
RAJALAKSHMI
ENGINEERING COLLEGE
An AUTONOMOUS Institution
Affiliated to ANNA UNIVERSITY, Chennai

# ROAD ACCIDENT PREDICTION SYSTEM

## A MINI PROJECT REPORT


| SUBMITTED | BY |
|---|---|
| SATHYANATH L | **2315** |
| RANJITH KUMAR B | **231501505** |
| SHARAN M | **231501508** |


CS23332DATABASE MANAGEMENT SYSTEM


Department of Artificial Intelligence and Data Science

Rajalakshmi Engineering College, Thandalam


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# BONAFIDE CERTIFICATE

Certified that this project report "**FINANCIAL MANAGEMENT SYSTEM**" is the bonafide work of **"SHRIRAM M (231801507) , SAKTHIVEL BALAJI (231801505) , VIGNESH R (231801508)"**

who carried out the project work under my supervision.

**Submitted for the Practical Examination held on _____**


**SIGNATURE**

**Dr.GNANASEKARJ M**
**HeadoftheDepartment,Artificialintelligence and data Science,Rajalakshmi EngineeringCollege(Autonomous),Chennai-602105**

**SIGNATURE**

**Dr.MANORANJINI J**
**Assoc.Professor,ArtificialIntelligenceandData Science, Rajalakshmi Engineering College(Autonomous),Thandalam,Chennai-602105**

# ABSTRACT

Due to the exponentially increasing number of vehicles on the road, the number of accidents occurring on a daily basis is also increasing at an alarming rate. With the high number of traffic incidents and deaths these days, the ability to forecast the number of traffic accidents over a given time is important for the transportation department to make scientific decisions. In this scenario, it will be good to analyze the occurrence of accidents so that this can be further used to help us in coming up with techniques to reduce them. Even though uncertainty is a characteristic trait of majority of the accidents, over a period of time, there is a level of regularity that is perceived on observing the accidents occurring in a particular area. This regularity can be made use of in making well informed predictions on accident occurrences in an area and developing accident prediction models. In this paper, we have studied the inter relationships between road accidents, condition of a road and the role of environmental factors in the occurrence of an accident. We have made use of data mining techniques in developing an accident prediction model using Apriori algorithm and Support Vector Machines. Bangalore road accident datasets for the years 2014 to 2017 available in the internet have been made use for this study. The results from this study can be advantageously used by several stakeholders including and not limited to the government public work departments, contractors and other automobile industries in better designing roads and vehicles based on the estimates obtained.

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# I. INTRODUCTION

## INTRODUCTION

Road traffic accidents are a significant global concern, causing loss of life, injury, and economic damage each year. According to the World Health Organization (WHO), road traffic accidents result in over 1.35 million deaths annually, with millions more suffering from injuries. In addition to human suffering, accidents also place a substantial burden on healthcare systems and the economy. Predicting and preventing such accidents is therefore crucial in improving road safety.

Traditional methods of accident prevention largely rely on historical data and reactive strategies, such as the implementation of road safety campaigns or infrastructure improvements. However, the rise of big data, machine learning, and artificial intelligence (AI) presents an opportunity to shift from reactive to proactive approaches in road safety. By analyzing large volumes of data from various sources—including traffic patterns, weather conditions, road characteristics, and driver behavior—predictive models can identify high-risk scenarios and help prevent accidents before they occur.

The **Road Accident Prediction System (RAPS)** is a project that utilizes data-driven techniques to forecast the likelihood of road accidents under various conditions. The system analyzes real-time and historical data to identify risk factors such as weather conditions, time of day, traffic density, and road conditions. Through machine learning algorithms, the system can predict accident-prone areas and timeframes, providing valuable insights for traffic authorities, transportation departments, and drivers to take preventive actions.

This project aims to develop an intelligent system capable of:

- Predicting road accidents in real-time based on various dynamic factors.
- Analyzing patterns in traffic and environmental data to forecast potential accident hotspots.
- Providing decision-makers with actionable insights to enhance public safety.

Ultimately, the goal is to reduce the frequency and severity of road accidents, thereby improving road safety and contributing to a safer driving environment for all road users. The following report outlines the methodology, implementation, and results of the Road Accident Prediction System, emphasizing its potential in transforming road safety management through the power of data analytics.

