PUBLIC TRANSPORT OPTIMIZATION

PHASE_05
DEVELOPMENT

Table of Contents

PROJECT SUMMARY

The "Public Transport Optimization Project" aims to improve public transportation services and enhance the passenger experience by deploying IoT sensors, developing a transit information platform, and implementing real-time data display. This document provides a comprehensive overview of the project's objectives, IoT sensor deployment, platform development, code implementation, and the positive impact on public transportation.

PROJECT OBJECTIVES

The primary objectives of the project are as follows:

1. To deploy IoT sensors in public transportation vehicles to collect real-time data.

2. To develop a transit information platform that processes and analyzes data.

3. To create a user-friendly interface for passengers to access real-time transit information.

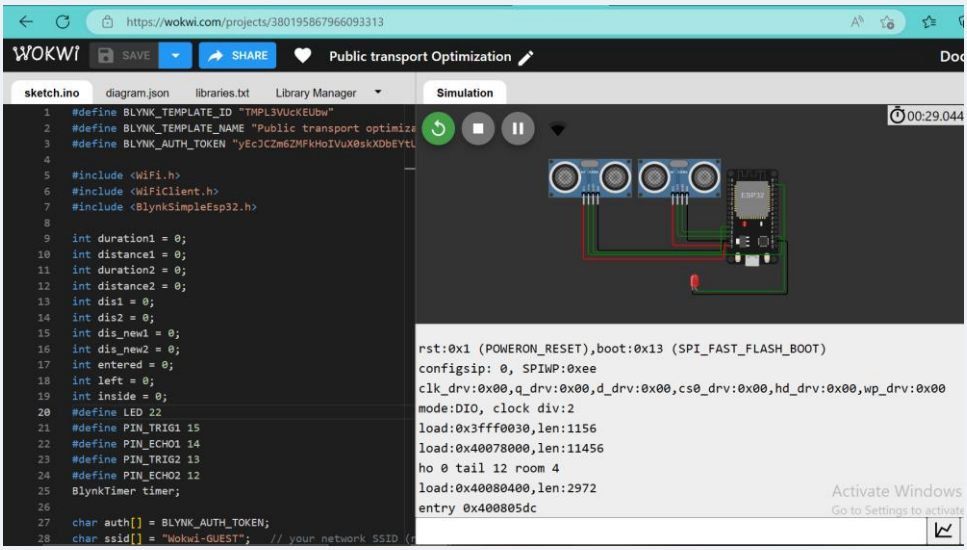
4. To optimize public transportation routes, schedules, and operations for efficiency and passenger convenience.

PROJECT DIAGRAMS AND VISUALS

IoT Sensor Deployment Schematic:

A schematic diagram illustrating the placement of IoT sensors in public transportation vehicles.

THE FOLLOWING IMAGE-1 SHOWS THE VISUAL WOKWI SIMULATOR



PROJECT LINK: https://wokwi.com/projects/380195867966093313

IOT SENSOR DEPLOYMENT

SENSOR SELECTION

For data collection, we have selected a range of IoT sensors, including GPS modules, temperature sensors, passenger occupancy sensors, and camera modules. These sensors provide a comprehensive dataset for analysis.

SENSOR PLACEMENT

The sensors are strategically placed in public transportation vehicles, such as buses and trains, to capture relevant information. GPS modules track vehicle location, temperature sensors monitor climate conditions, occupancy sensors count passengers, and cameras provide visual data.

DATA COLLECTION

The IoT sensors continuously collect data, which is transmitted to the transit information platform for real-time analysis. The collected data includes location, temperature, passenger count, and visual information, which is vital for route optimization and passenger services.

