Smart InternzVisualization Tool for Electric Vehicle Charge and Range Analysis

INTRODUCTION

A vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source and have an electric motor instead of an internal combustion engine.

The first electric car in the United States was developed in 1890-91 by William Morrison of Des Moines,Lowa; the vehicle was a six-passenger wagon capable of reaching a speed of 23 kilometers per hour (14mph).

1.1Overview

The demand for EVs is growing substantially worldwide. EVs have been developed in several nations, but in the USA, UK, Germany, and China comprise most of the global EV market. An EV is a vehicle that uses energy from recharge batteries to be entirely or partially powered by electric motors. In the 1880s, the first useable EVs were designed. In 20th centuries, EVs have become the common alternative for combustion fuel vehicles. Due to innovation, increased development in ICE, and the mass production of lower-priced gasoline-powered vehicles, the use of EVs have decreased.

Challenges and issues in EV technology: The technology of EVs is more energy-efficient and environmentally safe as compared to conventional internal combustion vehicles (ICE) because they emit no CO2. Adopting EVs provides various possibilities, including advancements in renewable energy sources (RES) tracking and V2G technologies. The difficulties with EV charger reliability have hindered EV adoption and possibly prompted a condition called ‘charging anxiety.’ Energy storage technology is crucial in resolving the issues of charging time and range anxiety. the author has addressed details of ESS categorisation, comparative performance of the various Energy storage systems (ESSs) charging infrastructure, ESS for EVs, Battery management systems (BMS) for EV applications, Thermal management system of EVs, failure and future aspects EVs battery, Alternative energy sources. The electrical grid can gain several economic, and environmental benefits by integrating RES and V2G technology. Before EVs can be effectively used in the marketplace, several complex problems and restrictions still need

to be resolved. The key aspects and technical challenges associated with the anticipated upcoming developments of Electric vehicles which are as follows:

(i)

Due to the high initial cost of EV batteries, it is still quite expensive to purchase an EV than a typical ICE vehicle.

(ii)

The present charging solutions are still in adolescence despite the substantial developments in battery technology. Limited life cycle and low energy density are the key issues with Li-ion batteries. Due to the relatively short life duration, frequent maintenance is needed yearly or in 2 years; the size and weight of the batteries make up about one-third of the vehicle. Few battery technologies can give superior performance, but they are still experimental and have not yet reached their best extent.

(iii)

To get the best performance out of batteries, reliable battery management systems are required. It is necessary to improve the designing techniques used to size the battery subsystems. The optimal battery subsystem configuration allows for excellent performance, several ranges, and longer battery life.

(iv)

The V2G technology is an alternate solution for many significant power network issues. It might accelerate RES integration. However, the V2G concept demands the active participation of EV owners.

(v)

EV customers should be encouraged to actively participate in the installation of V2G by new management policies that are implemented simultaneously with certain compensation packages. Otherwise, implementing V2G technology into action becomes challenging.

(vi)

Extensive investment is required to effectively update the existing electricity infrastructures in order to implement V2G technology. A completely updated charging station (CS) with appropriately installed EVs is also needed to execute the V2G structure successfully. Additionally, energy and conversion losses may rise due to batteries being cycled too frequently.

(vii)

The implementation of such a complex infrastructure and reward-based schemes require the use of effective planning strategies and cutting-edge research techniques.

The main objective of this paper is summarised below:

(i) To develop a mathematical model for the reliability, availability, and maintainability analysis of an EV system in the future.

(ii) To get a faster response of grid-integrated EV during motoring and braking mode, charging–discharging (V2G and G2V) mode in the future, because synchronisation reliability plays a vital role.

1.2Purpose

Regulatory environment

- Time to market is critical since OEMs will face severe regulatory penalities in many markets for failing to meet co2 emissions requirements from 2020 onwards
- Gradual decline in government subsidies expected as technology advantage

Customers

- Customers not yet requesting EVs consideration is up 50% or more but purchase conversion still low
- Top concerns and purchase barriers involve batteries , driving range and charging.

