

Visualization Tool for Electric Vehicle Charge and Range Analysis



INTRODUCTION

❖ 1.1 OVERVIEW

EVs offer several benefits over traditional vehicles, including zero emissions, quiet operation, and lower operating costs due to the absence of gasoline and oil changes. EVs are also more energy-efficient, with higher efficiency ratings than gasoline vehicles.

There are several types of electric vehicles, including battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs). BEVs are fully electric, while PHEVs and HEVs have both an electric motor and an internal combustion engine.

One of the main challenges facing EV adoption is the range limitations of battery technology, but advancements in battery technology have increased the range of EVs, making them a more practical choice for many drivers.

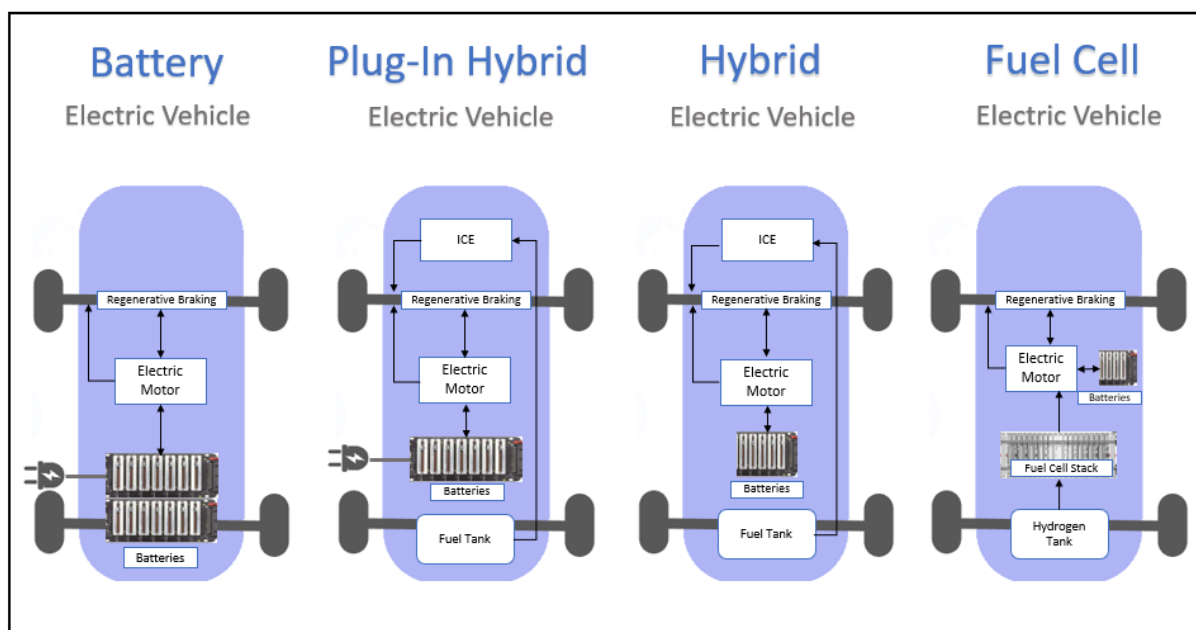
Overall the increasing popularity of EVs is driving innovation and development in the automotive industry, and it is expected that EVs will become more common in the coming years as technology continues to improve and charging infrastructure expands.

❖ 1.2 PURPOSE

The purpose of electric vehicles (EVs) is to provide a more environmentally friendly and sustainable transportation option that reduces our dependence on fossil fuels and decreases the amount of greenhouse gas emissions released into the atmosphere. By using electricity from renewable energy sources such as wind, solar, or hydro power, EVs have the potential to be almost completely emission-free, which makes them a key tool in the fight against climate change.

In addition to being better for the environment, EVs also offer several other benefits. They are generally cheaper to operate than traditional gasoline-powered vehicles since electricity is usually less expensive than gasoline, and EVs require less maintenance since they have fewer moving parts. EVs also offer a quieter and smoother driving experience, and because they have no tailpipe emissions, they help improve air quality in cities.

Overall, the purpose of EVs is to provide a cleaner, more efficient, and sustainable mode of transportation that reduces our reliance on fossil fuels and helps protect the environment.



PROBLEM DEFINATION AND DESIGN THINKING

❖ 2.1 EMPATHY MAP

Empathy map

Use this framework to develop a deep, shared understanding and empathy for other people. An empathy map helps describe the aspects of a user's experience, needs and pain points, to quickly understand your users' experience and mindset.

