Smart Vehicle Diagnostic App

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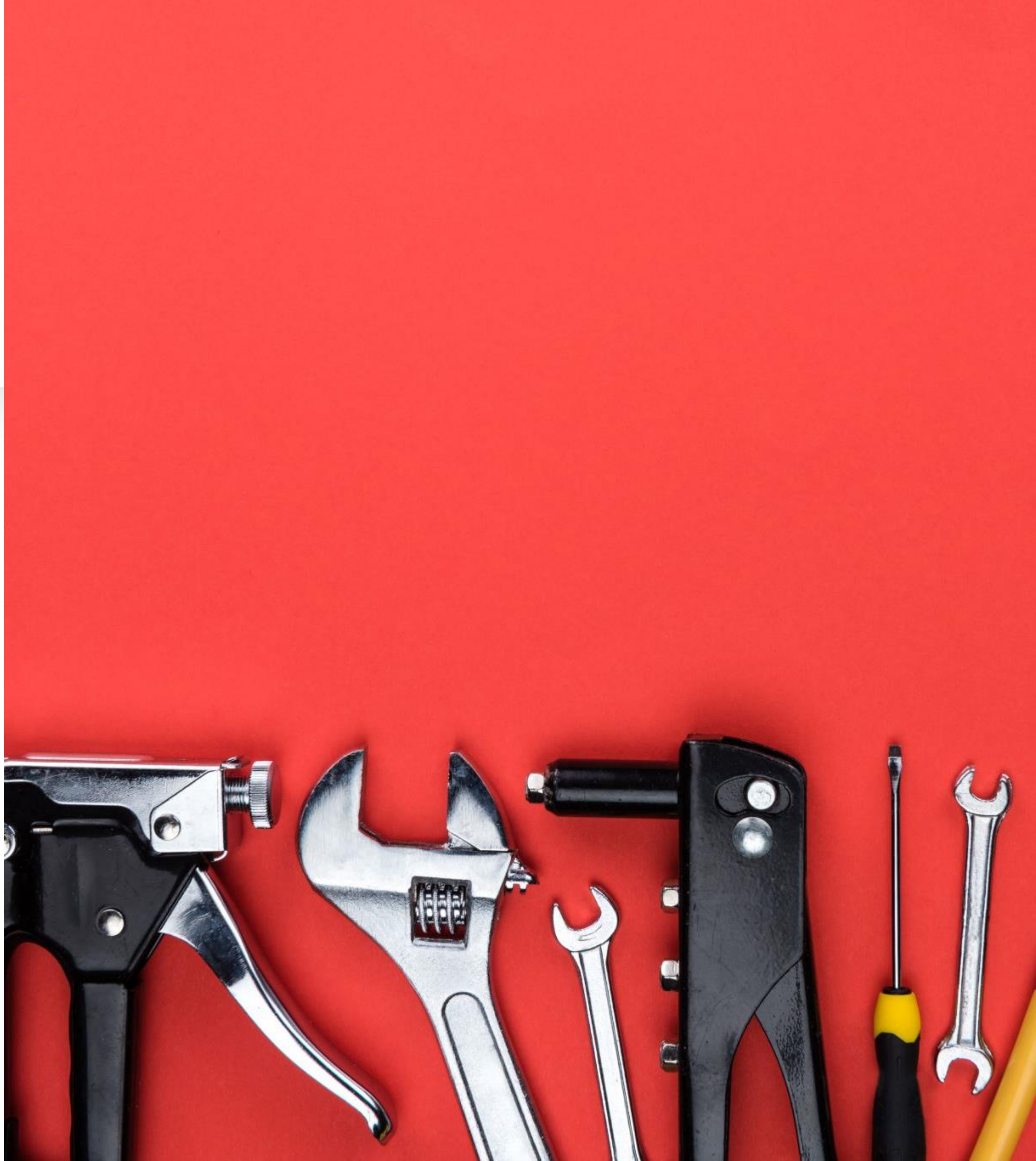
Computer Scince Thesis

Abstract

- This project presents a mobile application designed to monitor vehicle health using OBD-II technology and Bluetooth connectivity. The app provides real-time performance data, diagnostic trouble codes (DTCs), and trip tracking features. The goal is to simplify vehicle diagnostics for everyday drivers by translating complex mechanical data into clear, user-friendly insights.