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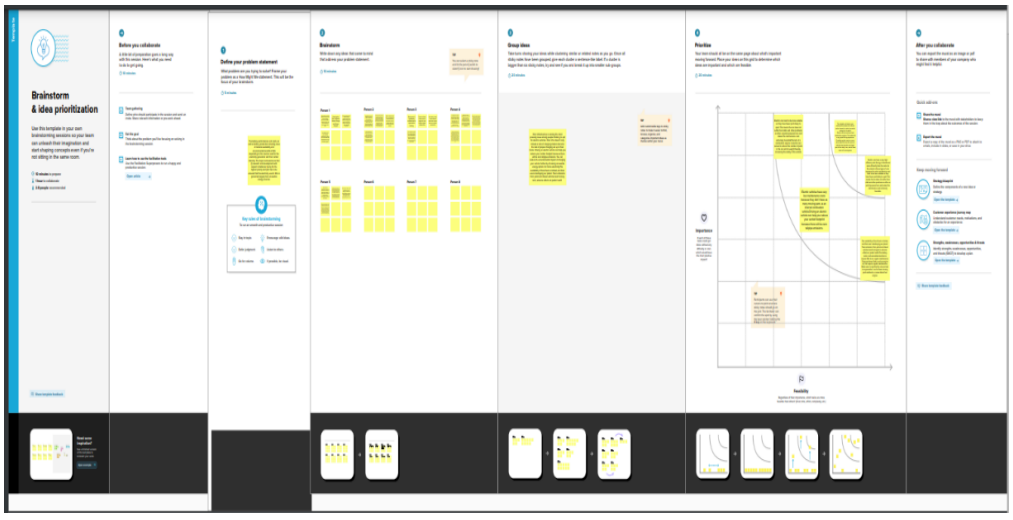
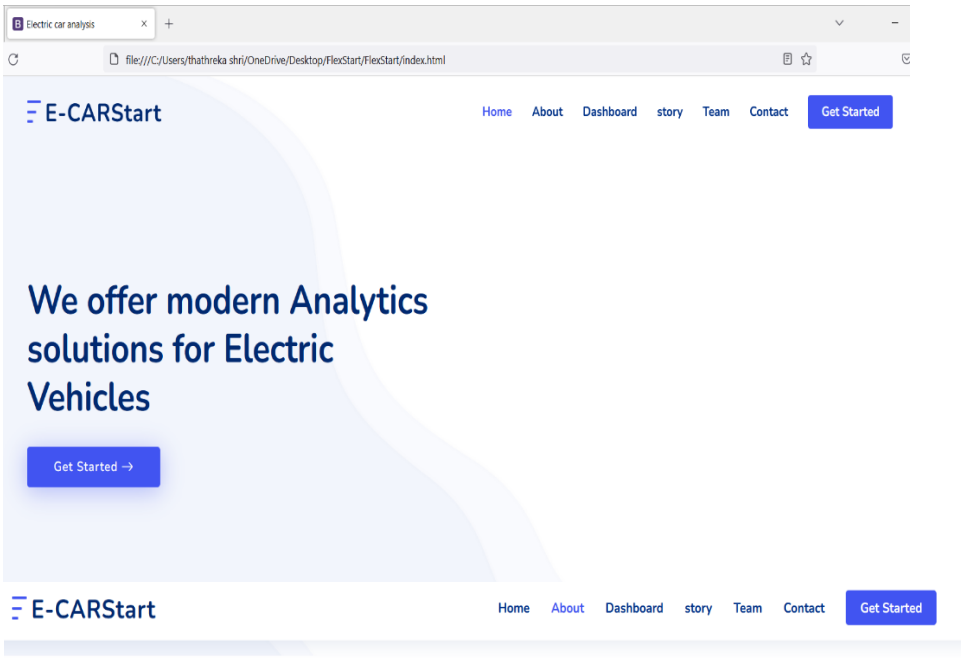
2 Problem Definition & Design Thinking

2.1 Empathy Map

2.2 Ideation & Brainstorming Map



3 RESULT


Electric car analysis
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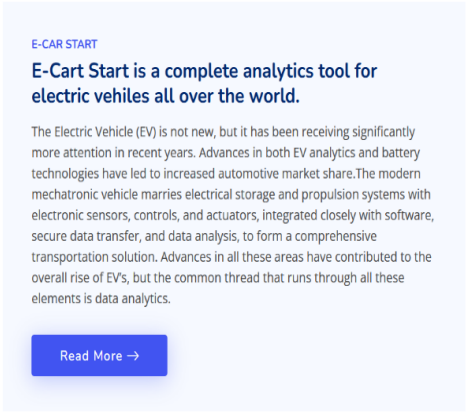
E-CARStart
Home
About
Dashboard
story
Team
Contact
Get Started
We offer modern Analytics solutions for Electric Vehicles
Get Started →
E-CARStart
Home
About
Dashboard
story
Team
Contact
Get Started


