



Electric Vehicle Aggregator for Range Anxiety Management

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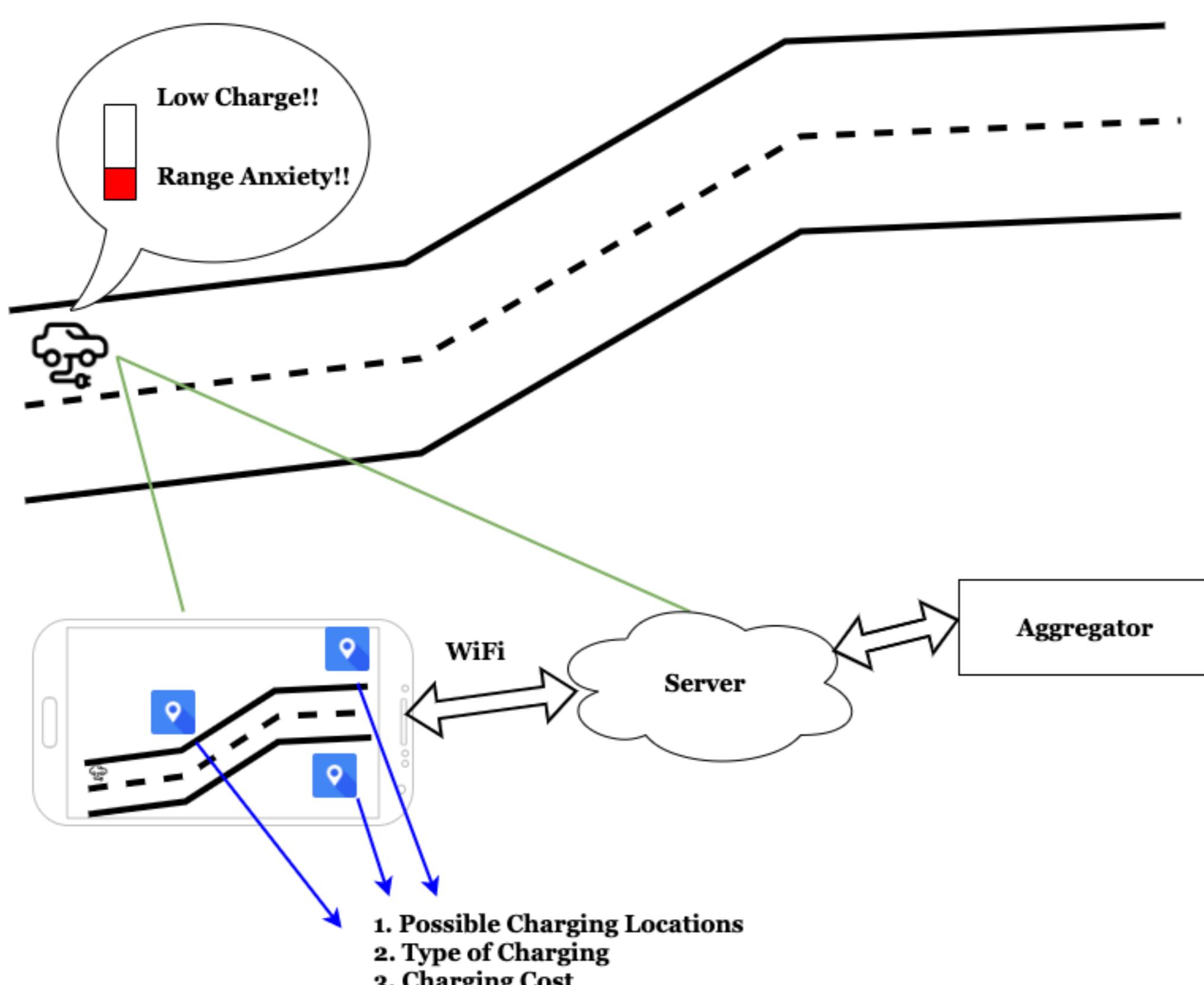
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Introduction

- The future is electric. With reports from McKinsey [1] and Deloitte [2] indicating the exponential increase in Electric Vehicle adoption around the world by 2030, the market capitalization data is also a prime indicator of the trend.
- The reports from Ranking Royal [3] over the past 20 years shows that Tesla has surpassed Toyota and has three times the market capitalization value now.
- This increase in Electric vehicle adoption involves the increased demand on the grid for charging and the issues related to range anxiety.
- The low range of Electric Vehicles and the fact that most of the countries are lacking adequate charging infrastructure shows the reasons for range anxiety associated with Electric Vehicles.
- This work focuses on development of a Electric Vehicle Aggregator based range anxiety management system. The management system would support the drivers of Electric Vehicles to reduce their range anxiety by providing them information about the nearest charging facility, the number of ports available, the cost that is expected for charging and even provides a price negotiation model.