## OBJECTIVES

- **PrimaryObjectives**
    1. Predict Road Accidents based on various factors
    2. Identify High-Risk Areas and Time Periods
    3. Develop a Scalable and Adaptive System
    4. Provide Actionable Insights for Road Safety Authorities

- **BusinessObjectives**
    1. Reduce Operational Costs for Transport and Insurance Companies
    2. Enhance Customer Experience and Safety
    3. Support Regulatory Compliance and Safety Standards
    4. Long-Term Impact on Infrastructure Development

## MODULES

### Login Page

The login page allows users to authenticate themselves by entering a username and password. The application validates the entered credentials against the securely stored hashed passwords in the database. Upon successful authentication, users are redirected to the home page. If the credentials are invalid, an error message prompts users to re-enter their details.

### Register Page

The register page enables new users to create an account by providing a unique username and a password. The password is securely hashed before being stored in the database to ensure confidentiality. Duplicate usernames are not allowed, and users are notified if the entered username already exists. After successful registration, users are redirected to the login page.

### Home Page

The home page welcomes authenticated users and provides a form for querying road accident data. Users can input specific filters, including state, area name, time, and vehicle load conditions, to search for relevant records in the database. The page acts as the main interface for interacting with the system.

### Result Page

The result page displays the details of accident records based on the filters submitted by the user on the home page. If a matching record is found, it is presented in a structured format. If no data matches the query, a message informs the user that no records were found.

# II. SURVEY OF TECHNOLOGIES

## SOFTWAREDESCRIPTION

### ECLIPSE

Eclipse is written mostly in Java and its primary use is for developing Java applications, Eclipse is an integrated development environment (IDE) used in computer programming. It contains a base workspace and an extensible plug-in system for customizing the environment. It is the second most-popular IDE for Java development, and, until 2016,was the most popular. Eclipse is written mostly in Java and its primary use is for developing Java applications.

Eclipse Enterprise Edition(EE)isa package for developerswho work withJava and web applications. It includes tools for:

- Java
- JavaScript
- TypeScript
- JavaServerPagesand Faces
- Tomcatserver
- ApacheMaven
- Git

Eclipse EE is a version of Eclipse that comes with tools to make it easier to write server code. For example, you can compile and run a server bypressing the play button.

### SQL LITE

SQLite is a self-contained, serverless relational database management system (RDBMS) known for its simplicity and efficiency. It doesn't require a separate database server, storing the entire database in a single file, which simplifies deployment and backups. SQLite is ACID-compliant, ensuring data integrity even during crashes. It supports core SQL features like indexing, triggers, and transactions, as well as advanced operations like full-text search and foreign key constraints. Commonly used in mobile apps, embedded systems, and desktop software, SQLite is ideal for lightweight data storage needs. While not suited for high-concurrency or large-scale applications, it excels in scenarios where simplicity and portability are key.

## LANGUAGES

### PYTHON

Python is a high-level, interpreted programming language known for its simplicity, readability, and versatility. Created by Guido van Rossum and released in 1991, it emphasizes clean syntax and ease of use, making it ideal for both beginners and experienced developers. Python supports multiple programming paradigms, including procedural, object-oriented, and functional programming. Its extensive standard library and third-party packages enable applications in diverse fields such as web development, data analysis, artificial intelligence, and automation. Python's cross-platform compatibility and strong community support have made it one of the most popular languages for modern software development.

### FLASK

Flask is a lightweight, open-source web framework for Python that provides the essential tools for building web applications. It is designed to be minimalistic and flexible, offering developers the freedom to choose how they structure their projects. Flask includes features like URL routing, request handling, and the Jinja2 templating engine, while leaving many decisions about architecture and components to the developer. This makes it ideal for creating small to medium-sized applications, RESTful APIs, or prototypes. Flask's simplicity, extensibility, and active community have made it a popular choice for web developers looking for a fast and efficient framework.

### HTML

HTML, or Hypertext Mark up Language, is the standard language used to create web pages. It defines the structure and content of web documents using tags and attributes to format text, embed images, create links, and build interactive elements. HTML facilitates communication between web browsers and servers, making it a crucial skill for web developers. HTML was invented by TimBerners-Lee, a physicist at CERN, in 1990. Since its inception, HTML has evolved significantly, becoming the foundation of web development. When working with HTML, you use a simple code structure that includes tags and attributes to build the layout of a webpage.