E-CAR START
E-Cart Start is a complete analytics tool for electric vehiles all over the world.
The Electric Vehicle (EV) is not new, but it has been receiving significantly more attention in recent years. Advances in both EV analytics and battery technologies have led to increased automotive market share.The modern mechatronic vehicle marries electrical storage and propulsion systems with electronic sensors, controls, and actuators, integrated closely with software, secure data transfer, and data analysis, to form a comprehensive transportation solution. Advances in all these areas have contributed to the overall rise of EV's, but the common thread that runs through all these elements is data analytics.
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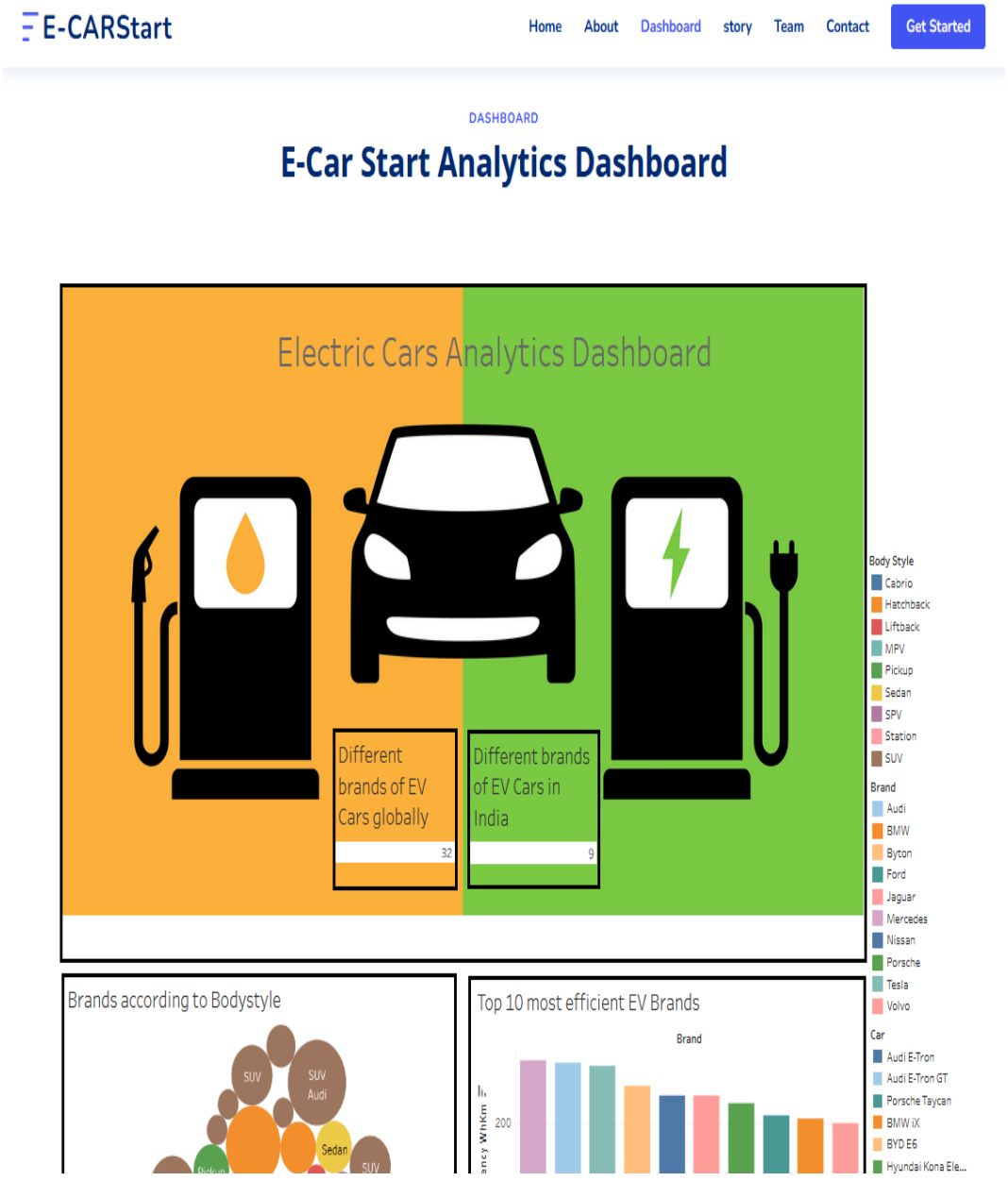

