

The background features a large white circle in the center, partially overlapping a light blue rectangle on the left and a light pink rectangle on the right. A dark blue shape, resembling a stylized car hood or a large 'U' shape, is positioned at the bottom, framing the white circle.

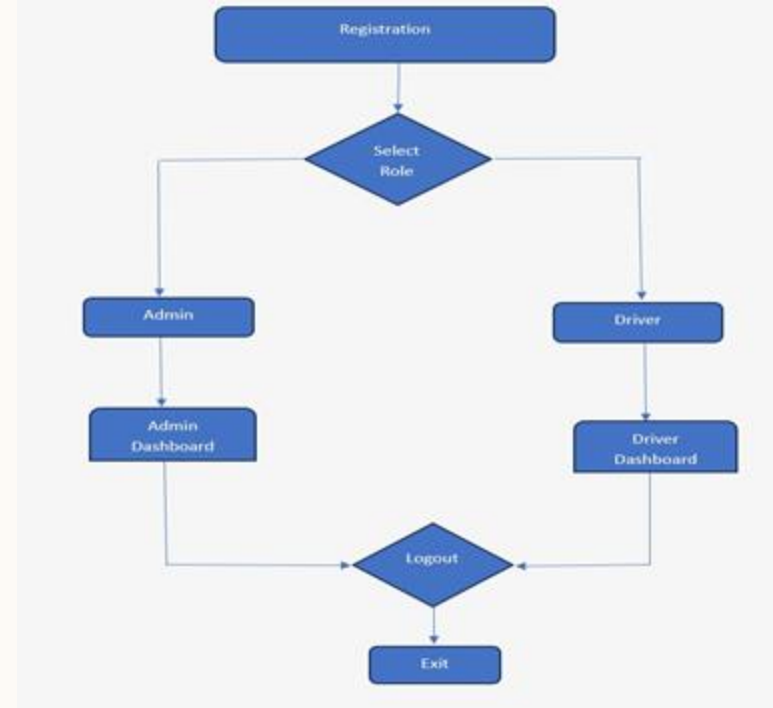
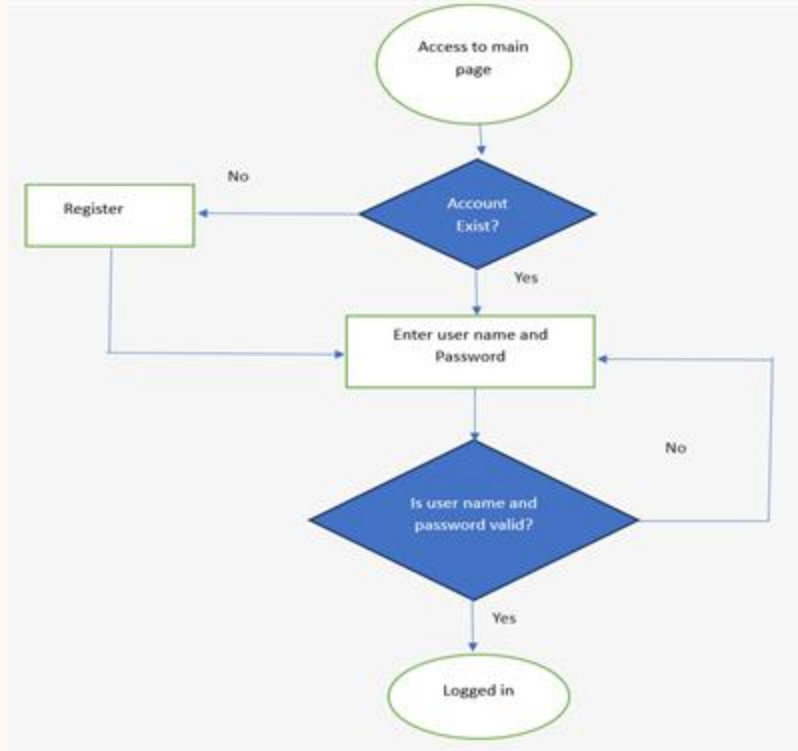
EV FLEET MONITORING AND PREDICTION

INTRODUCTION

EV Fleet Monitoring and Predictive Analysis is a Python-based solution designed to enhance the management and operation of electric vehicle (EV) fleets. By predicting the range of EVs, the system provides fleet operators and data-driven recommendations.

