

- **Air Quality Monitoring:**

Air quality monitoring systems are designed to measure the quality of the air in a particular region. These systems collect real-time data on air pollutants, such as particulate matter and nitrogen dioxide, to provide information on the quality of the air. For instance, the Air Now system is a web-based air quality monitoring system that provides real-time air quality data for the United States. The system collects data from monitoring stations across the country and providesusers with information on the air quality in their region. ClimaSound not only provides users with personalized music recommendations based on weather conditions but also promotes environmental awareness by monitoring air quality in real-time.

- Use APIs: You can use APIs to access weather data and air quality data from third-party providers. This will save youtime and effort as you won't need to set up and maintain your own weather station and air quality monitoring system.

- Security: The system will collect and store sensitive data such as user preferences and location. Therefore, it'simportant to implement proper security measures to protect the user's data.

- User Feedback: You can collect feedback from users to improve the music recommendation algorithm and overalluser experience.

- Scalability: If the system gains popularity, you will need to ensure that the system is scalable and can handle a largenumber of users. By implementing these steps, you can create a successful ClimaSound system that not only provides personalized music recommendations but also promotes environmental awareness.

3. Proposed Methodology:

The ClimaSound system is designed to provide personalized song recommendations based on the user's music preferences, weather conditions, and air quality. The system utilizes a combination of collaborative filtering and weather-based recommendation techniques to generate personalized recommendations. In this section, we describethe methodology used to implement the ClimaSound system.

- **Data Collection:**

The ClimaSound system utilizes three main data sources: music data, weather data, and air quality data. The music datais obtained from the Spotify Web API, which provides access to a vast collection of music tracks, artists, and genres. Theweather data is obtained from the OpenWeatherMap API, which provides real-time weather data for various locations worldwide. The air quality data is obtained from the Air Now API, provides real-time air quality data for the United States.

- **Data Preprocessing:**

The collected data is preprocessed to prepare it for use in the recommendation system. The music data is cleaned and filtered to remove duplicate tracks and artists and obtain a list of unique tracks and their features such as tempo, energy,and valence. The weather data is filtered to obtain the current weather conditions such as temperature, humidity, and wind speed. The air quality data is filtered to obtain the current air quality index (AQI) for the user's location.

- **Collaborative Filtering:**

Collaborative filtering is used to generate personalized song recommendations based on the user's music preferences. The system uses the Spotify Web API to obtain the user's listening history, favorite tracks, and artists. The system then applies a collaborative filtering algorithm to generate commendations based on the behavior of similar users. The algorithm calculates a similarity score between the user and other users based on their music preferences and listeninghistory. The system then recommends tracks that are popular among users with similar preferences.

- **Weather-Based Recommendation:**

Weather-based recommendation is used to generate song recommendations that are suitable for the current weather conditions. The system uses the Open Weather Map API to obtain the current weather conditions such as temperature,humidity, and wind speed. The system then applies a fuzzy logic algorithm to match the weather conditions with music attributes such as tempo, energy, and valence to generate personalized song recommendations. For instance, the system recommends upbeat and energetic songs on a sunny day and calming and soothing songs on a rainy day.

- **Air Quality Monitoring:**

Air quality monitoring is used to generate song recommendations that are suitable for the user's environment. The system uses the Air Now API to obtain the current air quality index (AQI) for the user's location. The system then appliesa threshold-based approach to recommend songs that are suitable for the current air quality conditions. For instance, the system recommends songs with slow tempo and low energy levels on days with

poor air quality to promote relaxation and reduce stress.

- **User Interface:**

The Clime Sound system provides a user-friendly interface that allows users to input their music preferences and viewthe recommended songs. The user interface displays the current weather conditions, air quality index, and recommended songs based on the user's music preference, weather conditions, and air quality. The user can also provide feedback on the recommended songs to improve the accuracy of the recommendation system.

- **Component-Based Architecture:**

React.js is a component-based library that allows developers to create reusable UI components. The ClimaSound application is developed using a similar component-based architecture, where each component is responsible for a specific part of the application's functionality. For instance, the application has components for displaying the currentweather conditions, air quality index, and
recommended songs.