**CSS**

CSS (Cascading Style Sheets) is a stylesheet language used to define the visual presentation of web pages written in HTML. It controls layout, colors, fonts, spacing, and overall design, allowing developers to create visually appealing and responsive websites. By separating content (HTML) from presentation (CSS), it improves accessibility and maintainability. CSS enables consistent styling across multiple pages, reduces redundancy, and enhances website performance by allowing browsers to cache stylesheets. It also supports responsive design, ensuring web pages adapt to various screen sizes. Overall, CSS is essential for creating attractive, user-friendly, and efficient web pages.

**JAVASCRIPT**

JavaScript is a versatile, high-level programming language used primarily for web development to create interactive and dynamic websites. It enables features like form validation, animations, and real-time content updates. As a client-side language, JavaScript runs in the browser, improving user experience without reloading the page. It also supports server-side development through environments like Node.js.

# III. REQUIREMENTS AND ANALYSIS

## REQUIREMENTSPECIFICATION

### User Requirements

The user requirements for the Road Accident Prediction System focus on providing real-time, accurate predictions, alerts, and analytical insights, while ensuring a user-friendly experience..

### System Requirements

The system requirements address the hardware and software components needed to support data collection, processing, storage, and presentation, ensuring smooth operation and scalability. By meeting these requirements, the system will be able to predict accidents effectively and help reduce traffic-related incidents, improving overall road safety.