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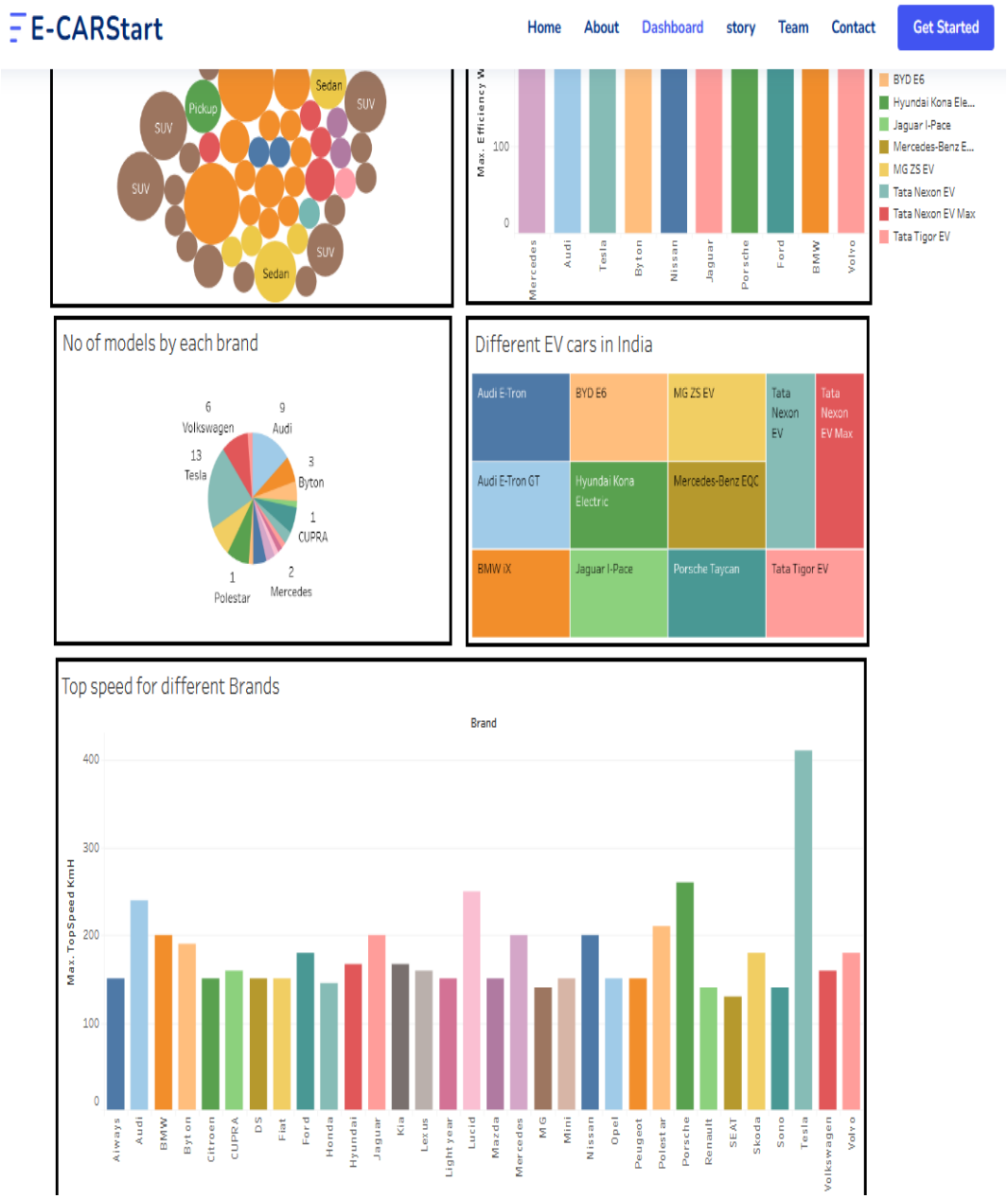