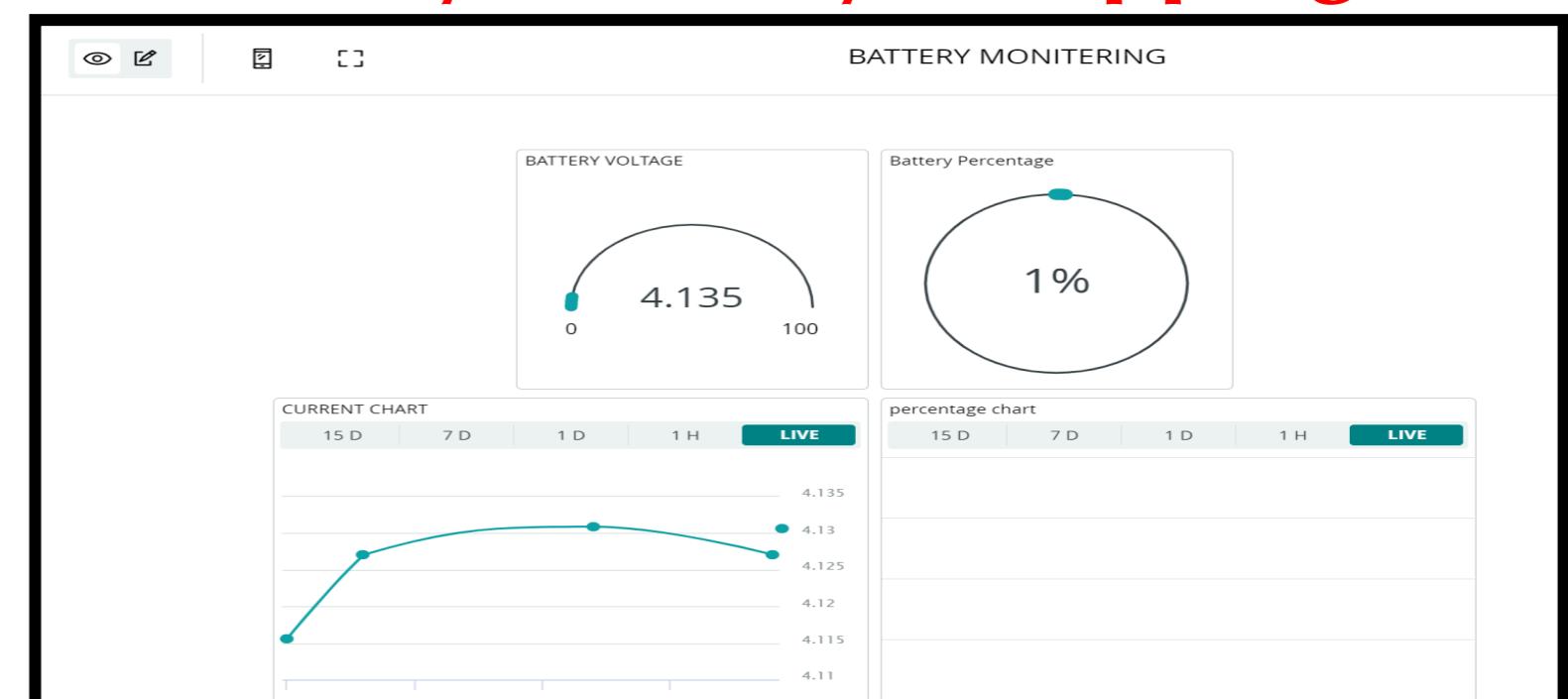
System Modelling



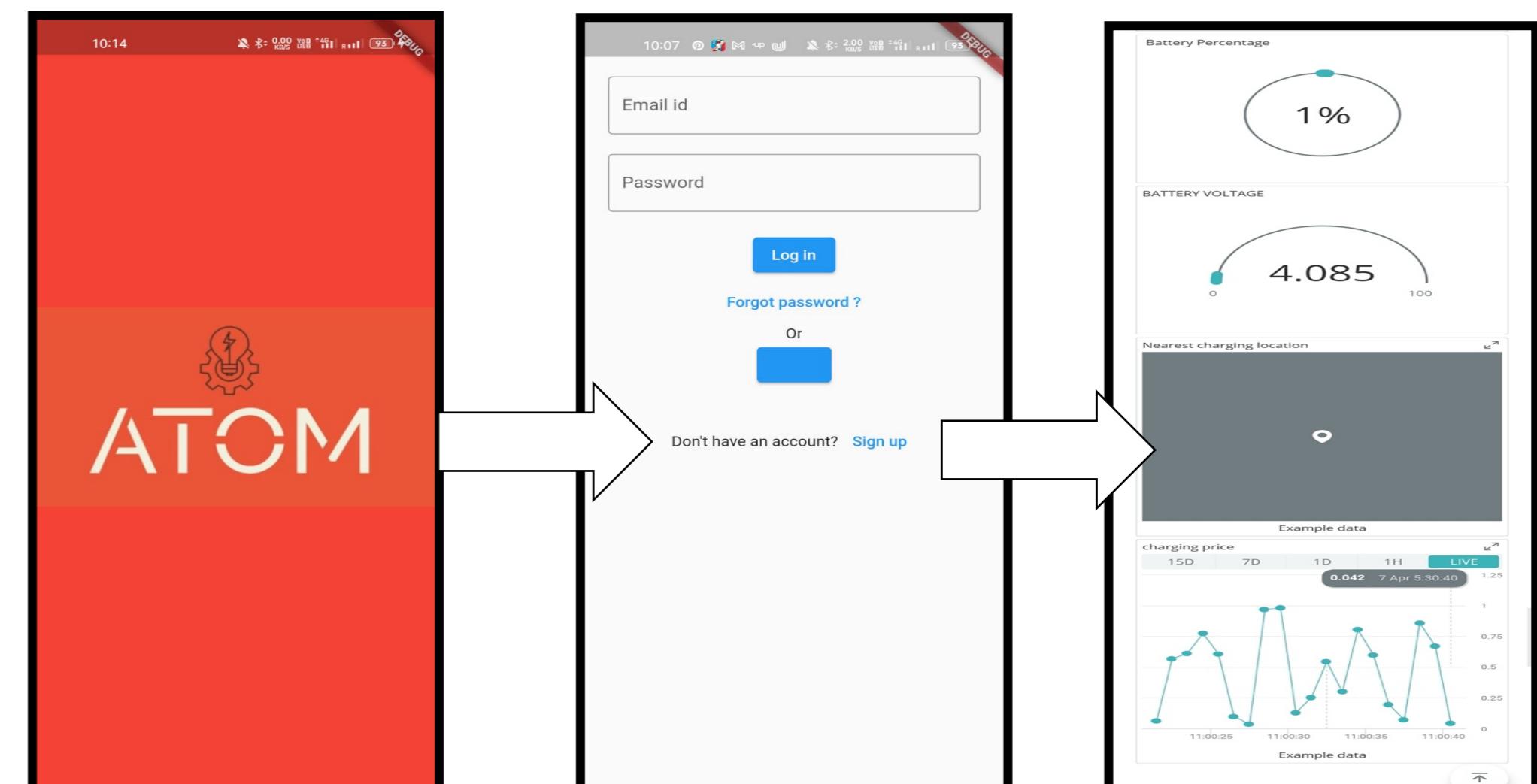
SWOT Analysis

- Strength :**
 - Easy integration with available mobile devices.
 - Provides options for selecting from parked charging or battery swapping based on the criticality of the journey.
 - Provides option for price negotiation to the EV users.
- Weakness :**
 - Requires network connectivity.
- Opportunities :**
 - With the soon adoption of 5G networks the data transfer rate would be fast thereby making the system highly effective.
- Threats :**
 - Cyber Security issues to be addressed.