## HARDWARE AND SOFTWARE REQUIREMENTS

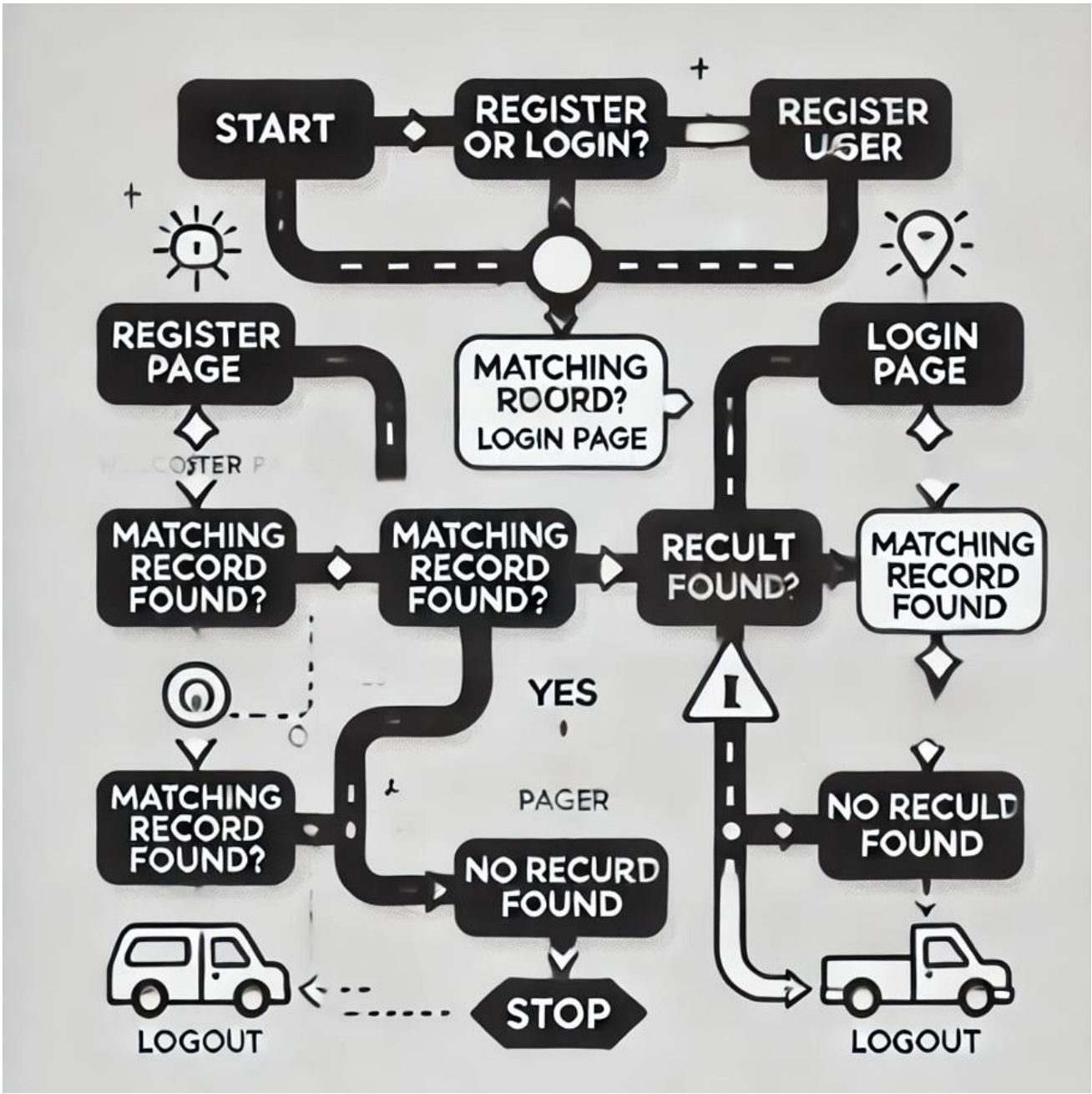
### SoftwareRequirements

- Operating System: Windows10
- Front End: HTML , CSS , JavaScript
- BackEnd: FLASK , SQL LITE

### HardwareRequirements

- Desktop PC or Laptop
- Printer (optional)
- OperatingSystem:Windows10
- Intel® Core™ i3-6006UCPU @2.00GHzor higher
- 4.00 GB RAM or higher
- 64-bitoperatingsystem,x64basedprocessor
- MonitorResolution:1024x768orhigher
- Keyboard and Mouse

**ERDIAGRAM**


START
REGISTER OR LOGIN?
REGISER USER
REGISTER PAGE
MATCHING ROORD?
LOGIN PAGE
LOGIN PAGE
MATCHING RECORD FOUND?
MATCHING RECORD FOUND?
RECULT FOUND?
MATCHING RECORD FOUND
YES
MATCHING RECORD FOUND?
PAGER
NO RECULD FOUND
NO RECURD FOUND
STOP
LOGOUT
LOGOUT

# IV. PROGRAM CODE

## DESIGN

```
{% load static %}  <!-- Add this line to load static files -->

<!DOCTYPE html>
<html lang="en">
<head>
    <title>{% block title %} Default Title {% endblock %}</title>
    <link rel="icon" href="{% static 'images/icon.png' %}" type="image/x-icon" />
</head>
<body>
    <header>
        <!-- Common header content like navigation goes here -->
        <h1>My Site</h1>
        <nav>
            <ul>
                <li><a href="/">Home</a></li>
                <li><a href="/about/">About</a></li>
                <li><a href="/contact/">Contact</a></li>
            </ul>
        </nav>
    </header>

    <main>
        {% block userblock %}
        <!-- This is where the content from ram.html will go -->
        {% endblock %}
    </main>

    <footer>
        <p>© 2024 My Site</p>
    </footer>
</body>
</html>
```

## APPLICATIONPROPERTIES

```
class Config:
    SECRET_KEY = 'your_secret_key'
    SQLALCHEMY_DATABASE_URI = 'mysql://username:password@localhost/your_database'
    SQLALCHEMY_TRACK_MODIFICATIONS = False
```

## INDEX

```
!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Accident Checker</title>
    <link rel="stylesheet" href="{{ url_for('static', filename='styles.css') }}">
</head>
<body>
    <div class="container">
        <h1>Check Accident Status</h1>
        <form method="POST">
            <label for="state">State:</label>
            <input type="text" id="state" name="state" required>

            <label for="area_name">Area Name:</label>
            <input type="text" id="area_name" name="area_name" required>

            <label for="time">Time:</label>
            <input type="number" id="time" name="time" required>

            <label for="vehicle_load">Vehicle Load:</label>
            <input type="text" id="vehicle_load" name="vehicle_load" required>

            <button type="submit">Check Accident</button>
        </form>

        {% if result %}
            <div class="result">
                <p>{{ result }}</p>
            </div>
        {% endif %}
    </div>
</body>
</html>
```