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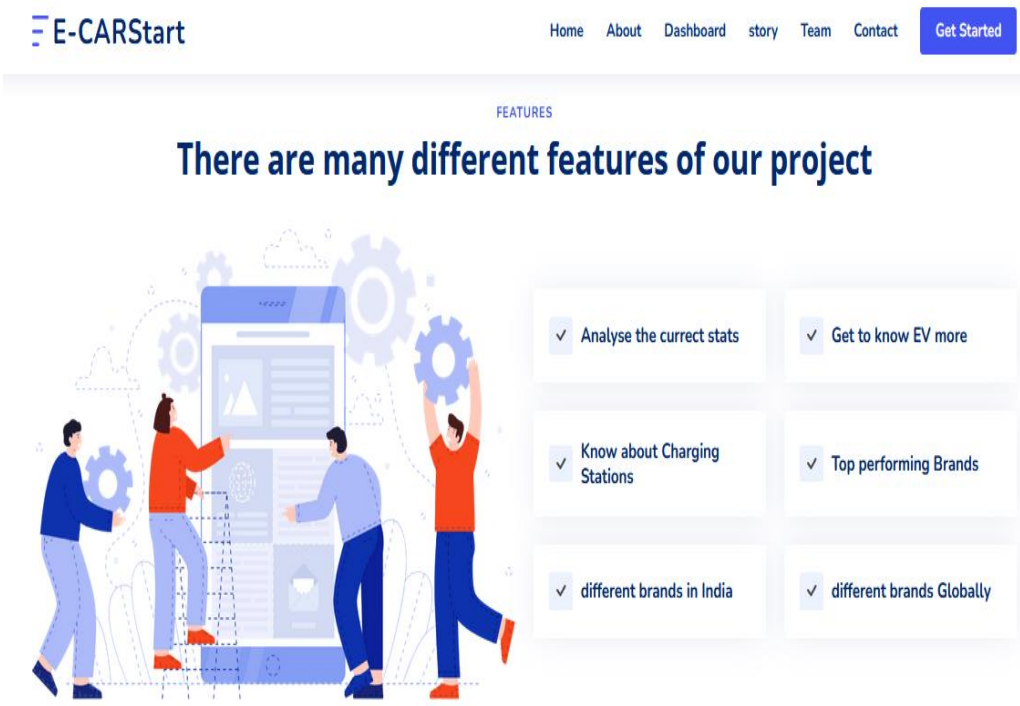

Overview of Electric Vehicle Sector

OVERVIEW PRICING

The supply of fossil fuels is constantly decreasing. The situation is very alarming. It is time for the world to slowly adapt to electric vehicles.

✓ A lot of change needs to happen

Major carmakers like Tesla and Porsche manufacture many electric vehicles.

✓ The improvement of battery technology in recent years has led to the higher popularity of electric vehicles.

Buying an electric vehicle can be a great choice for consumers. The drive quality, low noise levels, and convenience are really great.

