

Project Abstract – EV Assistant

The rapid transition toward Electric Vehicles (EVs) is a key step in achieving sustainable transportation. However, EV users continue to face critical challenges such as selecting the right vehicle, locating nearby charging stations, and accurately estimating charging time. These issues often lead to range anxiety and inefficient travel planning, limiting wider EV adoption. The EV Assistant addresses these challenges by providing an intelligent, all-in-one digital solution.

EV Assistant is a smart, web-based application developed using Streamlit, designed to support EV users before and during their journeys. The system integrates multiple features into a single platform, including an EV recommendation engine that suggests suitable vehicles based on battery capacity, range, and efficiency. A location-based charging station finder helps users identify the nearest charging stations using distance calculation techniques, enabling better route planning. Additionally, a charging time estimation module predicts approximate charging duration, allowing users to plan stops efficiently. The platform also includes a smart FAQ chatbot that provides instant answers to common EV-related questions, improving user awareness and confidence.

The application leverages data analytics and machine learning techniques, such as similarity analysis and distance metrics, to deliver accurate, meaningful, and user-centric results. By combining recommendation systems, predictive analysis, and interactive assistance, EV Assistant reduces range anxiety and enhances the overall EV travel experience.

This project stands out as a scalable, eco-friendly, and practical solution that simplifies EV ownership and encourages sustainable mobility. With potential extensions such as real-time station availability and route optimization, EV Assistant demonstrates strong potential for real-world deployment and future innovation in the EV ecosystem.

EV ASSISTANT

Problem Statement

Electric vehicle users face challenges in choosing suitable EVs, finding nearby charging stations, and estimating charging time. The EV Assistant provides EV recommendations, charging station search, charging time estimation, and FAQs to support efficient and hassle-free EV travel.

Project Overview

With the rapid adoption of Electric Vehicles (EVs), users often face challenges related to vehicle selection, trip planning, charging station availability, and charging time estimation. Lack of proper guidance leads to range anxiety and inefficient travel planning. The EV Assistant is an intelligent, user-friendly web application developed using Streamlit that helps EV users make informed decisions. The system provides EV recommendations, nearby charging station search, charging time estimation, and an interactive FAQ chatbot. By integrating data analytics and machine learning techniques, the EV Assistant simplifies EV ownership and promotes sustainable transportation.

Solution Offered

The EV Assistant provides a complete and intelligent solution to problems faced by electric vehicle users by integrating multiple EV-related services into a single web-based platform. The system helps users select the most suitable electric vehicle through a recommendation engine based on battery capacity, range and efficiency. It allows users to find nearby charging stations using location-based search, ensuring convenient access during travel. The charging time estimator calculates how long a vehicle needs to be charged based on the current battery level and planned travel distance, helping users plan their trips efficiently. In addition, the built-in FAQ chatbot provides instant answers to common EV-related questions, improving user understanding and reducing confusion. By combining data analytics, machine learning, and interactive design, the EV Assistant offers a reliable, user-friendly, and eco-friendly solution that makes EV usage easier, smarter, and more convenient.

Who Are The End Users?

- Electric Vehicle owners
- First-time EV buyers
- Long-distance EV travelers
- Students & researchers studying EV systems

Technology Used To Solve The Problem

The EV Assistant is developed using a combination of modern web technologies, data analytics and machine learning techniques to effectively solve real-world electric vehicle challenges. The frontend of the system is built using Streamlit, along with HTML and CSS, to provide an interactive and visually appealing web interface. The backend logic is implemented in Python, which handles data processing, calculations and system control. Pandas is used to load, clean, and manage EV and charging station datasets, while NumPy performs numerical computations such as distance and battery calculations. For intelligent decision-making, the system uses Scikit-learn, particularly the K-Nearest Neighbors (KNN) algorithm, to recommend similar electric vehicles and identify nearby charging stations. The Haversine distance formula is applied to calculate the real-world distance between user and charging stations based on latitude and longitude. FAQ responses are handled using a rule-based chatbot built with predefined questions and answers. All data is stored in CSV and JSON formats, making the system lightweight, efficient and easy to maintain.