Says
What do our users *say* about this topic?
What can we imagine them saying?

- Range Anxiety:** One of the biggest concerns that people have about electric vehicles is the limited range. Some worry that they won't be able to travel as far as they need to before needing to recharge the battery, especially on longer trips. This has been referred to as "range anxiety".
- Charging Infrastructure:** Another concern is the availability and accessibility of charging stations. While the number of charging stations is growing, some people worry that they won't be able to find a charging station when they need one, especially in more rural or remote areas.
- Performance:** Many people are excited about the potential of electric vehicles and are implementing or looking into electric vehicles, and a lot of people are looking to learn more about the benefits and advantages of electric vehicles.
- Battery Technology:** There is ongoing debate about the efficacy of current battery technology for electric vehicles, with some arguing that it's not yet advanced enough to offer sufficient range or longevity.

Thinks
What are their *thoughts*, beliefs, hopes, and desires? What other thoughts might influence their behavior?

- Range:** People need electric vehicles to be affordable and reliable, with a range that meets their daily driving needs. They also want a charging infrastructure that is convenient and accessible, and they want to know that there are enough charging stations available in their area.
- Performance:** Many people hope that electric vehicles will reduce air pollution, improve health, and overall drive change. They also hope that the adoption of electric vehicles will lead to more sustainable and environmentally friendly energy production and consumption.
- Design:** Some people dream of a future where electric vehicles are the norm, and a world where electric vehicles are a thing of the past. They envision a world where electric vehicles are more accessible and affordable, and where there are more charging stations available.

Does
What behavior have we *observed*?
What can we imagine them doing?

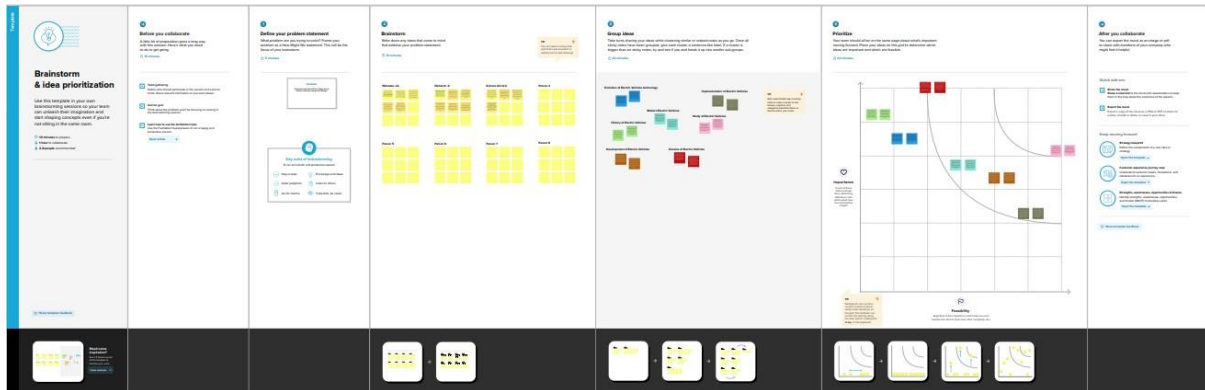
- Willingness to adjust driving habits:** People who are interested in electric vehicles may be willing to make changes to their driving habits and schedules to accommodate for charging stops.
- Researching and comparing options:** People who are interested in electric vehicles may be researching and comparing different models and brands, and they may be looking for information about the benefits and advantages of electric vehicles.
- Seeking out charging stations:** People who are interested in electric vehicles may be looking for charging stations and may be using apps or websites to find them.
- Considering the cost:** People who are interested in electric vehicles may be considering the cost of the vehicle and the cost of charging, and they may be looking for ways to reduce these costs.

Feels
What are their *feelings*, frustrations, and anxieties? What other feelings might influence their behavior?

- Excitement:** People who are interested in electric vehicles may feel excited about the potential benefits and advantages of electric vehicles, and they may be looking forward to owning and driving one.
- Confusion:** People who are interested in electric vehicles may feel confused about the technology and the different models and brands, and they may be looking for more information to help them make a decision.
- Concern:** People who are interested in electric vehicles may feel concerned about the range and performance of electric vehicles, and they may be looking for ways to address these concerns.
- Hope:** People who are interested in electric vehicles may feel hopeful about the future of electric vehicles, and they may be looking for ways to support the development and adoption of electric vehicles.