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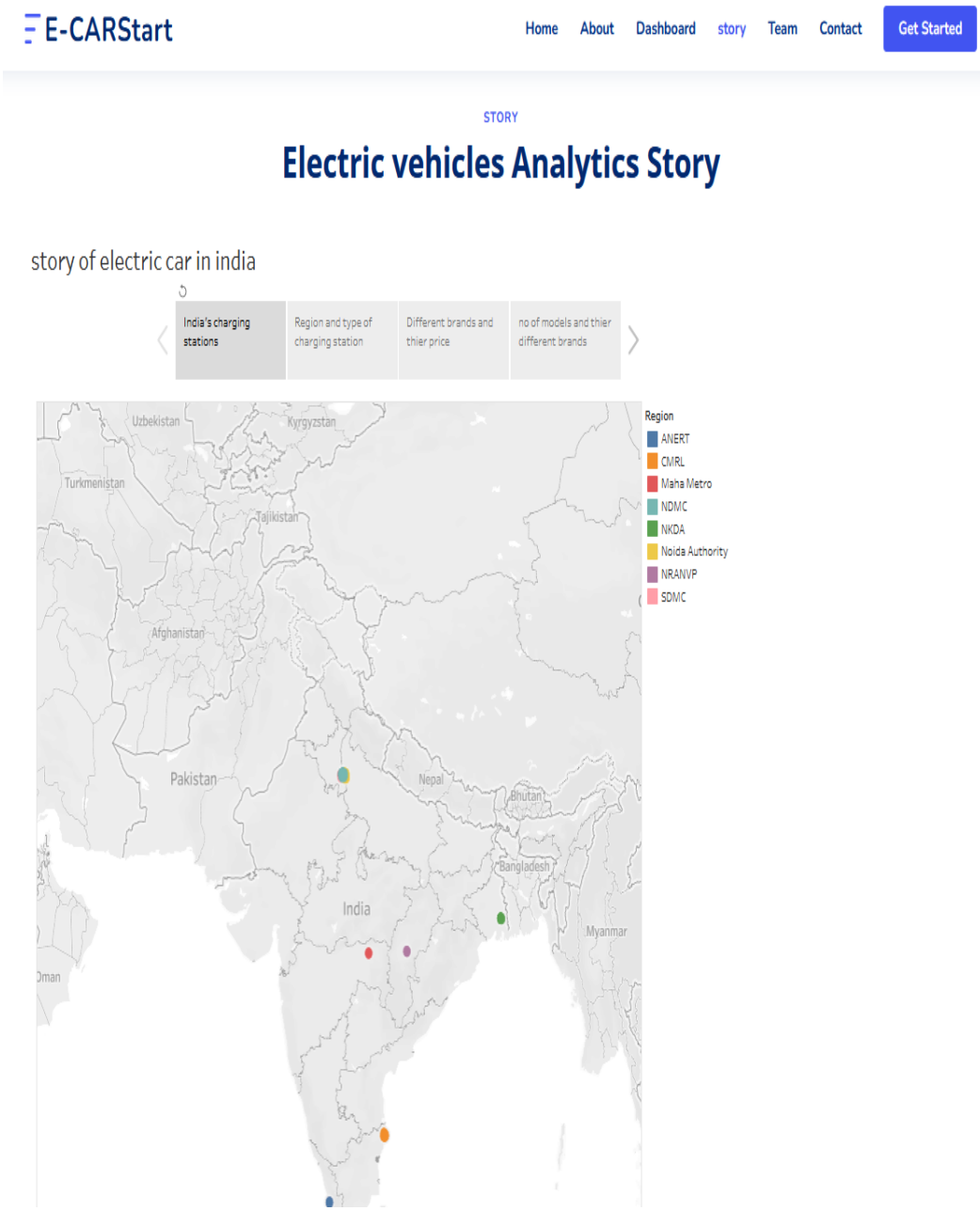

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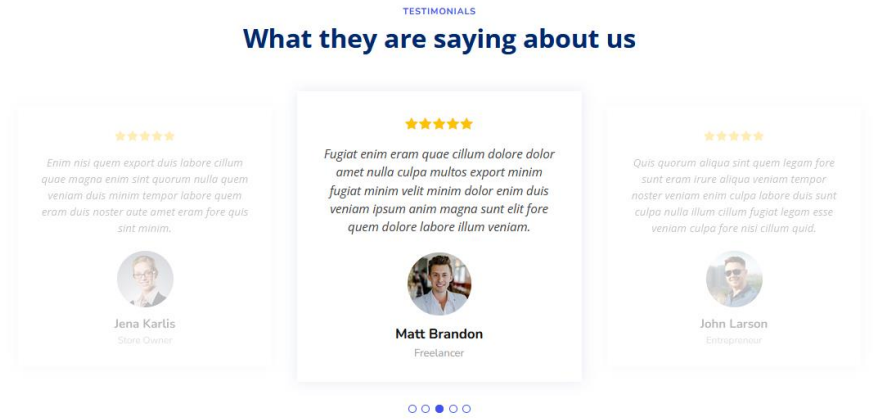

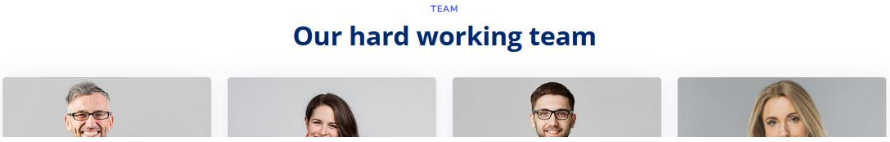

4.ADVANTAGES & DISADVANTAGES

1.Advantages of Electric vehicles

- Simple implementation
- Safe for humans
- Loose alignment
- Nonline of sight charging
- Charging multiple devices simultaneously on different power
    - High charging efficiency
- Electric vehicles are charged via an DC power supply at a fast (level3)
- Charging rate: voltage 208v or 480 v 3 phase AC amps

2.Disadvantages of Electric Vehicles

High initial cost: Electric vehicles continue to be quite expensive, and many buyers believe they are not as inexpensive as traditional automobiles.

