Weather Forecasting Website

Maharishi Markandeshwar (Deemed to be University)

In partial fulfillment of the requirement for the award of the degree of

Bachelor of Technology

In

Computer Science Engineering

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(2024-2025)

M.M. ENGINEERING COLLEGE
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December, 2024
(Batch 2023-2027)

1. INTRODUCTION

A weather app is one of the most rarely used application yet it finds a place in every android or iOS device. Coming to the roots of it, the android OS finds a place in almost 60% of the device in the entire world. Globally speaking, 3 out of 5 people are android users picked at random. It is an extremely huge market with very high potential and jurisdiction. With a high reach like this, android programming falls into the category of programmer's attraction. A weather application is also an in built application but the amount of usage of that application is lesser than the usage of a radio apps these days.

With a view of limited users in huge market, its is quite certain to reckon the fact that this product might not reach places, however what matters is how the product is presented. Not many apps are marketed the way they should be done but then this application offers way more than what a ordinary application will ever. The design and user

1.1 Objective

The main objective of this mobile application is to provide users a weather application with some brand new features which are not included in any other weather app but ours. This weather app will change the experience of the users forever. The app will not only give you weather reports but will also provide some extra features which will help users at times of need.

1.2 Organization of the report

The report is divided into 4 parts and each part deals with the different aspects of the system.

(i) Design: This part talks about the existing system, how they are designed and the issues associated with them. Furthermore, it describes the features of the system proposed and the requirements for operating it.

(ii) Module Description: This part describes each module implemented in the system,

i.e., how the data is processed in each and what are the steps involved from the user's point of view.

(iii) Implementation: This part deals with an overview of the platform for which the system is developed for. It also talks about the parameters needed for running the system and provides a sample of code used, along with screenshots of the output.

(iv) Conclusion: This part concludes the report and discusses the possible enhancement that can be implemented in the future improve the quality.

1.3 Challenges Overcome

The user is verified via Single Sign-on method with Google, Facebook verification method. The guest Sign-in will therefore have only weather forecast privileges. With respect to intensity of rainfall or climatic changes, the panic button's alert message will be accordingly increased. The Maps API is provided by Google and Weather API by certified Weather provided also used in ongoing inbuilt applications.

2. LITERATURE REVIEW

This specific project is not only the most easy topic but also rarely used. For instance there exist more than 15 Weather Applications and only 3 have managed to climb the cliff of 100k Downloads. With the market so low , entering into this was indeed difficult and the greatest risk. As Steve Jobs once said " There is no such thing as a simple project, make it complex " , just what I did here. With every review , every guidance, every step I have reached one step closer to what is now a baby. The project , the Application in itself is enough explain and need no marketing at any point of time. Application stands for itself. It is

indeed very important to take care of oneself, no one ever can ever predict rain , nor a storm. Climatic change is subject to risk. In interest of social service and user convenience that this app is perfect of a person who is climate conscious and doesn't use his /her phone well. This app will stand out from others for sure. For almost whole review I have referred to the project as the app and not Badal because it is not published yet and the main goal stays undone. For every possible hurdle is overcome now stays beta Testing and Debugging after which the project will be done with. This stands to reason how this idea came to mind that , I , myself have been a part of the Chennai floods and I can't imagine how it was to witness a disaster like this, This application is a tribute to Chennai Floods '16 . This application in full force can save atleast 20 % of people, Purpose of this project is served and we are happy. There will be no ads and glitches for this project is totally non profit and every penny invested is sort of a donation.

Chart -1(pie chart): user's preference to mobile application over web application 2.1

Existing System

The existing weather applications are AccuWeather , NBC , Weather so on and so forth. These applications are purely weather applications and do not provide any safety measures nor do they actually do anything. They're either informative or provide facts and figures of temperature and air-pressure. Although, NBC provides new which gives weather updates from all over the world.This was a new revolution in the market. However the age old problem of notifications. The application irritated so much with their notifications, furthermore the application even had permanent notifications adding on to the already existing problems. With that being said, the application have exquisite User Interface and powerful design and the real competition is between the design and User Interface and how the weather is presented and no scope for innovation. This application is what will change the whole perspective of people looking at a weather application.

2.2 **Proposed System**

Thousands of apps are released every day, stable as well as with bugs. This weather app has features and new implementations as follows: i). Light weighted ii). Support multiple units iii). Support for widget iv). Simple design and user interface v). Detailed graphical representation Our App is totally based upon the OpenWeatherMap Server. The data is provided by the OpenWeatherMap to users by the means of API key. The API key is used to provide the security to cloud as only authorized user can access the weather information from the cloud. The cloud is updated continuously over the time which is more accurate as compared to previous approaches.

2.4 Future Enhancements

- ● The offline notify service could improve with instant sharing options.
- ● The traffic route would be made App-Specific and and generate a overall climate map whilst it is showing the fastest and convenient.
- ● The User Interface will improve as per requirement.