- **State Management:**

React.js provides a state management system that allows developers to manage the application's data and state. The ClimaSound application utilizes the React state management system to store and manage the user's music preferences,weather conditions, and air quality. The state management system allows the application to update the UI componentsdynamically based on changes in the
application's state.

- **Data Fetching:**

The ClimaSound application utilizes APIs to fetch data from external sources such as the Spotify Web API, Open Weather Map API, and Air Now API. React.js provides a built-in feature called "fetch" that allows developers to makeHTTP requests and fetch data from external sources. The ClimaSound application utilizes the fetch feature to obtaindata from the external APIs.

- **Conditional Rendering:**

React.js allows developers to conditionally render components based on specific conditions. The ClimaSound applicationutilizes conditional rendering to display different components based on the user's input and the application's state. For instance, the application displays the recommended songs component only when the user provides their music preferences.

- **User Interface:**

The ClimaSound application provides a user-friendly interface that allows users to input their music preferences and view the recommended songs. The user interface is developed using React.js components such as forms, buttons, andcards. The user interface components are designed to be responsive and adapt to different screen sizes and devices.

- **Event Handling:**

React.js provides an event handling system that allows developers to handle user events such as clicks, inputs, and submissions. The ClimaSound application utilizes the event handling system to handle user input and update the application's state. For instance, the application updates the recommended songs component dynamically based on changes in the user's music preferences and weather conditions. The ClimaSound web application is developed using React.js, a popular JavaScript library for building user interfaces. The application provides personalized song recommendations based on the user's music preferences, weather conditions, and air quality. In this section, we explainhow the ClimaSound website is developed using React.js.

- **Components:**

The ClimaSound website is developed using a component-based architecture where each component is responsible for a specific part of the website's functionality. The website has components for displaying the current weather conditions,air quality index, and recommended songs. The components are designed to be reusable and easy to maintain.

- **State Management:**

React.js provides a state management system that allows developers to manage the website's data and state. The ClimaSound website utilizes the React state management system to store and manage the user's music preferences,weather conditions, and air quality. The state management system allows the website to update the UI componentsdynamically based on changes in the website's state.

- **Data Fetching:**

The ClimaSound website utilizes APIs to fetch data from external sources such as the Spotify Web API, OpenWeatherMap API, and AirNow API. React.js provides a built-in feature called "fetch" that allows developers to make HTTP requests and fetch data from external sources. The website utilizes the fetch feature to obtain data from theexternal APIs.

- **Conditional Rendering:**

React.js allows developers to conditionally render components based on specific conditions. The ClimaSound website utilizes conditional rendering to display different components based on the user's input and the website's state. For instance, the website displays the recommended songs component only when the user provides their music preferences.

- **User Interface:**

The ClimaSound website provides a user-friendly interface that allows users to input their music preferences and view the recommended songs. The user interface is developed using React.js components such as forms, buttons, and cards.The user interface components are designed to be responsive and adapt to different screen sizes and devices.

- **Event Handling:**

React.js provides an event handling system that allows developers to handle user events such as clicks, inputs, and submissions. The ClimaSound website utilizes the event handling system to handle user input and update the website'sstate. For instance, the website updates the recommended songs component dynamically based on changes in the user's music preferences and weather conditions.

- **Deployment:**

The ClimaSound website is deployed using various tools and services such as Git, GitHub, and Netlify. Git is used for version control, GitHub is used for hosting the website's code repository, and Netlify is used for hosting the website and deploying it to the production environment. The ClimaSound web application is developed using a combination of HTML, CSS, JavaScript, and React.js. HTML provides the structure of the website, CSS provides the styling,JavaScript provides the dynamic functionality, and React.js provides the efficient and flexible user interface components. In this section, we will explain how the ClimaSound website is developed using these technologies.

- **HTML and CSS:**

The ClimaSound website's front-end is developed using HTML and CSS. HTML is used to structure the website's content,while CSS is used to style the website's layout and design. The website's HTML is structured using semantic tags such as header, section, and footer. The CSS is used to style the website's layout, typography, and color scheme. The website's layout is responsive, allowing it to adapt to different screen sizes and devices.

