Minor Project Report

On

"Weather Forecasting System"

Submitted in partial fulfilment of

the requirements for the 5th Semester Sessional Examination of

BACHELOR OF COMPUTER SCIENCCE

BACHELOR OF DATA SCIENCCE

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CERTIFICATE

This is to certify that the project work entitled "WEATHER FORECASTING SYSTEM" is done by Name-khusi sahoo, sonali ghose, swayamprabha babu, Shivam kumar sahoo in partial fulfilment of the requirements for the 5th Semester Examination of Bachelor of Computer Science during the academic year 2023-24. This work is submitted to the department as part of the 5th Semester Minor Project evaluation.

Project Supervisor **Project Coordinator**

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ABSTRACT

The Weather Forecasting System project aims to enhance our understanding and prediction of weather conditions using advanced technologies and data analysis. The system integrates data from various sources to provide comprehensive and timely forecasts. The user interface is designed to be user-friendly, making weather information accessible to a wide audience. Future developments may include the use of artificial intelligence for real-time pattern recognition, personalized forecasting, and integration with emerging technologies such as Internet of Things (IoT) devices. Ultimately, the Weather Forecasting System project aspires to empower individuals, businesses, and communities with accurate and actionable weather insights for informed decision-making.

1. INTRODUCTION

Weather forecasting is a critical aspect of our daily lives, impacting a wide range of sectors, from agriculture to transportation, and public safety to disaster management. Accurate and timely weather predictions are essential for making informed decisions, reducing risks, and improving overall quality of life. The primary aim of this project is to provide individuals precise and location-specific weather information, improved safety, and overall enhanced quality of life.

1.1 PURPOSE

The primary purpose of the Weather Forecasting Project is to leverage technological advancements in meteorology for the creation of a robust and accurate weather prediction system. In a world increasingly influenced by climate variability, extreme weather events, and their consequential impacts on various sectors, a reliable forecasting mechanism becomes indispensable.

1.1 PROJECT SCOPE

The scope of the Weather Forecasting Project is comprehensive, encompassing various aspects of meteorological science and technological innovation. The project is designed to:

1. **User-Friendly Interface:**
    - Develop an intuitive and user-friendly interface accessible to a wide range of users, including the general public, researchers, and industry professionals.
    - Provide features for users to input specific locations and receive tailored weather forecasts.

2. **Multi-Parameter Forecasting:**

Forecast various meteorological parameters such as temperature, humidity, visibility, atmospheric pressure, UVI, sunset and sunrise.

3. **Forecast Visualization:**

- Provide representations and charts for a visual understanding of forecasted weather patterns.

1.3 PROJECT FEATURES

The project features include:

- **Real-Time Weather Data:**
  - Integration of real-time data from multiple sources, ensuring the latest and most accurate information on atmospheric conditions.
- **Location-Specific Forecasts:**
  - Tailored weather predictions based on user-specified locations, providing localized and relevant information.
- **Interactive User Interface:**
  - An intuitive and interactive interface for easy navigation and accommodating users with varying levels of technical expertise.
- **Multi-Day Forecasting:**
  - Forecasting extended periods, allowing users to plan activities days in advance with confidence in the predicted weather

.

- **Scalability:**
  - Design that allows for future expansions, accommodating additional features and improvements as technology and meteorological science evolve.
- **Visual Weather Representation:**
  - Representation of weather patterns through charts, graphs, and maps for enhanced visualization of forecasted conditions.

2. LITERATURE REVIEW

In Mary Nsabagwaa, Maximus Byamukamab, Emmanuel Kondelaa, " Towards a robust and affordable Automatic Weather Station " , journal homepage: www.elsevier.com/locate/deveng., the author suggested a reliable and cost-effective automatic weather station. In this essay, the author explains how every weather extreme event makes it more difficult to predict the weather, which has a negative impact on both lives and property. In order to improve weather forecast abilities and strengthen resistance to the effects of unfavourable weather report conditions, the accuracy of weather data is one of the key difficulties. The author discusses how several countries, including Uganda, The high expense of creating autonomous weather conditions includes the limited availability of weather monitoring. Those eligible for the restricted funding include national the national meteorological services of each country. The author first addresses the issues in this system before putting it into practise. The author suggested a wireless sensor network-based automatic weather monitoring station. The author intends to create three different automatic weather station (AWS) prototypes. According to the requirement and generation, the author of this study assesses the firstgeneration AWS prototype to enhance the second. In order to have an Automatic Weather Station, the author offers a suggestion to improve the nonfunctional requirements, such as power consumption, data accuracy, dependability, and data transfer.