- Predictive Analytics: Use historical data to forecast range and maintenance needs.
- User-Friendly Interface: Provides both fleet operators and administrators with easy-to-access insights, empowering them to make data-driven decisions.

FLOW OF PROJECT



PROJECT OVERVIEW

DRIVER FEATURES

- **User Account Creation**
 - Drivers can create a new user account to access the application.
- **Secure Login**
 - Log in with a email and password.
 - Forgot password? Easily reset via a link sent to the registered email.
- **Driver's Dashboard**
 - After login, access a dashboard.
 - Predict EV range by selecting the car name and entering battery percentage.

PROJECT OVERVIEW

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ADMINISTRATOR FEATURES

- **Admin Dashboard Access**
 - After login, access the admin dashboard with advanced tools.
- **Data Visualization**
 - Bar graphs for dynamic distribution analysis.
 - Pie charts for understanding distribution.
 - Relationship visualization for better insights.
 - Status Counts: View the count of vehicles in Working or Charging conditions.
 - Average maintenance costs by manufacturer.
- **Driver Behavior Analysis**
 - Identify overspeeding drivers.
 - Notify drivers via email regarding safety and behavior.
- **Range Prediction**
 - Select models and input battery percentages for EV range prediction.

SOFTWARE SPECIFICATION

Operating System: Linux /Windows 10

Programming Language: Python 3.12.3

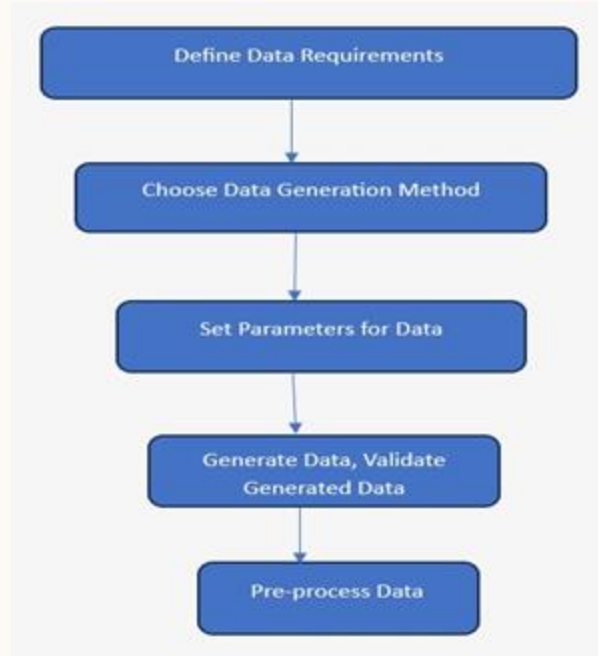
IDE : VS code , Jupyter notebook/google colab

DataBase: mysql Ver 8.0.39

Libraries Used : Flask(3.1.0), Numpy(2.1.3), Pandas(2.2.3), Flask-Mail(0.10.0), Faker(32.1.0)