**STYLE**

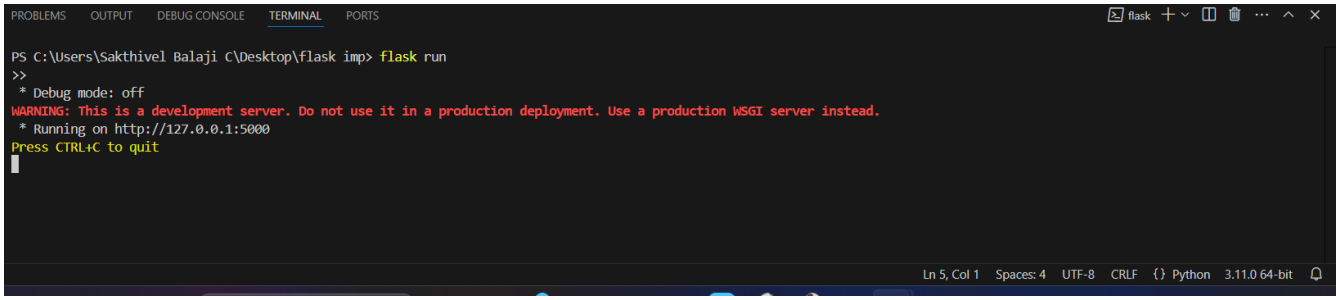
```
* {
    box-sizing: border-box;
    font-family: Arial, sans-serif;
}
body {
    background-color: #121212;
    color: #e0e0e0;
    display: flex;
    align-items: center;
    justify-content: center;
    height: 100vh;
    margin: 0;
}
.container {
    max-width: 400px;
    padding: 20px;
    background-color: #1e1e1e;
    border-radius: 8px;
    box-shadow: 0 4px 8px rgba(0, 0, 0, 0.3);
}
h1 {
    text-align: center;
    color: #bb86fc;
}
```

```
form label {
    margin-top: 10px;
    display: block;
}
form input {
    width: 100%;
    padding: 8px;
    margin-top: 5px;
    border-radius: 4px;
    border: none;
    background-color: #333;
    color: #e0e0e0;
}
button {
    width: 100%;
    padding: 10px;
    margin-top: 20px;
    background-color: #bb86fc;
    color: #121212;
    border: none;
    border-radius: 4px;
    cursor: pointer;
}
```

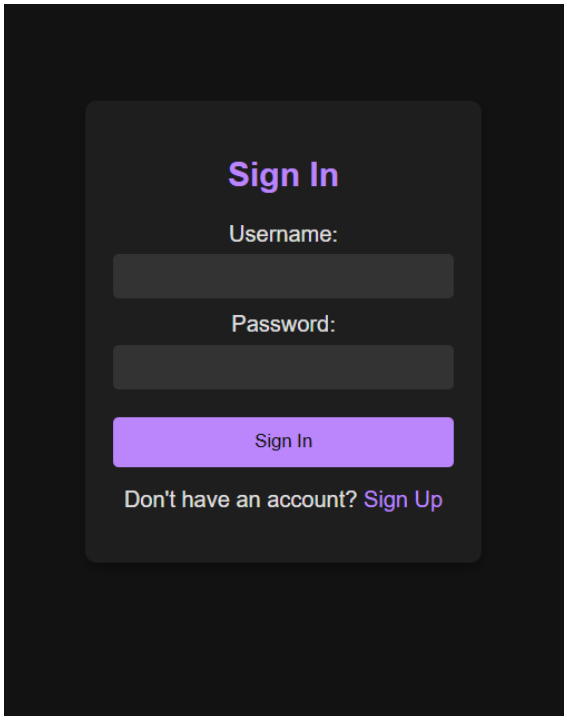
```
button:hover {
    background-color: #3700b3;
}

.result {
    margin-top: 20px;
    text-align: center;
    font-size: 1.2em;
    color: #bb86fc;
}
```