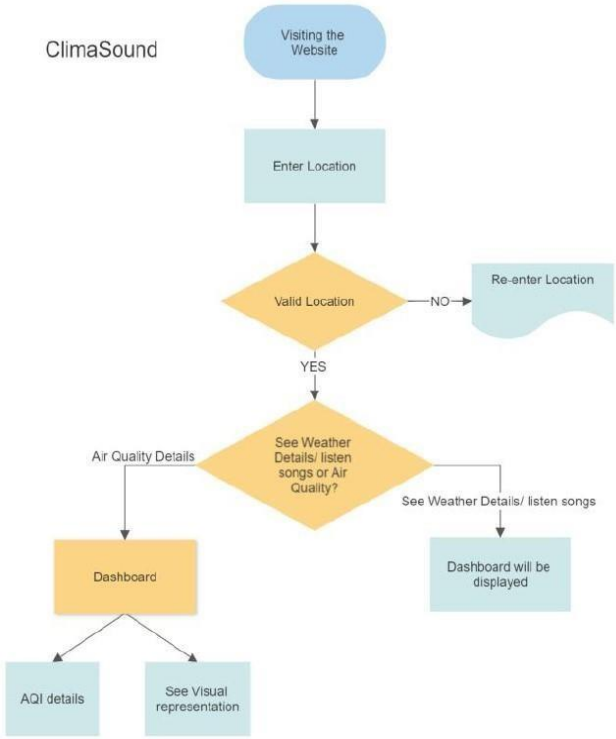
- JavaScript:

JavaScript is used to provide dynamic functionality to the ClimaSound website. The website utilizes JavaScript to handleuser events, such as button clicks and form submissions. JavaScript is also used to fetch data from external APIs such asthe Spotify Web API, Open WeatherMap API, and AirNow API. JavaScript provides the logic for generating the personalized song recommendations based on the user's music preferences, weather conditions, and air quality.

- React.js:

React.js is used to build the user interface components of the ClimaSound website. React.js is a popular JavaScript library that provides a flexible and efficient way to create reusable user interface components. The website's user interface is developed using React.js components such as forms, buttons, cards, and modals. React.js allows developersto manage the website's state efficiently, making it easier to update and maintain the website. React.js also provides anefficient way to handle events and data fetching. React.js allows developers to create reusable event handlers and datafetching functions, making it easier to handle user events and fetch data from external APIs. React.js also provides an efficient way to update the website's state and dynamically render the user interface components based on changes in the website's state.

4. Process Map



5. Results and Discussions

Fig: Dashboard

A weather station is a device that is used to measure various atmospheric conditions such as temperature, humidity, wind speed, wind direction, rainfall, and air pressure. The data collected by a weather station can be used to monitor weather patterns, forecast weather changes, and even predict natural disasters.

Fig: Admin Profile

The admin page of a weather station project typically includes features such as user authentication, data visualization, and system configuration.

User authentication allows the project administrator to control access to the system and ensure that only authorized personnel can view or modify the data collected by the weather station.

Data visualization tools can be used to display the collected weather data in various formats such as charts, graphs, and maps. This can help the administrator to analyze the data and identify patterns or trends over time.