3. PROBLEM STATEMENT

Weather forecasting plays a critical role in various sectors, including agriculture, transportation, and emergency management. However, the current state of weather prediction systems faces challenges in terms of accuracy and timely updates. The existing models and technologies have limitations in accurately forecasting extreme weather events, leading to potential risks and disruptions in various industries.

4. SYSTEM ANALYSIS

System analysis is a crucial phase in the development of a weather forecasting system. It involves a detailed study of the current system, identification of requirements, and the formulation of specifications for the new system.

4.1 IDENTIFICATION OF NEED

- Accuracy Improvement:
  - Current Limitations: Identify specific areas where the existing weather forecasting system falls short in terms of accuracy.
  - Quantify Improvement Goals: Clearly define the level of accuracy improvement required, both for short-term and long-term forecasts.
- Real-Time Updates:
  - Timeliness: Determine the requirements for real-time updates and the frequency at which updates should be provided.
  - Communication Channels: Identify the channels through which real-time weather information should be disseminated to end-users and relevant stakeholders.
- Accessibility and Inclusivity:
  - User Accessibility: Ensure that the weather forecasting system is accessible to users with varying levels of technical expertise.
  - Inclusivity: Consider the needs of diverse user groups, including those with disabilities or special requirements.

4.2 SYSTEM REQUIREMENTS

When you initiate any Project then there is need of some software. In this project the software listed below ware used:

HARDWARE REQUIREMENTS

- Operating system- Microsoft Windows 7 and above.
- 2 GB RAM and above.

4.3 TOOLS AND TECHNIQUE USED :

1) HTML

2) CSS

3) JavaScript

4)OpenWeatherMap API

1. HTML :

The Hyper Text Markup Language or HTML is the standard markup language for documents designed to be displayed in a web browser. It defines the meaning and structure of web content. It is often assisted by technologies such as Cascading Style Sheets and scripting languages such as JavaScript. Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for its appearance.

2. CSS :

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language such as HTML. CSS is designed to enable the separation of content and presentation, including layout, colors, and fonts.[3] This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS

in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

3. JavaScript :

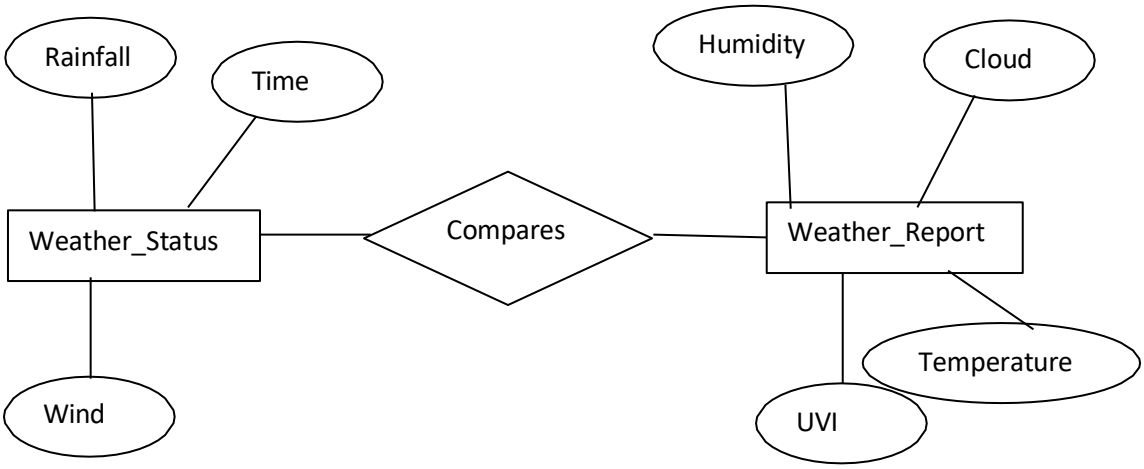
JavaScript (JS) is the most popular lightweight, interpreted compiled programming language. It can be used for both Client-side as well as Server-side developments. JavaScript also known as a scripting language for web pages. This JavaScript Tutorial is designed to help both beginners and experienced professionals master the fundamentals of JavaScript and unleash their creativity to build powerful web applications. From basic syntax and data types to advanced topics such as object-oriented programming and DOM manipulation.