2.5 Features Of The Application

● Map access from within the application to get shortest route to destination in case of heavy downpour

- ● Panic button is provided in-case of emergency
- ● News can be accessed from within the application which gives real-time weather updates pertaining to only

the user's location.

- ● Application runs foreground and not background so no unnecessary and annoying news updates.
- ● No background running so no battery drainage.

3. Stakeholders of the project/Application:

In this weather forecasting website i have used the code i.e;

1. **End Users (General Public)**
Individuals seeking accurate and timely weather information for daily planning. Expect a user-friendly, mobile-friendly interface and personalized features.

2. **Meteorologists**
Experts who analyze and interpret weather data for forecasts. Require reliable tools and data sources to enhance forecast accuracy.

3. **Website Administrators**
Responsible for the management and operation of the website. Need easy-to-use CMS, security, and performance monitoring tools.

4. **Weather Data Providers**
Entities supplying raw weather data, such as government agencies or private companies. Expect proper data usage rights and clear presentation of data.

5. **Software Developers/Engineers**
Build and maintain the website's codebase. Require clear project specifications, APIs, and scalable infrastructure.

6. **UX/UI Designers**
Design the website's user interface and experience. Need user research and feedback to create an intuitive design.

4. Software & Hardware Requirement/ Technology Stack Used

- Hardware Requirement

Processor-Quad core CPU Ram-16gb or high
Display-OLED display
Wifi- High speed wifi connection

- Software Requirements
  Programming language- HTML, CSS , JAVASCRIPT, REACT-JS, MATERIAL-UI.
  API Key- [OpenWeatherMap]
  Operating System-Windows

5. Methodology to be used

At Weather our methodology is designed to deliver precise, real-time, and actionable weather forecasts through a combination of advanced technology, data integration, and expert analysis. Here's an in-depth look at the processes and methods we use:

1. Data Collection

a. Meteorological Data Sources:

We gather data from a wide array of sources, including:

- **Weather Stations:** Ground-based weather stations that provide local measurements such as temperature, humidity, wind speed, and precipitation.
- **Radar Systems:** Weather radars that track precipitation intensity, movement, and type.
- **Satellite Imagery:** Satellites in geostationary and polar orbits provide comprehensive views of cloud cover, storm systems, and atmospheric conditions.
- **Buoys and Ships:** Oceanic buoys and marine vessels contribute data on sea surface temperatures and maritime weather conditions.

b. Global Weather Models:

We incorporate data from several global weather models, such as:

- **Numerical Weather Prediction (NWP) Models:** High-resolution models like the Global Forecast System (GFS) and the European Centre for Medium-Range Weather Forecasts (ECMWF) provide large-scale atmospheric simulations.
- **Regional Models:** Models tailored to specific regions offer more detailed forecasts by refining the global data.

2. Data Integration and Processing

a. Data Assimilation:

Our system uses data assimilation techniques to combine real-time observations with model predictions. This process helps correct model biases and improve forecast accuracy by integrating current conditions with historical data.

b. Data Filtering and Quality Control:

We apply rigorous quality control to ensure the accuracy of incoming data. This includes filtering out anomalies, correcting measurement errors, and validating data against established standards.

3. Forecast Generation

a. Numerical Weather Prediction: Our forecasting system utilizes advanced numerical weather prediction models to generate forecasts.

These models simulate atmospheric processes using complex mathematical equations and algorithms.

b. Statistical Forecasting Techniques:

We enhance our forecasts with statistical methods that analyze historical weather patterns and trends. Techniques such as regression analysis and machine learning models are used to refine predictions based on past weather data.

c. Ensemble Forecasting:

To account for uncertainties in weather predictions, we use ensemble forecasting techniques. By running multiple simulations with slightly varied initial conditions, we generate a range of possible outcomes, providing a probability-based forecast.The core idea is that combining the outputs of multiple models can reduce errors and biases, providing more robust and reliable forecasts.

4. Forecast Validation and Calibration

a. Historical Verification:

We continuously compare forecast data with actual weather outcomes to assess accuracy. This historical validation helps identify model strengths and weaknesses, guiding ongoing improvements. **b. Calibration:**

Forecast models are periodically calibrated to adjust for systematic biases and improve precision. This involves fine-tuning algorithms and incorporating new data sources. 5. User Experience and

5. Presentation

a. Interactive Tools:

We present forecasts through user-friendly tools such as interactive maps, graphs, and dashboards. Users can visualize weather patterns, view detailed breakdowns, and access customizable alerts.

b. Personalized Forecasts:

Our system offers personalized weather updates based on user preferences and location. Customizable notifications and alerts ensure that users receive relevant and timely information.

c. Expert Analysis and Insights:

Meteorologists provide expert analysis and commentary on complex weather phenomena.
This contextual information helps users understand the forecast and make informed decisions.

a. Feedback Mechanisms:

We actively solicit feedback from users to improve our services. User experiences and suggestions are used to enhance forecast accuracy, usability, and overall satisfaction.