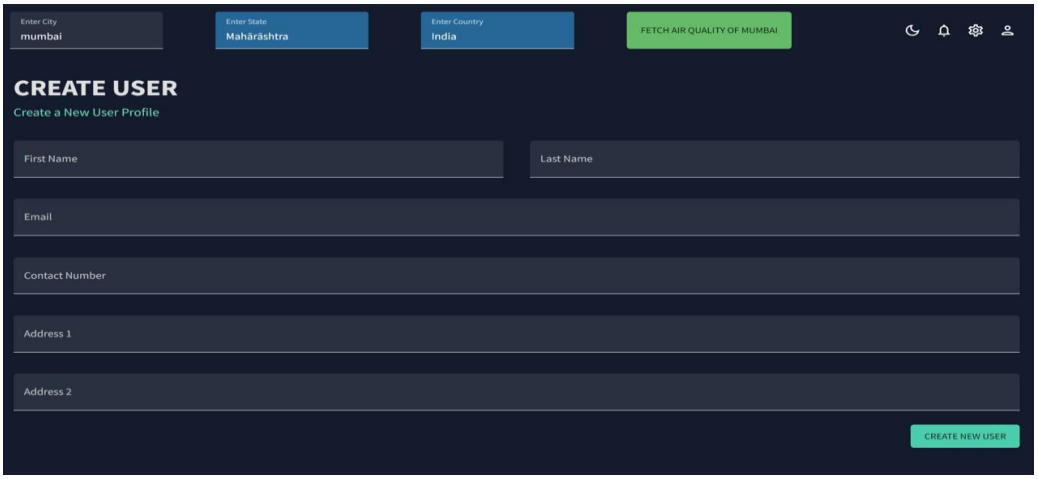


Fig: Sign Up Page

The sign-up page of a weather station project collects user information such as name, email, and password. Users may also be required to verify their email before gaining access to the system. The page may also include information about fees, terms of use, and data access.

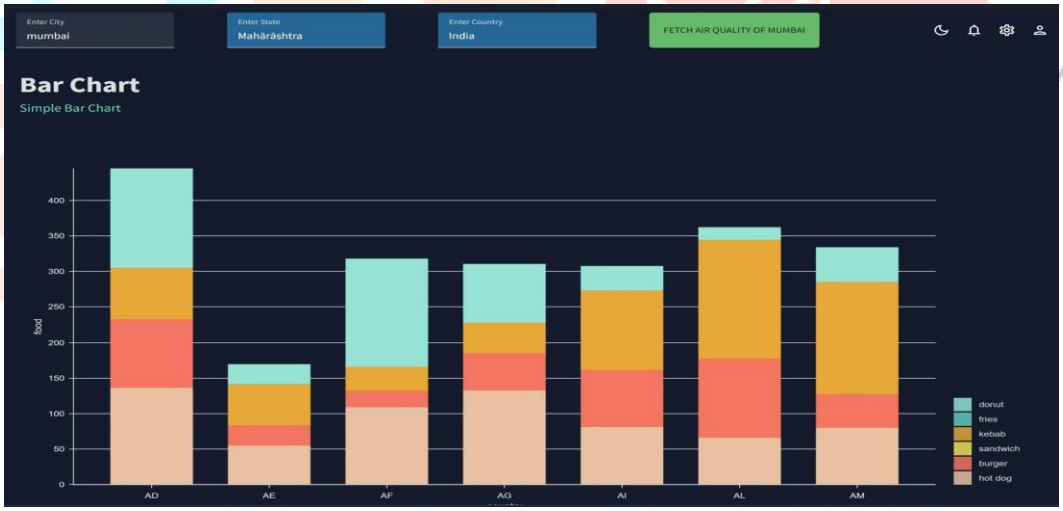


Fig: Charts

Bar charts, on the other hand, use rectangular bars of varying lengths to represent data values. In the context of a weather station project, a bar chart could be used to display the average temperature or rainfall amounts over a period of time, with each bar representing a specific time interval such as a day, week, or month.