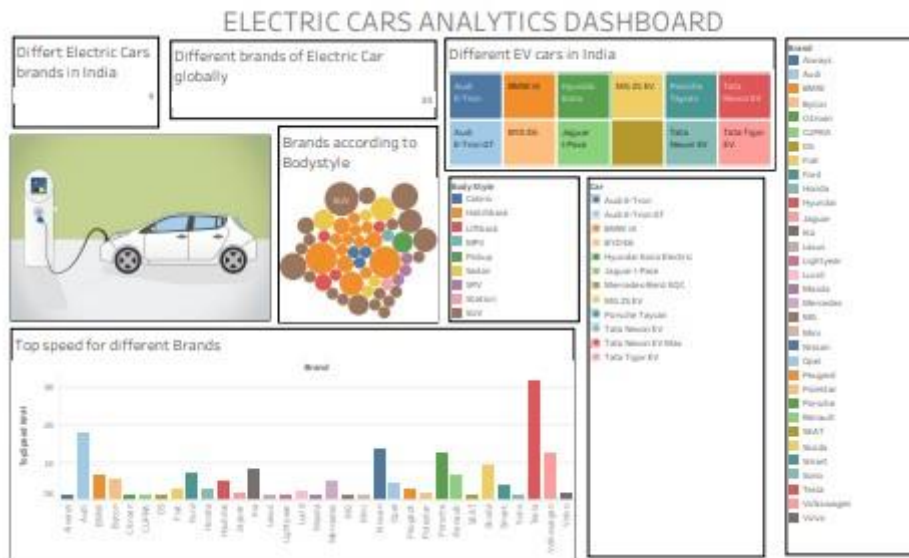
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❖ 2.2 IDEATION AND BRAINSTORMING MAP