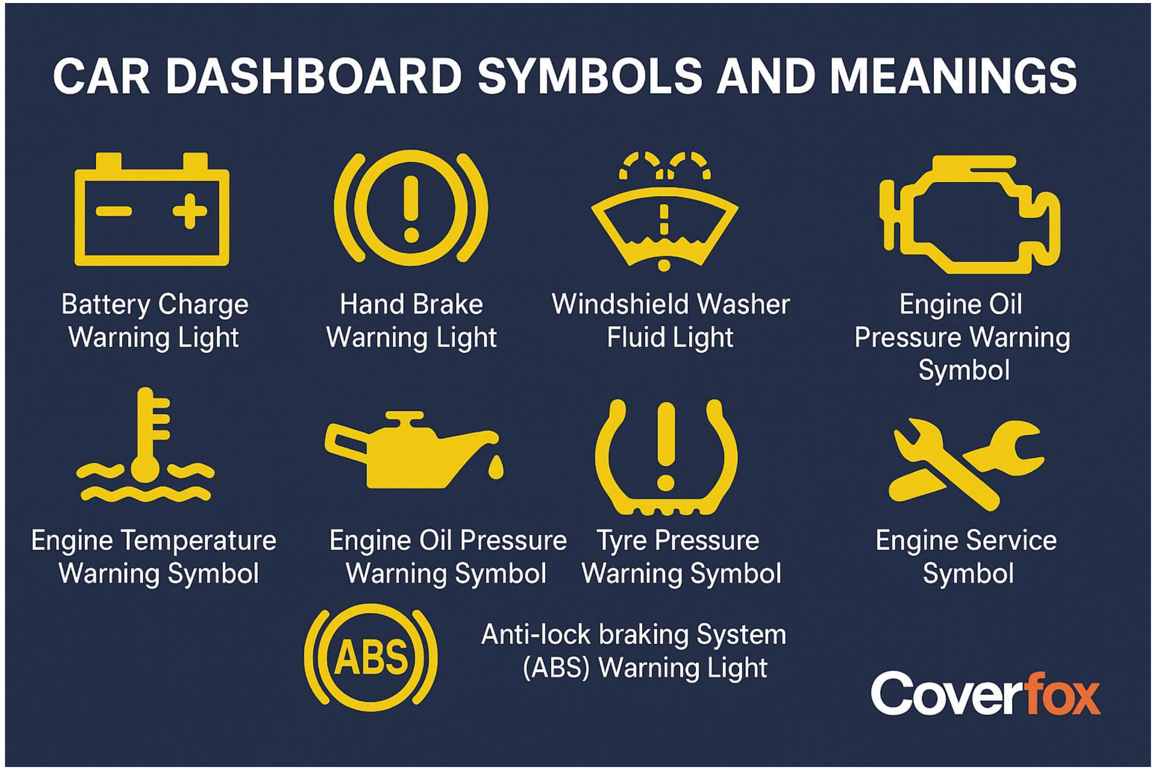
Problem Statement

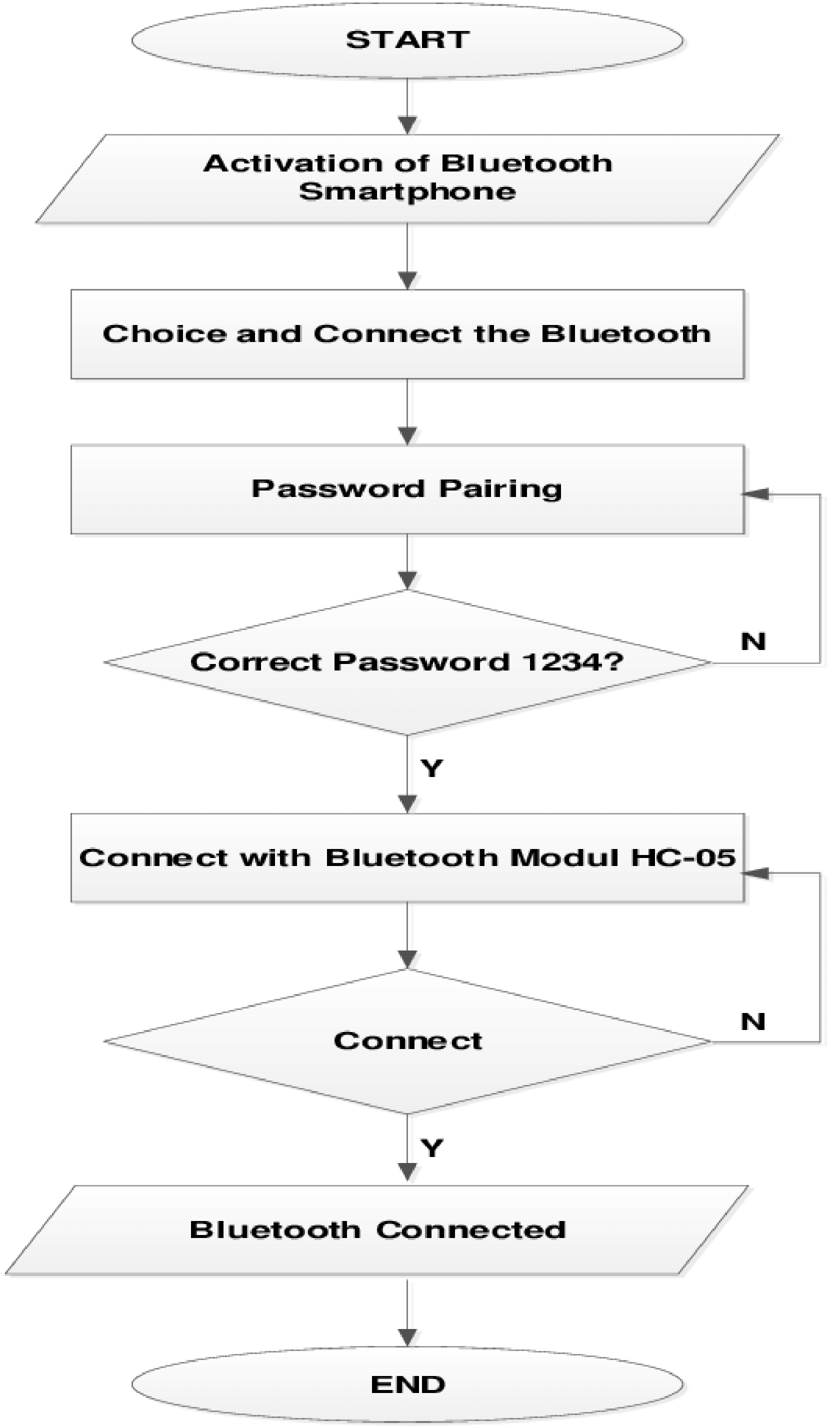
- Many vehicle diagnostic tools are designed for mechanics, not everyday drivers. Most drivers do not understand warning lights or technical error codes, which can lead to delayed repairs and higher costs. Additionally, existing diagnostic tools are often expensive, difficult to use, or require specialized knowledge. As a result, there is a need for a simple, accessible solution that provides real-time vehicle insights in a user-friendly way.



Purpose of the Study

- The purpose of this project is to design and develop a mobile application that allows users to monitor their vehicle's health in real time.
- This app aims to translate complex vehicle data into simple, understandable information.
- It also provides features such as trip tracking and maintenance alerts to help users make informed decisions about their vehicle's condition.