4. OpenWeatherMap API:

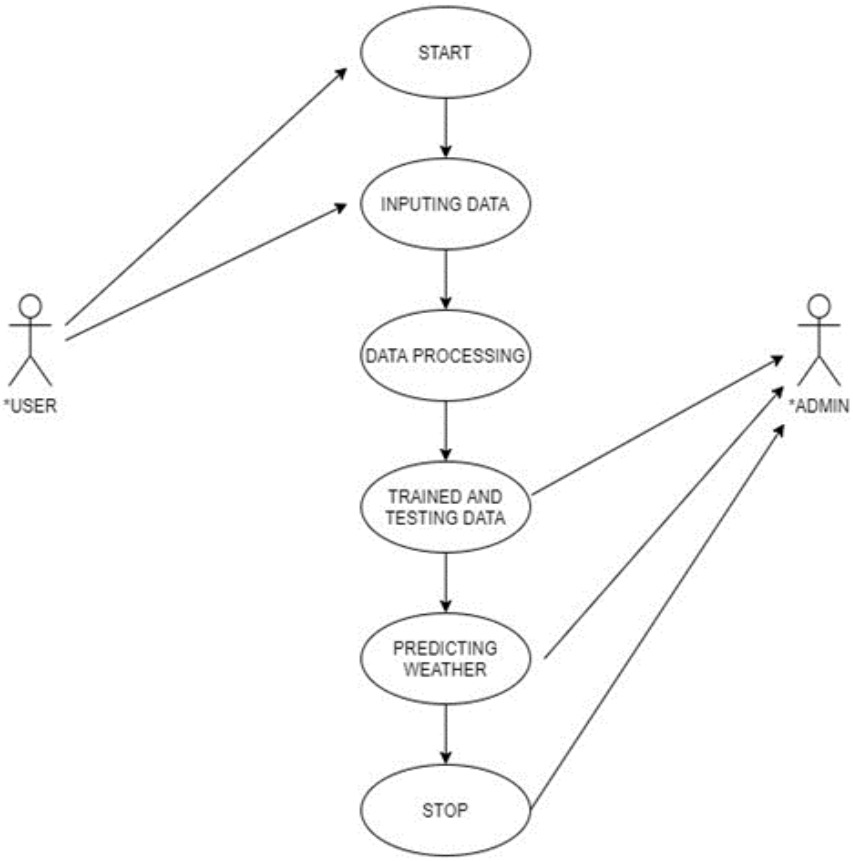
OpenWeatherMap is an online service, owned by OpenWeather Ltd, that provides global weather data via API, including current weather data, forecasts, nowcasts and historical weather data for any geographical location. The company provides a minute-by-minute hyperlocal precipitation forecast for any location.