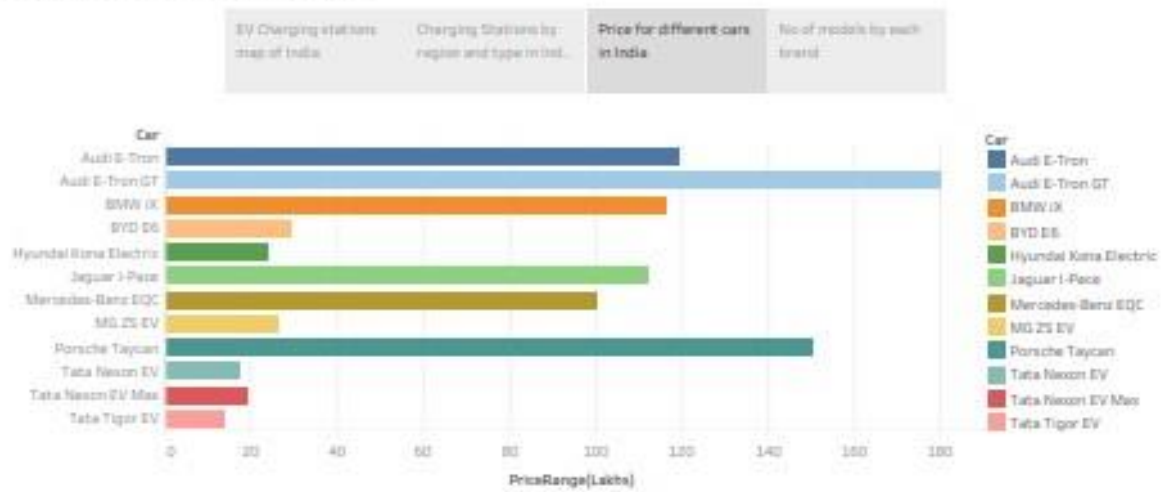
RESULT

DASHBOARD

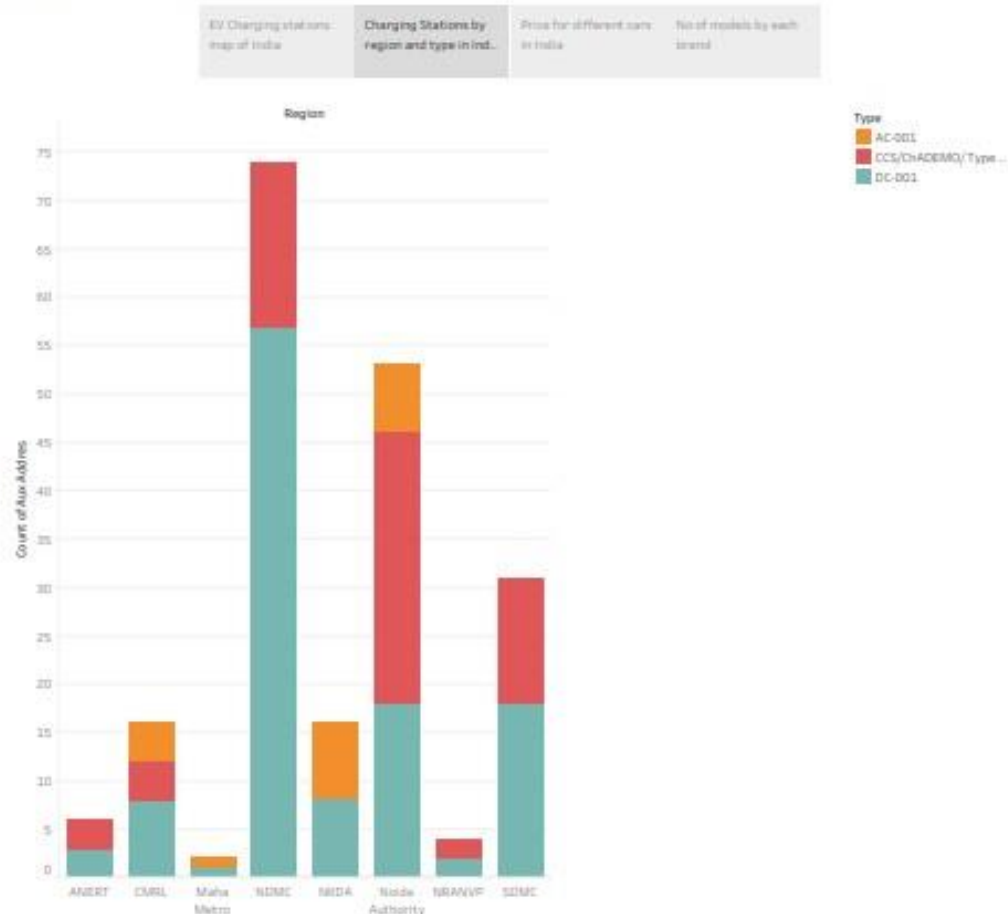


STORY

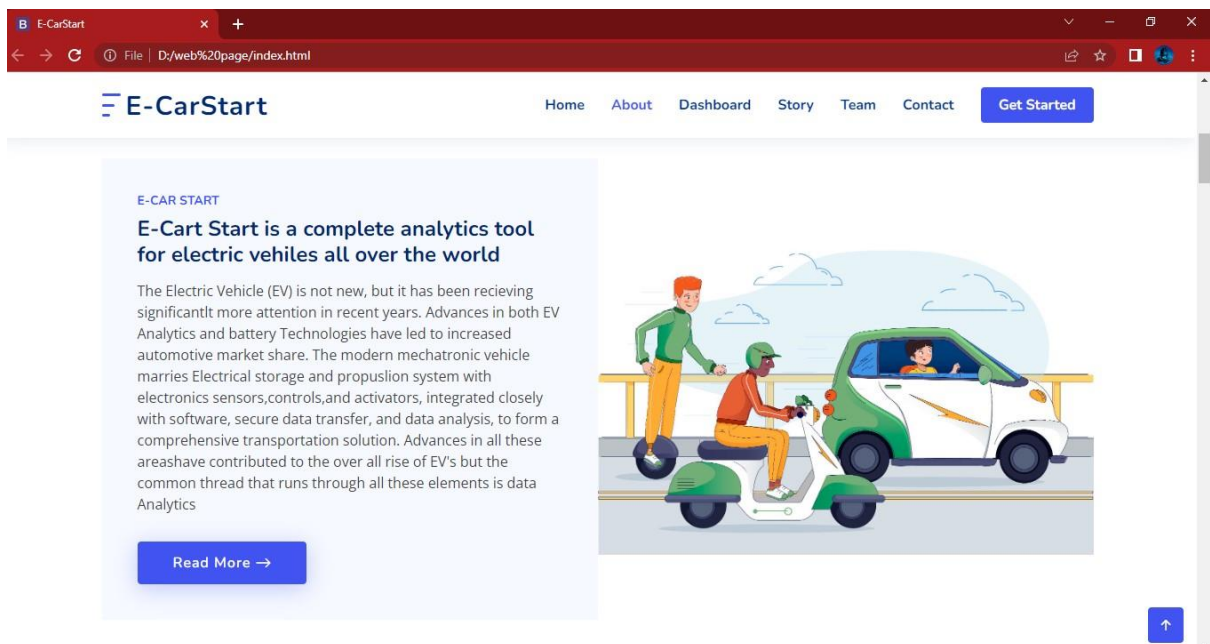
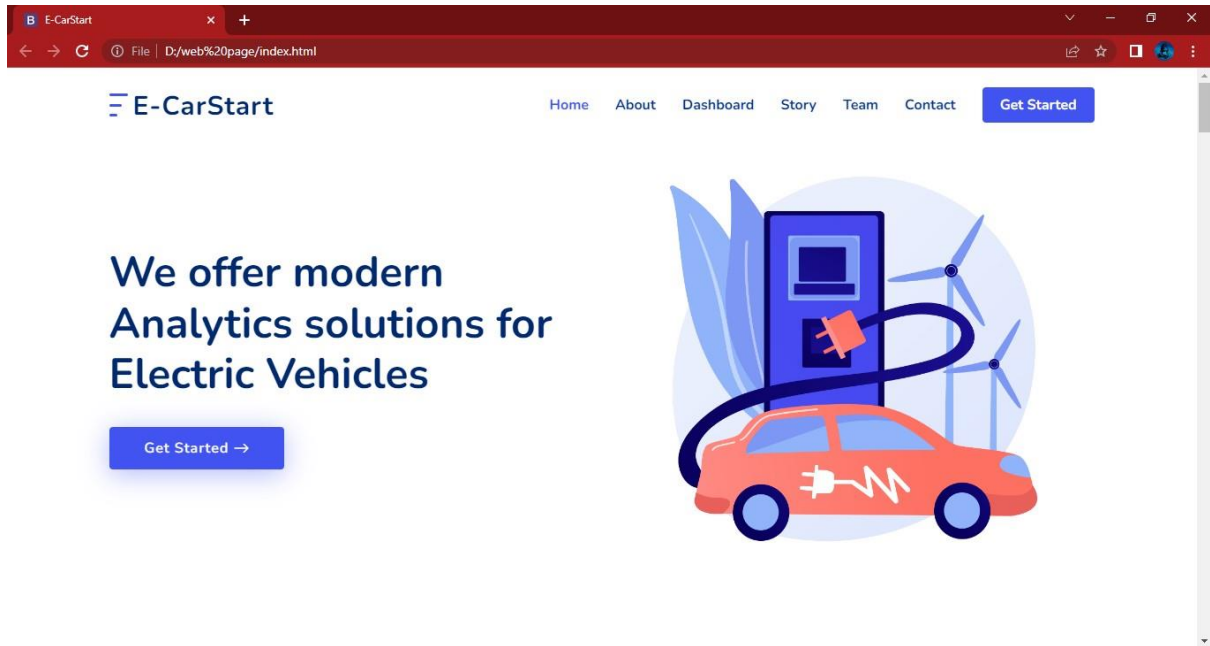
Story of Electric Cars in India



Story of Electric Cars in India



WEB PAGE



ADVANTAGES AND DISADVANTGES

❖ ADVANTAGES

Environmental benefits: EVs produce no tailpipe emissions, which helps reduce air pollution and greenhouse gas emissions. They also have a smaller carbon footprint than gas-powered cars, even when taking into account the production and disposal of batteries.

Lower operating costs: EVs have lower fuel costs and maintenance costs than traditional gas-powered cars. Electric motors are more efficient and require less maintenance than internal combustion engines.

Reduced dependence on oil: EVs rely on electricity, which can be produced from a variety of sources, including renewable energy sources like wind and solar power. This helps reduce dependence on fossil fuels and increases energy security.

Quieter and smoother driving experience: Electric motors provide a quieter and smoother driving experience compared to internal combustion engines.

Government incentives: Many governments around the world offer incentives for purchasing EVs, such as tax credits and rebates, to encourage the adoption of cleaner transportation.