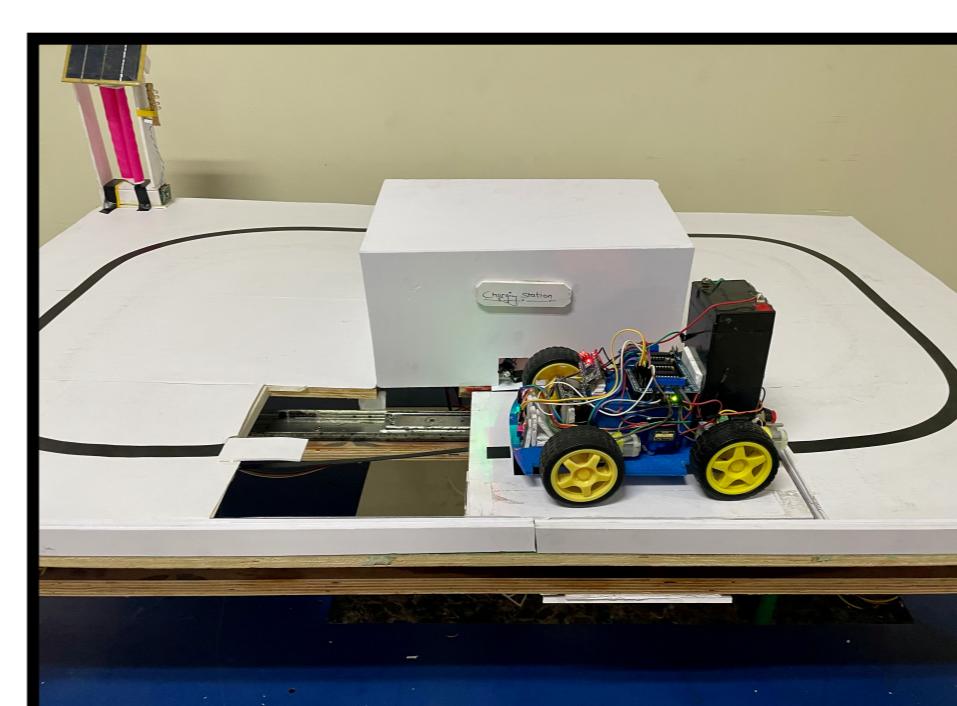
Case Study (Battery Swapping Station)



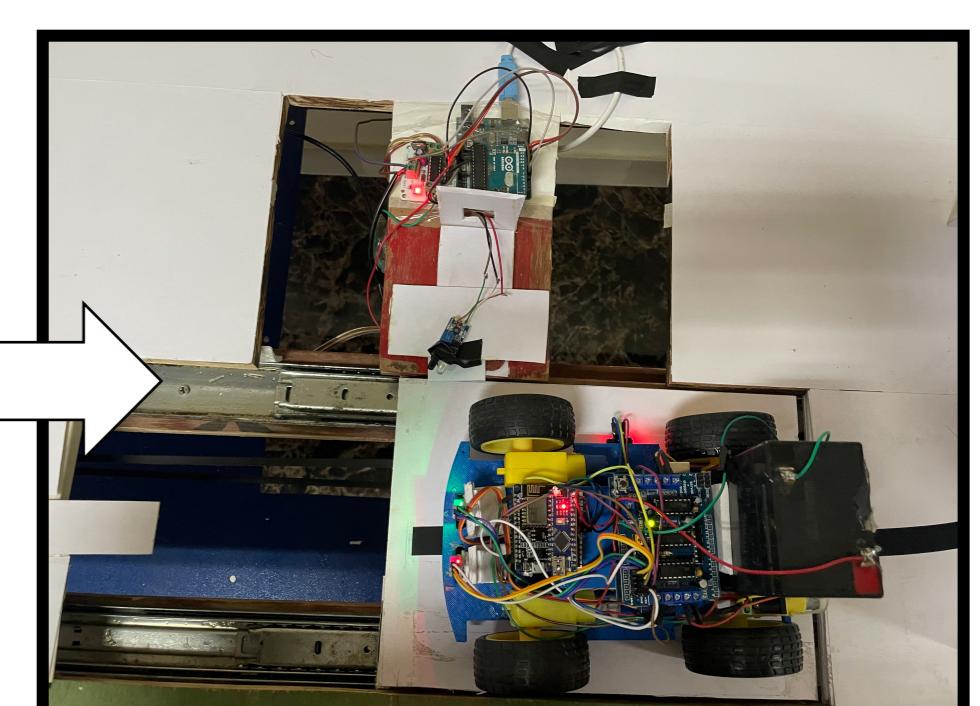
Aggregator



EV User integrating with aggregator through mobile application



Swapping Station



Swapping in progress

Conclusions

- The issue of range anxiety is one of the major deterrent of mass adoption of Electric Vehicles.
- The research work proposes a novel and easy approach to address the range anxiety issue.
- The case study is developed to show the effectiveness of this approach with advanced battery swapping process.
- With increasing network strengths, the concepts of vehicular communication and autonomous driving would advance and that would require such effective approaches to eliminate range anxiety.

References

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