SYSTEM DESIGN &SPECIFICATIONS

5.1 ENTITY RELATIONSHIP MODEL



5.2 USE CASE DIAGRAM



CODING PART

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">

<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Cloud Caster</title>
<link rel="stylesheet" href="css/style.css">
<link rel="shortcut icon" href="/favicon.ico" type="image/x-icon">
<script src="https://kit.fontawesome.com/f5c8e13b2d.js" crossorigin="anonymous"></script>
</head>
<body>
<div class="container">
<div class="weather-report">
<nav>
<div class="location">
<h2 id="city">New Delhi</h2>
<h3 id="country"><i class="fa-sharp fa-solid fa-location-dot">
</i>India</h3>
</div>
<div class="search-area">
<input type="text" id="search" placeholder="Enter city name..." spellcheck="false">
<button><i class="fa-solid fa-magnifying-glass"></i></button>
</div>
<div class="hamburger">
<span class="bar"></span>
<span class="bar"></span>
```

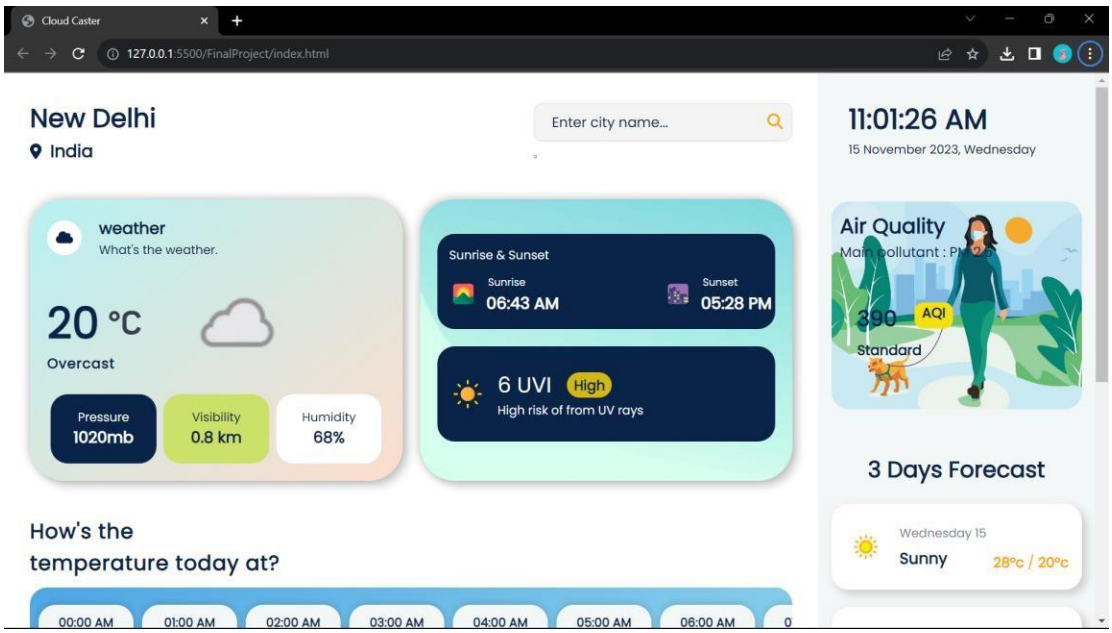
```
            <span class="bar"></span>
        </div>
    </nav>
    <div class="current-status">
        <div class="weather weather-box1">
            <div class="weather-heading">
                <div class="weather-icon">
                    <i class="fa-solid fa-cloud"></i>
                </div>
                <div class="weather-description">
                    <h3>weather</h3>
                    <h4>What's the weather.</h4>
                </div>
            </div>
            <div class="weather-temperature">
                <div class="temperature">
                    <div class="temp">
                        <h2 id="temp">22 </h2>
                        <img src="images/celsius.svg" alt="">
                    </div>
                    <img id="weather-icon" src="images/clear.png" alt="">
                </div>
                <p id="description">Partly Cloudy</p>
            </div>
<div class="weather-details">
            <div class="box">
                <p>Pressure</p>
                <h3 id="pressure">800mb</h3>
            </div>
            <div class="box">
                <p>Visibility</p>
```