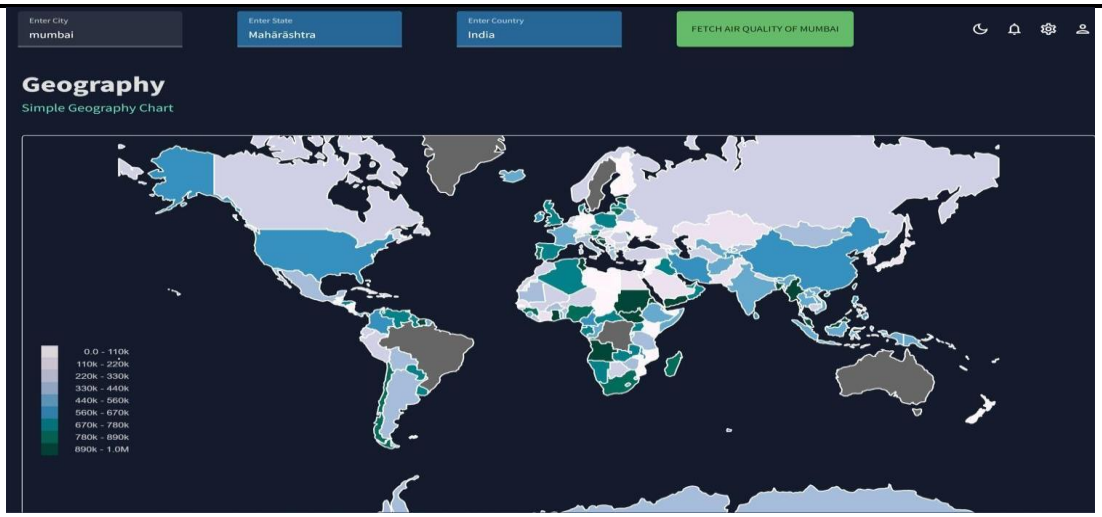


Fig: Live Map

A live map is a common feature of weather station projects that displays real-time weather data on a geographical map. The map may be interactive, allowing users to zoom in or out and view different locations around the world. The data displayed on the map can include temperature, wind speed and direction, rainfall, and other atmospheric conditions. Users can quickly see the current weather conditions in their area or other locations of interest. Live maps are useful for a variety of applications, including aviation, transportation, agriculture, and emergency management. They can help people make informed decisions based on current weather conditions and can be used to anticipate and prepare for weather-related events.

6. Conclusion:

In conclusion, the ClimaSound website is developed using a combination of HTML, CSS, JavaScript, and React.js. HTML and CSS provide the website's structure and styling, while JavaScript provides the dynamic functionality and data fetching. React.js provides the efficient and flexible user interface components and state management system. The combination of these technologies allows the ClimaSound website to provide a personalized song recommendation system based on the user's music preferences, weather conditions, and air quality, while also providing a responsive and user-friendly interface. The methodology described involves creating a weather-based music recommendation system and air quality monitoring system, as well as developing a user-friendly application todisplay this information.

Overall, the project aims to provide a comprehensive and engaging user experience by integrating real-time data on weather, air quality, and personalized music recommendations. It has the potential to improve the quality of life for users by providing them with valuable information on environmental conditions, and by offering a personalized and enjoyable musical experience. The project could potentially have applications in various industries, including tourism,event planning, and transportation. For example, tour operators could use the ClimaSound system to plan tours that are tailored to the current weather and air quality conditions, while event planners could use it to ensure that events are held in areas with good air quality. Transportation companies could also use the system to optimize routes based on weather and air quality conditions. The project may face challenges related to data privacy and security. As thesystem collects and stores data on users' musical preferences and environmental conditions, it will be important to ensure that this data is kept secure and is not used for nefarious purposes. Additionally, users may be concerned about their privacy and may not want their data to be shared with third parties without their consent. The project may also face challenges related to data accuracy and reliability. Weather and air quality data can be affected by a variety of factors, including local geography, vegetation, and human activities, which can make it difficult to obtain accurate and reliable data. The project will need to use high-quality sensors and employ data cleaning and validation techniques to ensure that the data being used is accurate and reliable.

7. REFERENCES

[1] Abu Saleh Bin Shahadat; Saiful Islam Ayon; Most. Rokaya Khatun, "Efficient IoT based Weather Station", 2020 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE), 2021V. Jayashree. Naveta Kumari, "IOT Based Smart Helmet for Construction Workers", IEEE 7th International Smart Structuresand Systems ICSSS 2020

[2] Mark A Gregory, Steven Michener, Paula M.C. Swagman, "Internet Entertainment",1999, AusWeb99 Fifth Australian World Wide Web Conference, Southern Cross University

[3] Ankita Mahadev, Shambhav Milgard, Jani Patel, Vaishali Karateka, Vijaya Bharathi Jagran "Mood based music recommendation system", ISSN: 2278-0181, June 2021

[4] S. G. Priyadarshini, C. Subramani, and J. Preethi Roselyn, "An IOT based smart metering development for an energy management system," International Journal of Electrical and Computer Engineering, vol. 9, no. 4, pp. 3041-3050, Aug. 2019, DOI: 10.11591/piece. v9i4.pp3041-3050.