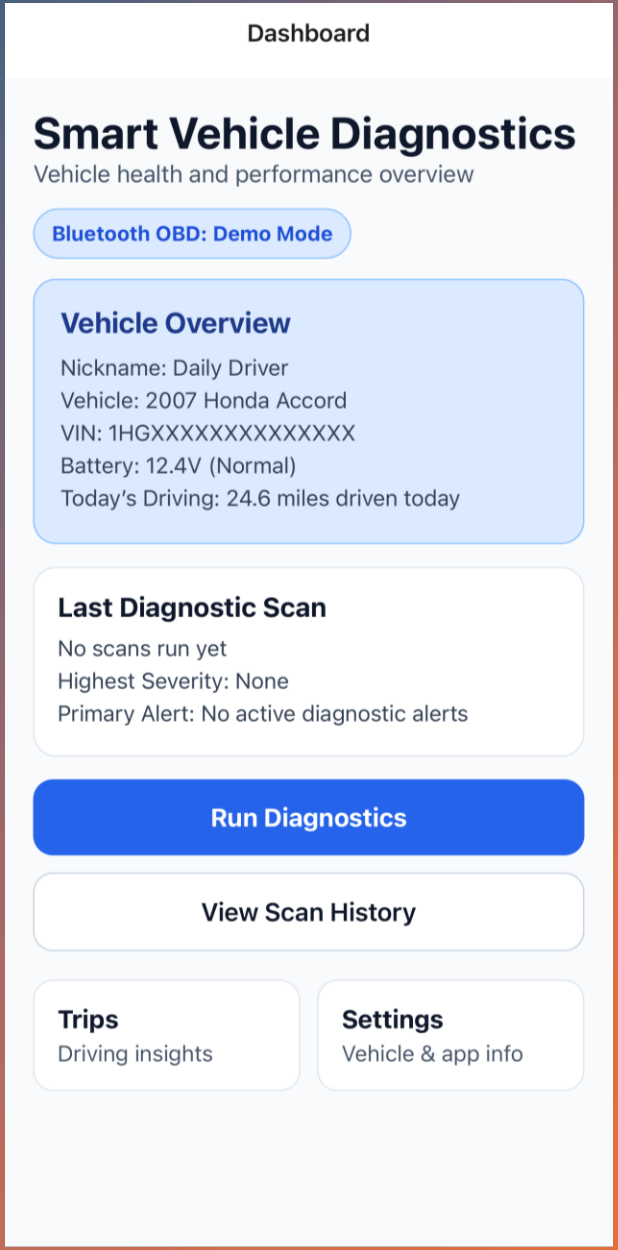


System Overview

- The system is a mobile application developed using React Native and Expo. It is designed to connect to a vehicle's onboard diagnostic system (OBD-II) through a Bluetooth adapter. The app collects vehicle data, processes it, and displays it through an easy-to-use interface. For this prototype, simulated data is used to demonstrate how the system would function in a real-world environment.

Key Features

- The application includes several key features that support its functionality.
  - It displays real-time vehicle metrics such as speed, RPM, and coolant temperature. It allows users to run diagnostic scans and view trouble codes with clear explanations.
  - The app also includes trip tracking, which records driving data such as distance and fuel usage.
  - Additionally, users can receive maintenance alerts and customize their vehicle profile within the app.

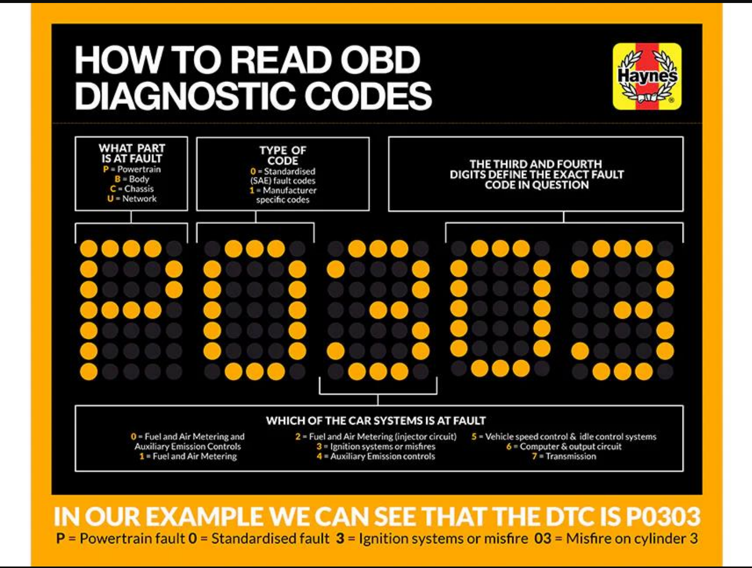


Demo Walkthrough

- The demo begins on the dashboard, where users can view an overview of their vehicle's status, including recent activity and system health.
- From there, users can navigate to the diagnostics screen to run a scan and view any detected issues. The trips screen simulates a driving session, tracking distance, speed, and fuel usage.
- Finally, the settings screen allows users to update their vehicle profile and adjust app preferences.