```
                    <h3 id="visibility">4.3 km</h3>
                </div>
                <div class="box">
                    <p>Humidity</p>
                    <h3 id="humidity">87%</h3>
                </div>
            </div>
        </div>
<div class="weather weather-box2">
            <div class="more-details">
                <div class="more-detail-box">
                    <p>Sunrise & Sunset</p>
                    <div class="sunrise-sunset">
                        <div class="sunrise">
                            <span>  </span>
                            <div class="sunrise-status">
                                <p>Sunrise</p>
                                <h3 id="sunrise-time">6:41 AM</h3>
                            </div>
                        </div>
                        <div class="sunset">
                            <span></span>
                            <div class="sunset-status">
                                <p>Sunset</p>
                                <h3 id="sunset-time">5:56 PM</h3>
                            </div>
                        </div>
                    </div>
                </div>
```

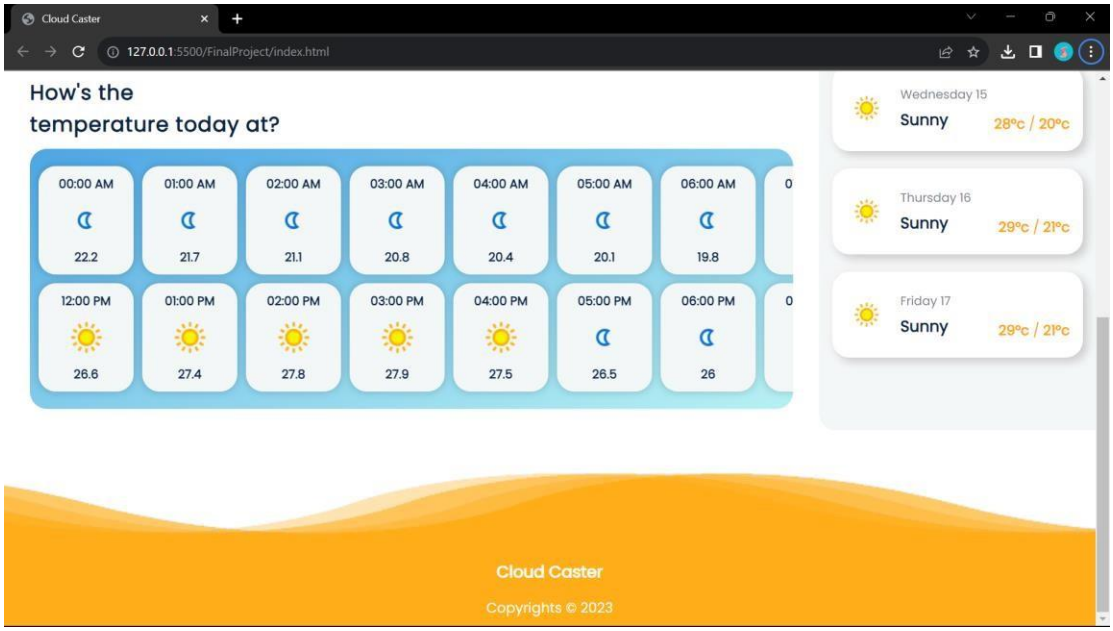
```
<div class="more-detail-box uvi-rays-area">
                    <img src="images/clear.png" alt="">
                    <div class="uvi-mesurement">
                       <div class="uvi-rays-status">
                          <div id="uvi-rays">20 UVI</div>
                          <div class="uvi-level">Moderate</div>


                </div>
                <div class="uvi-level-desc">
                   <span class="uvi-level2">Moderate</span> risk of from UV

                </div>
             </div>
          </div>
       </div>
    </div>
</div>
```

SCREENSHOTS OF THE PROJECT

Dashboard Page



Weather Information Page



CONCLUSION

In conclusion, the Weather Forecasting System project represents a significant achievement in our commitment to providing accurate and reliable weather predictions. The integration of advanced forecasting algorithms, collaboration with meteorological experts, and the development of an intuitive user interface have collectively resulted in a robust and adaptable system. Challenges, such as ensuring data quality and optimizing system performance, were met with resilience and problem-solving, contributing to the project's overall success. As we reflect on this endeavour, it is clear that the interdisciplinary collaboration, agile development methodology, and continuous user feedback were pivotal in shaping a system that meets the evolving needs of both meteorological professionals and the wider community. Looking ahead, the project serves as a foundation for ongoing research, community engagement, and the integration of emerging technologies, ensuring that the Weather Forecasting System remains at the forefront of advancements in meteorology, providing invaluable insights for years to come.

FUTURE ENHANCEMENT

Looking ahead, the future enhancement of our weather forecasting system project is envisioned to be a dynamic evolution that builds upon our current successes. Emphasizing precision and innovation, our roadmap includes the incorporation of advanced machine learning models for more accurate predictions, leveraging real-time data from cutting-edge remote sensing technologies. The user experience will be further elevated through enhanced visualization techniques, embracing three-dimensional representations and augmented reality. Personalization will take centre stage, allowing users to receive tailored forecasts based on their preferences and historical interactions. To bolster resilience against extreme weather events, we aim to implement early warning systems and real-time alerts. The integration of Internet of Things (IoT) devices will contribute to localized, granular data, while community engagement features and crowdsourced inputs will foster a collaborative ecosystem. The mobile application will see continuous improvements, offering seamless functionality, push notifications for severe weather, and offline capabilities. Additionally, our commitment extends to addressing the impacts of climate change, with tools for assessing long-term trends and aiding in climate resilience planning.

REFERENCES

https://www.irjet.net

https://www.geeksforgeeks.org

https://en.wikipedia.org