Charging station limitations: People who need to travel long distances are concerned about finding adequate charging stations in the middle of their journey, which are not always accessible.

Recharging takes time: Unlike conventional automobiles, which require only a few minutes to replenish their gas tanks, charging an electric vehicle takes many hours.

Limited options: Currently, there aren’t many electric car models to pick from in terms of appearance, style, or customized variations.

Less driving range: When compared to conventional automobiles, electric vehicles have a shorter driving range. Electric cars can be convenient for short-distance travel but are inconvenient for long-distance travel.

4 APPLICATIONS

Mahindra Electric is using Dassault's 'Simulia' software which is powered by the '3DEXPERIENCE' platform for realistic simulation in a virtual environment. Mahindra Electric will be aiming toward innovation efficiency by using digital simulations for all existing electric vehicles in the company's line-up.

An electric vehicle charging station is equipment that connects an electric vehicle (EV) to a source of electricity to recharge electric cars, neighborhood electric vehicles and plug-in hybrids.

Most Indian buyers believe that an electric vehicle will be ready by 2023, but the majority also believe that it would no longer be available until 2025.

5 CONCLUSION

At present, there is no single global EV standard. Many of the major EV production centres - including Japan, Europe, North America. and China-are promoting their own ideas in a variety of areas.

These laws and regulations are like a passport that grants manufacturers access to the marketplace. They stipulate basic guidelines for safety and environmental compliance, but they usually follow, rather than precede technology

So, for the foreseeable future, manufacturers will continue to rely on accredited certification bodies to keep track of requirements and certify their products.

6 FUTURE SCOPE

The future of electric vehicles global market is expanding at a CAGR of 21.7%, which is expected to continue. Growth from 8.1 million units is anticipated to reach 39.21 million by 2030. Multiple factors, including worries about pollution, are driving this rapid expansion

The Economic Survey 2023 predicts that India's domestic electric vehicle market will see a 49 percent compound annual growth rate (CAGR) between 2022 and 2030, with 10 million annual sales by 2030. Additionally, the electric vehicle industry is projected to create around 50 million direct and indirect jobs by 2030.

Taking a glimpse into the future we will see a lot of improvement of the current charging technology. For instance, it will look a lot like the re-fueling experience. In the following years the cars charging voltage will be increased from 500V to 800V, also the power of a single charger will increase to 350kW compared to the current 60kW. In practice, this means charging time will be shortened from about 1 hour to 10 - 15 minutes.

The IoT would bring a revolution to the EV charging experience. It will smartly connect grids, networks, green energy, batteries and cars for optimal use of resources and for a better charging experience. This system would be known as IoV (Internet of Vehicles)

Demand for electric trucks and buses will increase significantly. Big companies of the likes of Amazon and Walmart want to be perceived as environmentally friendly. Part of their current strategy is deployment of zero emission commercial vehicles. For that reason, EV charging players would need to create mega-chargers which will allow the long-distance operability of these large electric vehicles.

Public EV chargers will continue to expand with a double-digit percentage increase per year. In terms of growth speed and development, this makes the industry one of the most promising ones. In 2019 public chargers were up 85% compared to the year before. In 2020 the growth was half of that, mostly due to the covid-19 pandemic. Today, the majority of EV drivers charge their cars at home or at the office with mostly slow chargers. We will see a great surge in demand for fast and ultra-fast public chargers in the coming years, eased by convenience as well as shorter charging times at a lower cost in the future.

7 APPENDIX

A. Source Code

MY SQL CODE

```
select * from evindia;

select * from electriccardata_clean;

select * from electriccardata_clean where PowerTrain
```

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EXCEL SHEET DATA:

Cheapest electric car: database EV

https://drive.google.com/file/d/1rMhNvFitXodY-zuPbxJ60dy4s2zaYGyR/view?usp=share_link

EV india:

https://drive.google.com/file/d/1f8hcispK439nJNgc-Ab13tBEsCx2vTcv/view?usp=share_link

Electric car data clean:

https://drive.google.com/file/d/1-rTANUsWxe2Et5vF6ik0SWjUTUTNoZhP/view?usp=share_link

Electric vehicle charging station list:

https://drive.google.com/file/d/1mv1GcOzwShlv4vYyXF82kBfLtZMqIDoN/view?usp=share_link