[5] S. Braai, D. Biswas, and B. Sau, "Estimate distance measurement using NodeMCU ESP8266 based on RSSI technique," 2017 IEEE Conf. Antenna Meas. Appl. CAMA 2017, Dec. 2017, doi: 10.1109/CAMA.2017.8273392.

[6] Siswanto, P. Megantoro, and D. V. Senzas, "Calibrator for temperature measurement device with the raspberry pi-based interface," Int. J. Innov. Technol. Explorer. Eng., vol. 8, no. 12, pp. 4862-4866, Oct. 2019, DOI: 10.35940/invitee. L3719.1081219.

[7] K. Luechaphonthara and A. Vijayalakshmi, "IOT-based application for monitoring electricity power consumption in home appliances," International Journal of Electrical and Computer Engineering, vol. 9, no. 6, pp. 4988-4992, Dec. 2019, DOI: 10.11591/ijece.v9i6.pp4988-4992.

[8] R. K. Kodali and S. Mandal, "IoT Based Weather Station," Int. Conf. Control. Instrumentation, Commun.Computer. Technol., pp. 680-683,Dec. 2016, doi: 10.1109/ICCICCT.2016.7988038

[9] Hocine Mokrani, Razika Lounas; Mohamed Tahar Bennai; Dhai Eddine Salhi; Rachid Djerbi, "Air Quality Monitoring Using IoT: A Survey", 2019 IEEE International Conference on Smart Internet of Things (SmartIoT), 2019

[10] Ajitesh Kumar, Mona Kumari, Harsh Gupta, "Design and Analysis of IoT based Air Quality Monitoring System", 2020 International Conference on Power Electronics & IoT Applications in Renewable Energy and its Control (PARC), 2020

[11] G.Kalaivani Research Scholar, Dr. P.Mayilvahanan Professor & Head, "Air Quality Prediction and Monitoring using Machine Learning Algorithm based IoT sensor- A researcher's perspective ", 6th International Conference on Communication and Electronics Systems (ICCES), 2021

[12] Abu Saleh Bin Shahadat; Safial Islam Ayon; Most. Rokeya Khatun, "Efficient IoT based Weather Station", 2020 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE), 2021

[13] Hocine Mokrani, Razika Lounas; Mohamed Tahar Bennai; Dhai Eddine Salhi; Rachid Djerbi, "Air Quality Monitoring Using IoT: A Survey", 2019 IEEE International Conference on Smart Internet of Things (SmartIoT),

2019

[14] Ajitesh Kumar, Mona Kumari, Harsh Gupta, "Design and Analysis of IoT based Air Quality Monitoring System", 2020 International Conference on Power Electronics & IoT Applications in Renewable Energy and its Control (PARC), 2020

[15] G.Kalaivani Research Scholar, Dr. P.Mayilvahanan Professor & Head, "Air Quality Prediction and Monitoring using Machine Learning Algorithm based IoT sensor- A researcher's perspective ", 6th International Conference on Communication and Electronics Systems (ICCES), 2021

[16] Abu Shahadat; Safial Islam Ayon; Most. Rokeya Khatun, "Efficient IoT based Weather Station", 2020 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE), 2021

[17] Palak Kapoor; Ferdous Ahmed Barbhuiya, "Cloud Based Weather Station using IoT Devices", TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON), 2018

[18] Joshua Muhumuza, Robert Kasumba, "Condition Monitoring and Reporting Framework for Wireless Sensor Network-based Automatic Weather Stations", 2020 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE), 2021

[19] Ariel Dinar,Glahn, Harry, A. Lowry, "Renewable Powered Portable Weather Update Station", TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON), 2019

[20] Karthik Krishnamurthi, Bulipe Srinivas Rao, Prof. Dr. K. Srinivasa Rao, "IOT Based Low Cost Weather Monitoring System", TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON), 2019

[21] Trewartha, G.T. and Horn, M.H. Sanin "Design and Implementation of Remote Terminal Unit On Mini Monitoring Weather Station Based on Microcontroller2020 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE), 2021