# V. RESULT AND DISCUSSION

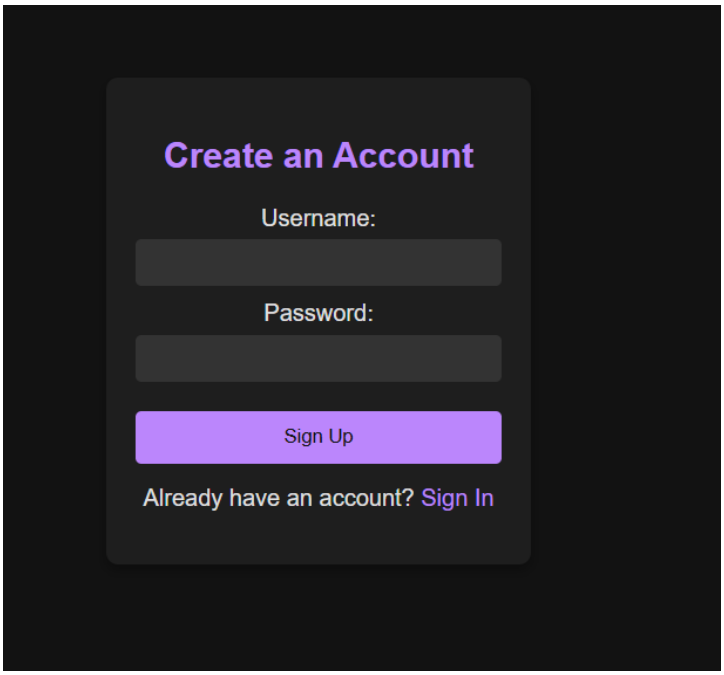
## GENERATING THE LINK



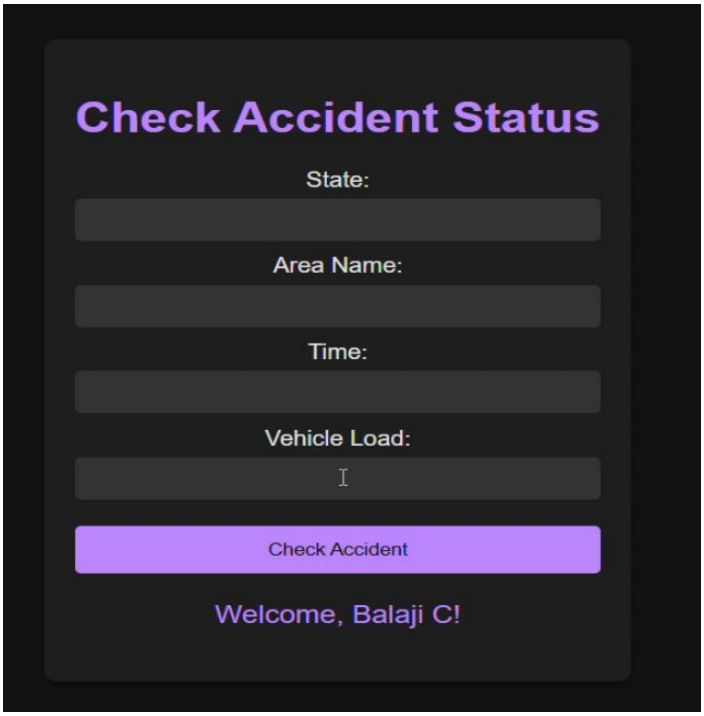

## LOGIN PAGE



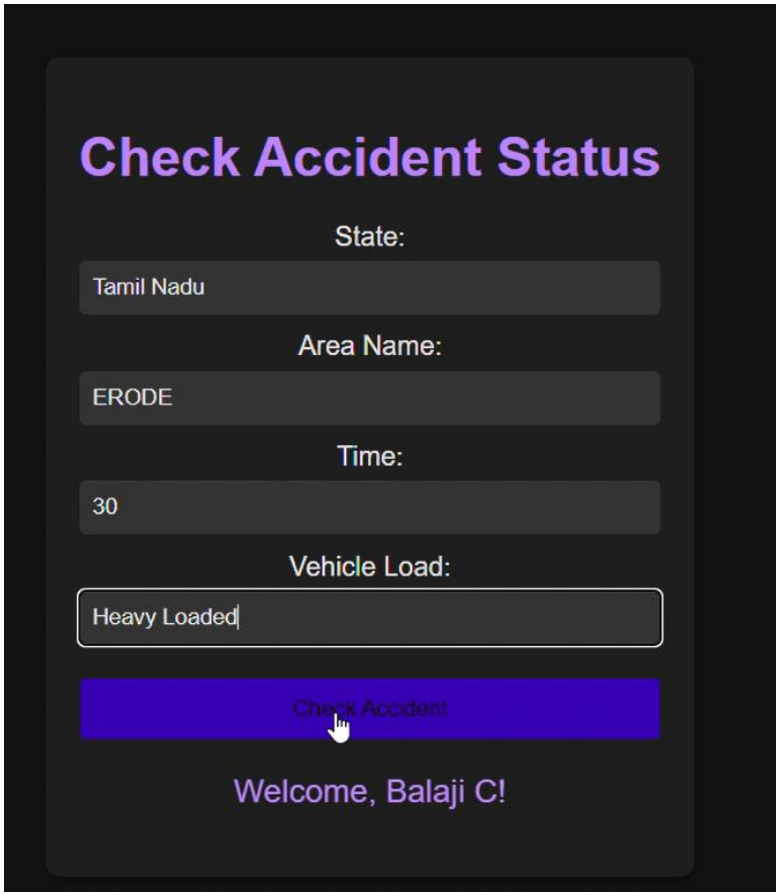
**SIGNUP PAGE**



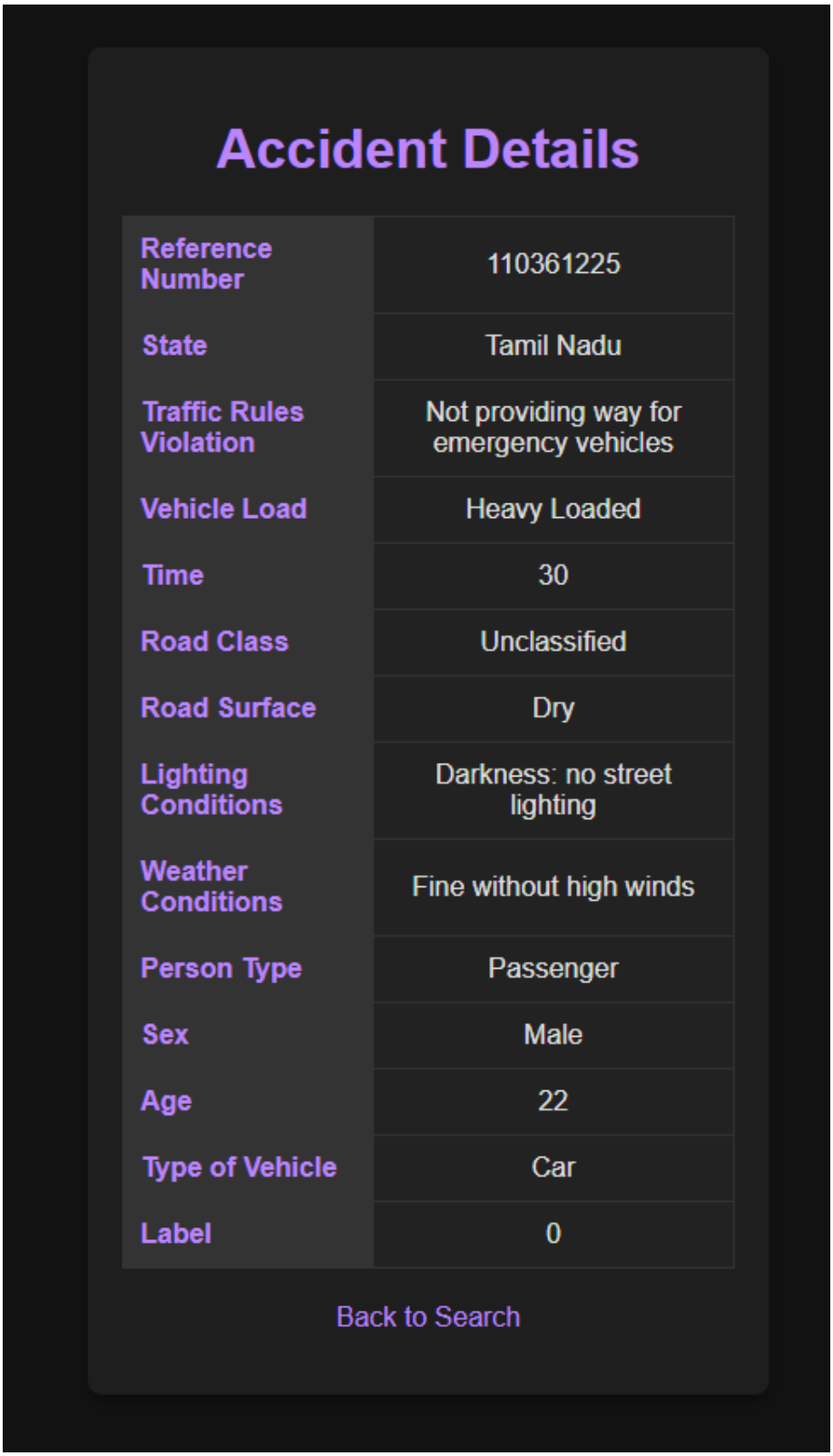

CHECK ACCIDENT STATUS



**USER INPUT**


Check Accident Status
State:
Tamil Nadu
Area Name:
ERODE
Time:
30
Vehicle Load:
Heavy Loaded
Check Accident
Welcome, Balaji C!

**RETRIVED ACCIDENT DETAILS**



# RESULTS

1. **identify high-risk locations based on various factors:**

    - Identifying high-risk locations is a combination of analyzing past accident data.
    - It is analyzed by factoring in elements like road conditions, traffic density, weather conditions, time of day, and driver behavior.
    - help prioritize interventions to reduce accidents and improve road safety..
    - it is greatly useful to transportation agencies, insurance companies, drivers, and even pedestrians also travelers too.
    - It is useful for the government to analyze the primary cause of the accident do the needed.

2. **helps users make informed decisions:**

    - by providing them with risk assessments for different road segments.
    - This enables safer travel decisions, proactive safety measures, and optimized routes..

3. **Raising Awareness:**

    - Raise Awareness About Potential Accident Zones and Promote Road Safety through notifications not only to reduce the number of accidents but also helps save lives, reduce injuries, and foster safer driving behavior across communities.

4. **Performance&Security:**