SYNTHETIC DATA STEPS

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SYNTHETIC DATA RULES

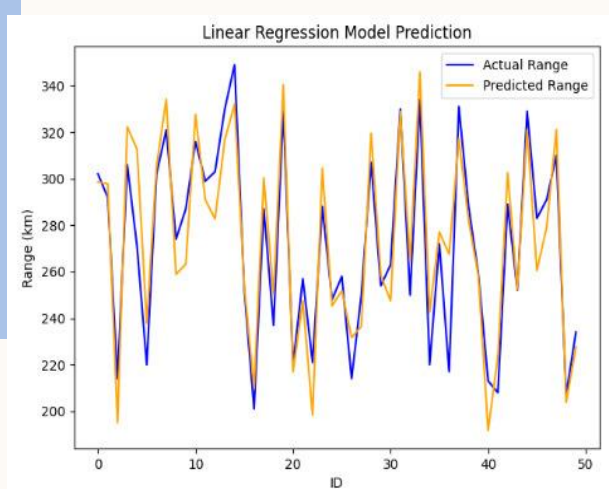
1. **Install the Faker Library:** First, install the faker library in your environment, either using Google Colab or Jupyter Notebook.
2. **Import Required Libraries:** Import all necessary libraries for creating the DataFrame. In this code, we will use pandas, random, faker, and datetime.
3. **Create DataFrame :** We will generate a DataFrame containing 10000 rows of data with the following columns:
 - **Range:** Generate a correlated range value.
 - **Battery Level (%)**: Use random.randint to generate random battery levels within the range of (15, 100).
 - **Latitude (N) and Longitude (E)**: Use random.uniform to generate latitude values in the range (10.00, 20.00) and longitude values in the range (76.00, 80.00).
 - **Speed:** Generate random speeds within the range (30, 200).
 - **Length and Width:** Generate random values within the range, Length Range(2500,5500) in mm, Width Range(1500,4500) in mm.
 - **Height:** Generate random values within the range (500, 2000) in mm.
 - **Top Speed:** Generate values within the range (70, 200).
 - **Vehicle Status:** Use random.choice to select randomly between 0 and 1, representing the vehicle's status.
 - **Charge Time:** Use fake.time() to generate fake times.
 - **Maintenance Cost:** Generate random values within the range (400, 2500).
 - **Charge Cost:** Generate values within the range (10, 100).
 - **Dates:** Use a custom function generate_random_dates to create dates formatted as %d for day, %m for month, and %y for year. Set the start date as January 1, 2024, and the end date as October 31, 2024.
4. **Extract Day, Month, and Year:** Use Python's substring functions to extract the day, month, and year from the date column.
5. **Create the DataFrame:** Finally, create the DataFrame using the function pd.dataframe

MODEL PREDICTION STEPS

- **Prepare Your Dataset** : Ensure the dataset is in the correct directory and properly formatted.
- **Process the Data** : Select Features and Target
- **Split the Dataset** : Use `train_test_split()` to divide the data into training and testing subsets , ensuring that 80% is used for training and 20% for testing.
- **Scale the Data** : Standardize the feature set using `StandardScaler()`. Fit the scaler on the training data, and apply the same transformation to the testing data.
- **Train the Model** : Initialize and train the models on scaled training data.
- **Make Predictions** : Use the `predict()` method on the test set(`X_test_scaled`) to generate predictions for the 'Range'.
- **Evaluate the Model** : Calculate evaluation metrics using(`MSE, RMSE, MAE, RSS`)

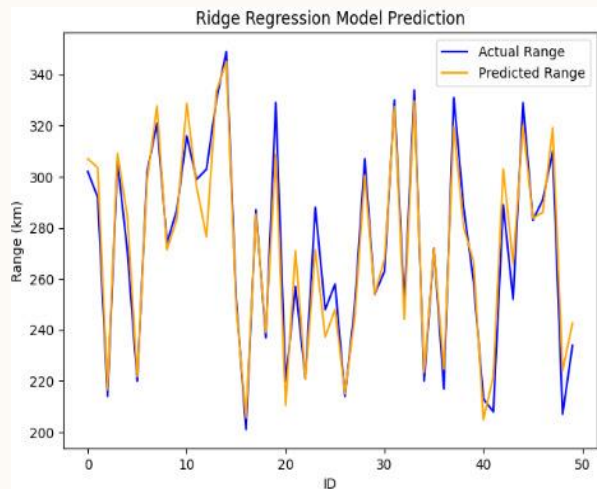


MODEL PREDICTION



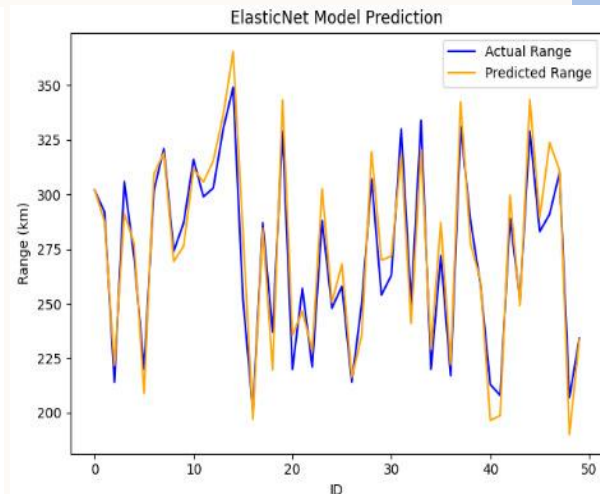
Accuracy using

Linear Regression is 0.895080



Accuracy using

Ridge Regression is 0.895070



Accuracy using

ElasticNet Regression is 0.895079

LOGIN/REGISTER

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Create an Account

Name:

Email:

Phone Number:

Date of Birth:

Password:

Password must be at least 8 characters long, include an uppercase letter, a lowercase letter, a number, and a special character.

Confirm Password:

Select Role:
☒ Fleet Manager ☐ Driver

☒ I agree to the [Terms and Conditions](#)

Create Account

Already registered? [Back to Login](#)

Create an Account

Email or Phone number already registered.

Name:

Email:

Phone Number:

Date of Birth:

Password:

Confirm Password:


Select Role:
☒ Fleet Manager ☐ Driver

☒ I agree to the [Terms and Conditions](#)

Create Account

Welcome to EV System

[Inbox](#) x



email23testing@gmail.com
to me ▾

Hi test,

Thank you for registering with us!

Best regards,
EV System Team

Forgot Password

Enter your email address:

[Back to Login](#)

Reset Password

New Password:

Confirm Password:

[Back to Login](#)

Password Reset Request Inbox x



email23testing@gmail.com

to me ▼

Hi sam,

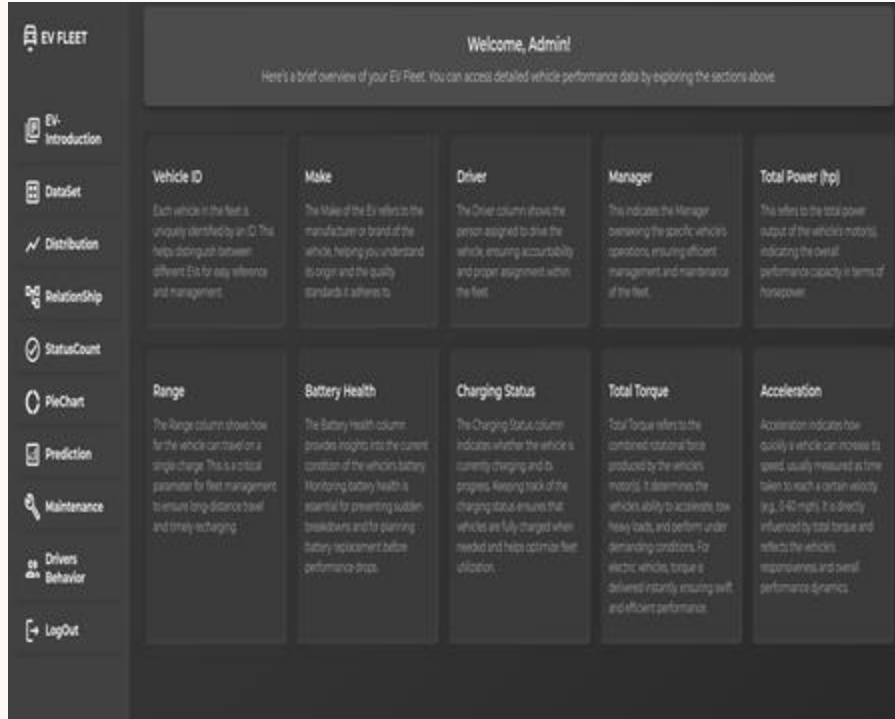
Click the link below to reset your password:

[http://localhost:5000/reset_password?token=pbkdf2:sha256:1000000\\$jp1c7HJkmMvAaPCN\\$13db77a28952369e4d310e2902f6c1ba989e5e7a5f33238eb0cee3c249c42ded](http://localhost:5000/reset_password?token=pbkdf2:sha256:1000000$jp1c7HJkmMvAaPCN$13db77a28952369e4d310e2902f6c1ba989e5e7a5f33238eb0cee3c249c42ded)

If you did not request a password reset, please ignore this email.