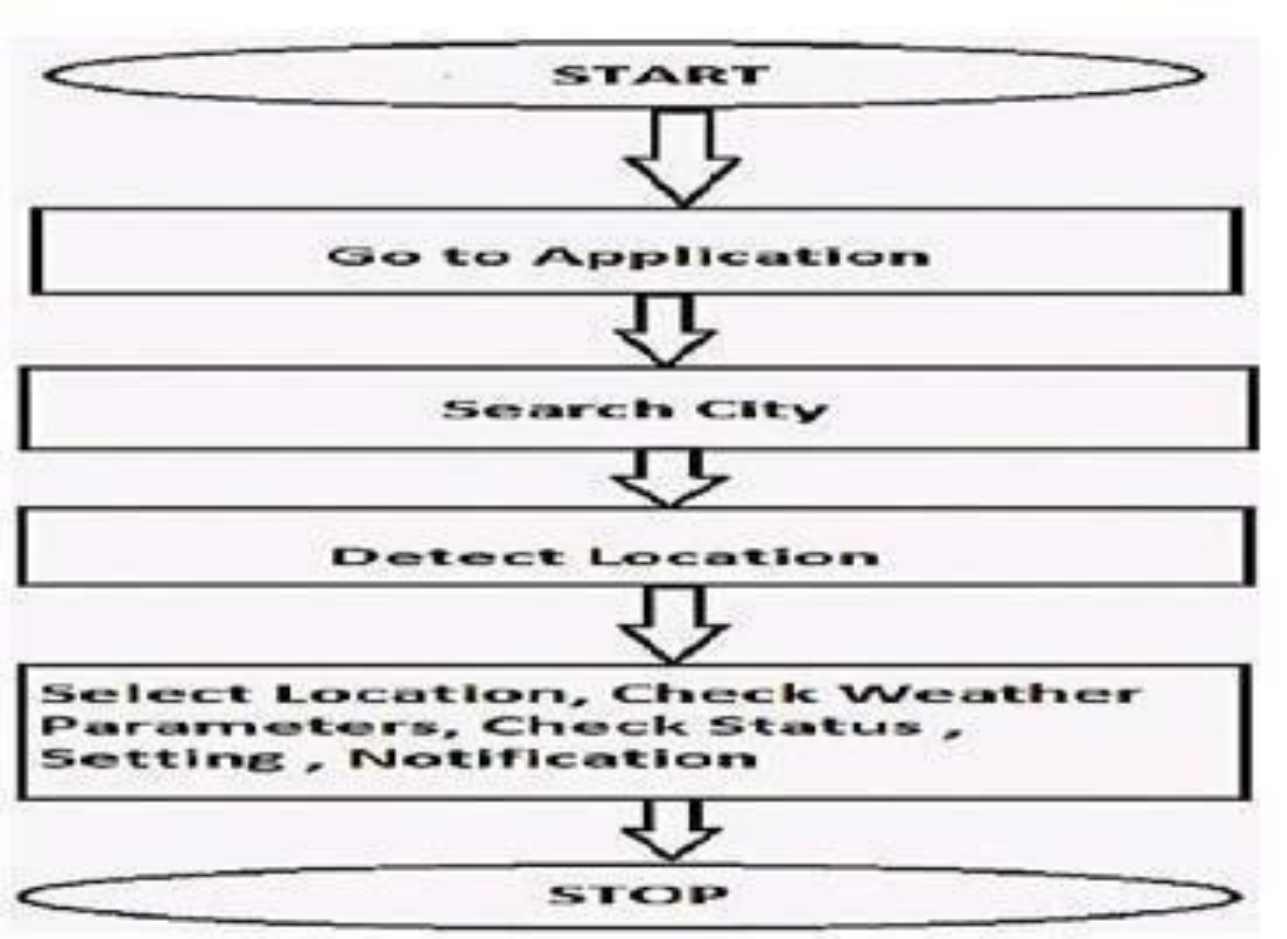
b. Technological Advancements:

We stay at the forefront of technological advancements in meteorology. Regular updates to our systems and integration of new technologies ensure that we provide the best possible weather information.

6.TEAM DETAILS:

NAME	GMAIL	WORK
Anik Shah	Shahanik12@gmail.com	UI/UX- CSS, React-JS, Material-UI.
Suraj Sharma	Surajthakurst629970@gmail.com	HTML.

7.Steps of flowchart in below:



8.REFERENCES

[1]. Google Maps API, https://developers.google.com/maps/documentation/androidapi/start.
[2]OpenWeatherAPI, https://openweathermap.org/api.