Improved performance: EVs can deliver instant torque, providing quick acceleration and a responsive driving experience. Additionally, they can have a lower centre of gravity, which can improve handling and stability.

❖ DISADVANTGES

Limited driving range: EVs typically have a shorter driving range than gas-powered cars, and may require frequent charging for long-distance travel. Although the range has been improving over the years, it is still a concern for many drivers.

Long charging times: Charging an EV takes longer than filling up a gas tank. Even with fast-charging technology, it can still take up to 30 minutes or more to charge an EV to 80% capacity.

Limited charging infrastructure: Although the number of charging stations is growing rapidly, the charging infrastructure is not yet as widely available as gas stations. This can be a concern for drivers who need to travel long distances or live in areas with limited charging options.

Higher upfront costs: EVs are generally more expensive than comparable gas-powered cars, due in part to the cost of batteries. While the cost of EVs is decreasing, it can still be a barrier for many buyers.

Battery degradation: Over time, the battery capacity of an EV will decrease, which can reduce its driving range. This is a concern for drivers who plan to keep their car for many years.

Battery recycling: The production and disposal of EV batteries can have environmental impacts. While the batteries can be recycled, the process can be costly and energy-intensive.

APPLICATIONS

Personal transportation: EVs are an excellent option for personal transportation, offering low operating costs, reduced emissions, and improved performance. They can be used for daily commutes, errands, and longer trips, depending on the vehicle's driving range.

Public transportation: Many cities are transitioning their public transportation systems to electric buses and trains to reduce emissions and noise pollution. EVs can also improve the reliability and efficiency of public transportation systems.

Commercial transportation: EVs are well-suited for commercial transportation, including delivery vans, trucks, and taxis. They offer low operating costs, reduced emissions, and improved efficiency, making them an attractive option for businesses.

Industrial applications: EVs can be used for a range of industrial applications, including forklifts, mining equipment, and construction vehicles. These vehicles can be operated indoors or in confined spaces, where emissions from traditional gas-powered vehicles can be dangerous.

Energy storage: EV batteries can be used to store excess energy from renewable sources like wind and solar power. This stored energy can be used to power homes, businesses, and even the grid during periods of high demand.

Emergency response: EVs can be used as emergency response vehicles, including police cars, ambulances, and fire trucks. They offer quiet operation, quick acceleration, and improved manoeuvrability, making them well-suited for emergency situations.

CONCLUSION

We have Analyse the Data by doing many visualisations in Tableau and we came across many graphs

- Charging Stations by region and type in India
- EV Charging stations map of India
- Different EV cars in India
- Top speed for different Brands
- Price for different cars in India
- Top 10 most efficient EV Brands
- Brands according to Body style
- Brand filtered by Power Train type
- No of models by each brand
- Summary card for Different brands of EV Cars globally
- Summary card for Different brands of EV Cars in Indi

In conclusion, electric vehicles (EVs) offer several advantages over traditional gas-powered cars, including lower operating costs, reduced emissions, and improved performance. While there are some limitations and challenges to EVs, such as limited driving range, long charging times, and higher upfront costs, the benefits of EVs are driving their increased adoption around the world.

Overall, while there are still challenges to be addressed, EVs offer a promising solution to reduce greenhouse gas emissions and improve the sustainability of transportation, making them an important part of the transition to a more sustainable future.

FUTURE SCOPE

The future of electric vehicles (EVs) is bright, with continued growth and technological advancements expected in the coming years. Some of the key future developments and trends in the EV industry include:

- **Increased range:** One of the main challenges of EVs is their limited driving range. However, continued advancements in battery technology are expected to increase the range of EVs, making them a more viable option for longer trips.
- **Faster charging times:** The time it takes to charge an EV is another challenge for the industry. However, improvements in charging technology are expected to reduce charging times and make charging more convenient.
- **More affordable:** As production volumes increase, the cost of EVs is expected to decrease, making them more accessible to a wider range of consumers.
- **Increased infrastructure:** As demand for EVs continues to grow, the charging infrastructure will also continue to expand. Governments and private companies are investing in charging stations and other infrastructure to support the growth of EVs.
- **Autonomous driving:** Many EV manufacturers are working on autonomous driving technology, which could revolutionize the transportation industry by reducing the need for human drivers.
- **Integration with renewable energy:** EVs can be used to store energy from renewable sources like solar and wind power, making them an important part of the transition to a more sustainable energy system.

APPENDIX

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