Best regards,
EV System Team

DASHBOARD FOR FLEET MANAGER



EV FLEET

EV-Introduction

DataSet

Distribution

Relationship

StatusCount

PieChart

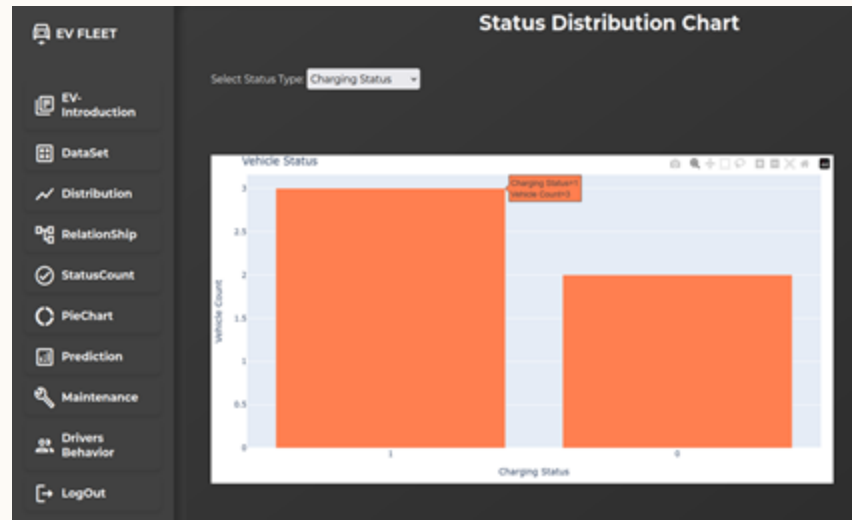
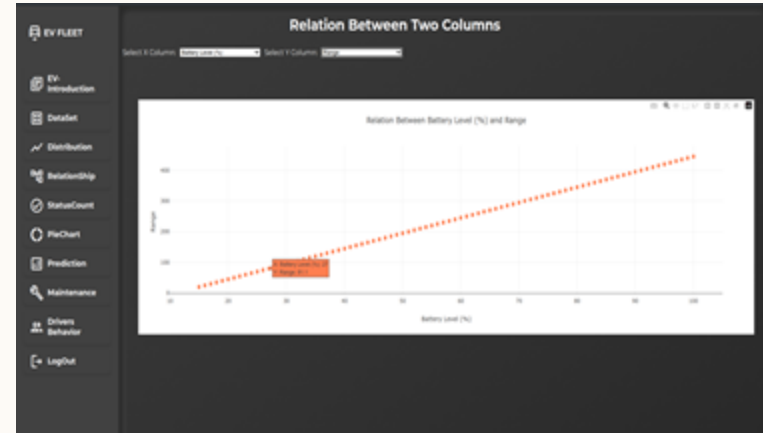
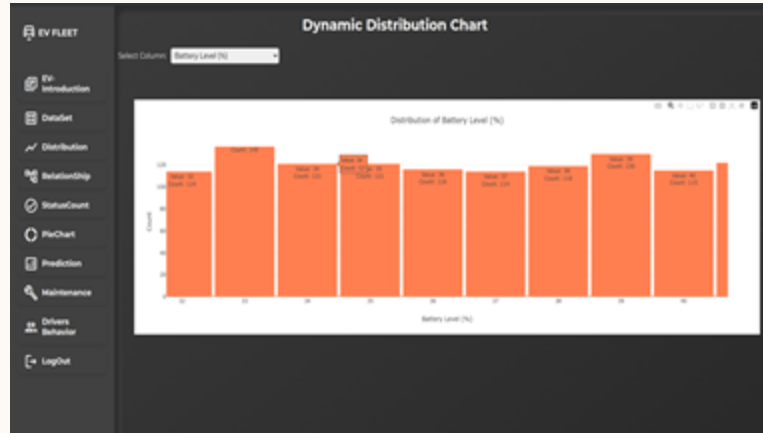
Prediction