Data Flow

- The system follows a clear data flow process. In a real implementation, vehicle data would be collected through an OBD-II adapter and transmitted via Bluetooth to the mobile app. The app processes this data and converts it into readable information. The processed data is then displayed to the user and stored locally for future reference, such as trip history and diagnostic records.



Results

- The project successfully produced a functional prototype that demonstrates the core features of a smart vehicle diagnostic system. The app simulates real-time data updates, generates diagnostic scan results, and tracks trip performance. The interface was designed to be simple and intuitive, allowing users to easily understand their vehicle’s condition. Overall, the results show that the application meets its intended purpose.

Limitations

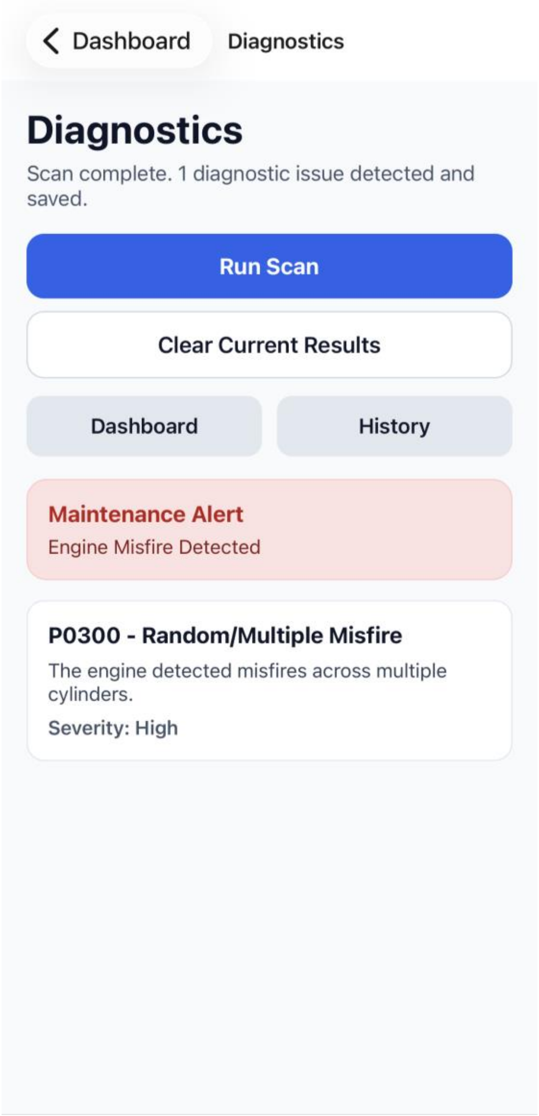
- Although the prototype demonstrates key features, there are some limitations. The current version uses simulated data instead of a live Bluetooth connection. Additionally, testing was limited to a controlled environment, and the app does not yet support cloud storage or advanced analytics. These limitations highlight areas for improvement in future development.

Future Improvements

- Future improvements for this project include integrating real Bluetooth OBD-II devices to collect live vehicle data.
- Additional features such as cloud storage, predictive maintenance using machine learning, and enhanced user interface design can also be implemented.
- Expanding compatibility with different vehicle types and adding navigation features would further improve the application.

FQA

- **Q: Does this app work with real vehicles?**
  A: The current version uses simulated data, but it is designed to connect to real OBD-II devices in future development.
- **Q: Who is this app designed for?**
  A: It is designed for everyday drivers who want a simple way to understand their vehicle's condition.
- **Q: What makes this app different?**
  A: It focuses on simplicity and presents technical data in a clear, user-friendly format.
- **Q: What type of data does the app provide?**
  A: It provides metrics such as speed, RPM, temperature, trip data, and diagnostic trouble codes.



Conclusion

- In conclusion, this project demonstrates the potential of mobile technology to simplify vehicle diagnostics. By combining real-time data monitoring with an intuitive interface, the application makes it easier for users to understand and maintain their vehicles. While the current version is a prototype, it provides a strong foundation for future development and real-world implementation.

References

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