    - The web application was responsive and performed well under standard testing, though it requires more enhanced development and performance for alive environment.

Overall , the project achieved its objectives, delivering a functional and user-friendly web apllication experience.

# DISCUSSION

## LIMITATIONS AN CONSTRAINS :

### **Scalability**:

- This project is designed as a mini-project focused on a limited number of users and routes, making it more manageable in terms of infrastructure, data processing, and user interaction. However, as the system moves from this small-scale implementation to a larger-scale solution, scalability becomes an important consideration.

### Predictive Accuracy:

- While the system uses predefined rules and historical data, it cannot predict all accidents due to the complex and unpredictable nature of road incidents, such as driver behavior or sudden changes in conditions

### Dependence on User Input:

- The system’s predictions depend on the accuracy of user input for route and location details. However, users may occasionally provide incorrect or incomplete information, potentially affecting the reliability of the system's predictions and risk assessments.

### Real-Time Updates:

- While the system provides near real-time updates, there may be slight delays due to factors such as network congestion or high system load. These delays could impact the timeliness of accident predictions and alerts, potentially affecting the system's ability to provide instant recommendations during peak usage periods.

# VI. CONCLUSION

In conclusion, the Road Accident Prediction System represents a significant advancement in proactive road safety. By utilizing sophisticated data analysis and real-time insights, the system evaluates various factors that contribute to accidents, such as weather conditions, road quality, traffic density, and historical accident data. This comprehensive analysis allows the system to predict potential accident hotspots and assess risk levels for specific routes, providing users with timely information to make safer travel decisions.

Drivers can benefit by avoiding accident-prone areas, adjusting their routes to safer alternatives, and being better prepared for adverse conditions, ultimately reducing the likelihood of accidents. Additionally, the system raises awareness about potential road hazards, encouraging safer driving behavior and cultivating a culture of caution on the road.

Beyond individual users, the system is a valuable resource for traffic authorities, local governments, and organizations that focus on road safety. It offers actionable insights that can guide the implementation of targeted safety measures, policies, and infrastructure improvements. By continuously monitoring and analyzing traffic and road conditions, the Road Accident Prediction System enhances overall road safety, reduces accident-related risks, and helps safeguard lives by providing users and authorities with the information they need to make informed, proactive decisions.

# VII. REFERENCES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