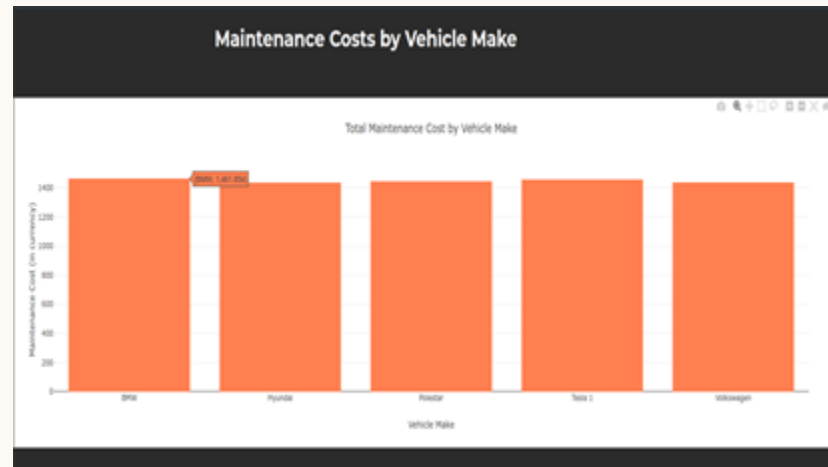
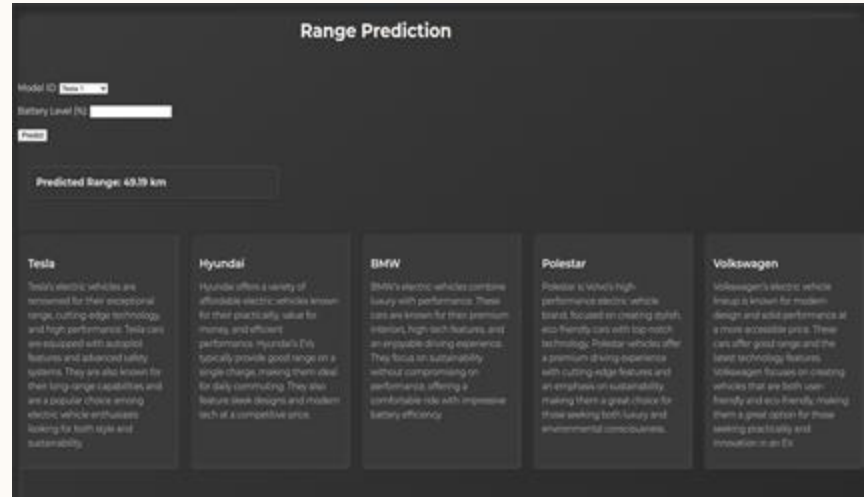
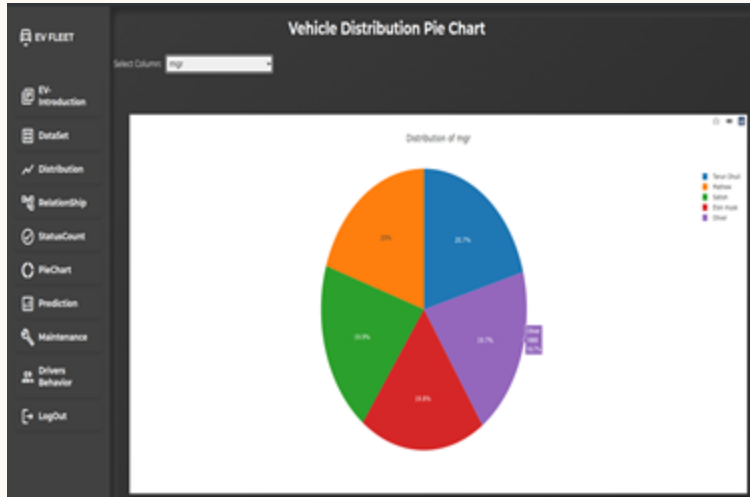
Maintenance

Drivers Behavior

LogOut

Make	Driver	mgr	Acceleration 0-100 km/h	Top speed	ER	Total Power	Drive	BC	Length	Width	Height	Wheelbase	Gross Vehicle Weight (GVWR)	Max. Payload	Cargo Volume	Seats	Range	Battery Level (%)	Latitude (°)	
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	389.0	89	15.742
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	17.06	45	18.326
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	54.66	22	15.876
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	2.46	15	18.922
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	48.02	20	15.987
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	80.16	27	12.864
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	19.42	42	15.026
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	30.85	8	12.888
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	28.27	18	17.630
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	50.94	22	14.925
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	2421	62	17.878
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	78.05	27	15.988
Tesla	chandu	Don muk	4.4	23	485	36	485	AWD	82	4094	1948	1442	2875	2322	388	90	\$	15.35	18	15.208





Overspeeding Drivers

chandu

Exceeded Speed Limit of 120 km/h
on 06-04-24

[Send Alert!!](#)

praneetha

Exceeded Speed Limit of 120 km/h
on 19-03-24

[Send Alert!!](#)

sahithya

Exceeded Speed Limit of 120 km/h
on 16-09-24

[Send Alert!!](#)

samiksha

Exceeded Speed Limit of 120 km/h
on 23-03-24

[Send Alert!!](#)

santhi

Exceeded Speed Limit of 120 km/h
on 27-06-24

[Send Alert!!](#)

Overspeeding Alert Inbox x



email23testing@gmail.com

to bcc: me ▾


Dear santhi,


You have been observed driving at speeds exceeding 120 km/h. Please adhere to the speed limits for safety.


Regards,

Fleet Management Team

DASHBOARD FOR DRIVER

 EV DRIVER

 Prediction

 LogOut

Range Prediction

Model ID: Tesla 1

Battery Level (%):

Predict

Predicted Range: 51.44 km

- Rule 1:** Always wear your seatbelt and ensure all passengers are securely seated.
- Rule 2:** Conduct a pre-trip inspection of the vehicle to ensure it is in good condition (e.g., tire pressure, lights, brake function, etc.).
- Rule 3:** Abide by the posted speed limits and adjust your speed according to road and weather conditions.
- Rule 4:** Never drive under the influence of alcohol or drugs.

- Rule 5:** Avoid using mobile phones or any other distractions while driving. Use hands-free options if necessary.
- Rule 6:** Drive efficiently to maximize the vehicle's energy use and reduce emissions.
- Rule 7:** Immediately report any malfunctions or issues with the EV to the fleet management team.
- Rule 8:** Ensure the vehicle is adequately charged before beginning the trip and follow the charging guidelines.

- Rule 9:** Stick to the prescribed routes to avoid delays and ensure timely deliveries.
- Rule 10:** Ensure you take sufficient rest and breaks during long trips to avoid fatigue.
- Rule 11:** Regularly check the tire pressure to optimize range.
- Rule 12:** Keep your driving speed within recommended limits for better battery life.

- Rule 13:** Keep the vehicle in eco-driving mode to maximize energy efficiency.
- Rule 14:** Ensure regular maintenance checks for improved performance.

FUTURE SCOPE

- **Driver Behavior Monitoring and Feedback**
 - Tracks driving patterns and provides real-time feedback to encourage safe and efficient driving.
- **Mobile App Integration**
 - Offers a mobile platform for drivers and fleet managers to access real-time updates
- **Live Location Tracking**
 - Tracks the real-time location of vehicles using GPS.
- **Personalized Dashboards**
 - Customizes dashboard views based on user roles

CONCLUSION

The EV Fleet Monitoring and Predictive Analysis System is a comprehensive solution designed to optimize fleet management. This project integrates various metrics including vehicle status, cost per meter, fuel and maintenance expenses, assignments, and open issues, offering a holistic view of fleet operations.

The system provides essential tools for tracking and analyzing fleet performance, enabling managers to make data-driven decisions, reduce operational costs, and improve overall efficiency. By predicting vehicle range and providing detailed dashboards, this solution enhances the ability to manage and monitor electric vehicles effectively, paving the way for a sustainable and efficient fleet management approach.

TEAM MEMBERS

Wagh Samiksha Satish

Masetty Lakshmi Chandana

Chutla Praneetha

Madala Sahithya



The background features a large, light cream-colored circle on the left and a large, light pink circle on the right. These two circles overlap in the center. The area outside the cream circle but within the top and bottom boundaries of the image is a solid dark blue. The pink circle contains several thin, white, concentric circular lines that are more densely packed towards its top edge.

THANK YOU