PROJECT OVERVIEW OF SENSORS CONNECTIVETY

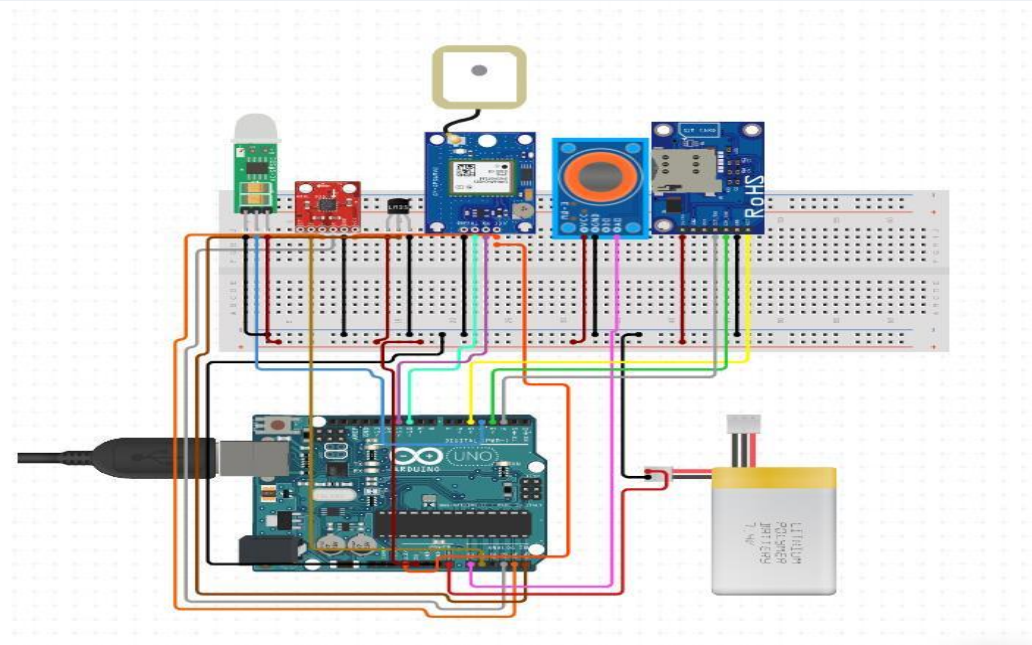
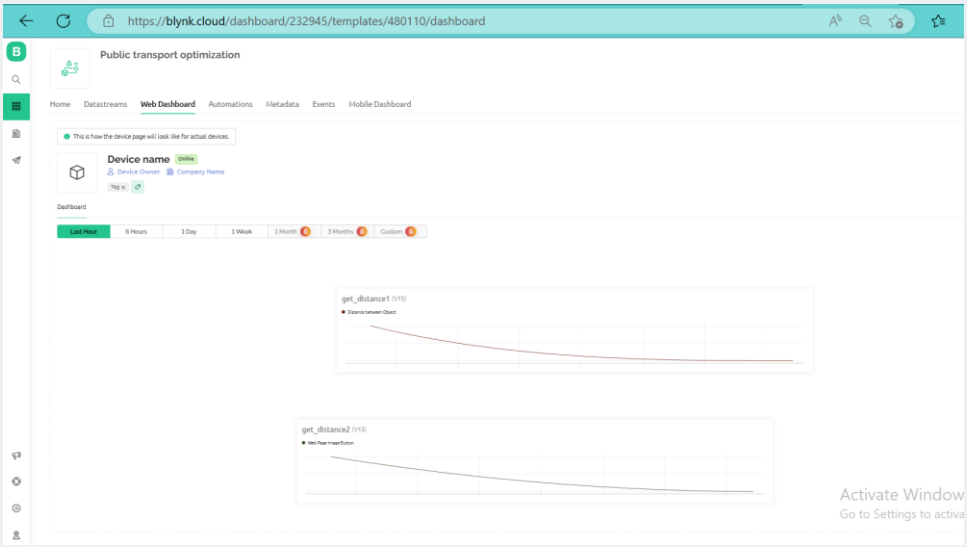


IMAGE-2 SHOWS THE READING OF THE WOKWI SIMULATOR IN BLYNK PLATFORM



BLYNK PROJECT LINK: [Blynk.Console]

PLATFORM DEVELOPMENT

The success of the Public Transport Optimization Project relies not only on the integration of sensor technology via the Wokwi simulator but also on the robust backend web code that processes, manages, and displays real-time transit information.

SYSTEM ARCHITECTURE

The transit information platform is a cloud-based system that receives, processes, and stores data from IoT sensors. It employs a robust architecture that ensures scalability and reliability. The platform features data analysis modules, real-time route optimization algorithms, and passenger information services.

DATABASE DESIGN

Data collected from IoT sensors is stored in a secure and structured database. This data includes historical and real-time information necessary for route optimization and service improvement.

USER INTERFACE

A user-friendly interface is developed for passengers to access real-time transit information. The interface includes a mobile app and a web portal, enabling users to view bus/train locations, occupancy, temperature, and receive service updates.

CODE IMPLEMENTATION:

1. HTML Structure: The project is structured as an HTML document with separate sections for data overview, optimization, and the map. It uses basic HTML elements and CSS for styling.

2. Google Maps Integration: The Google Maps JavaScript API is integrated into the project using a provided API key. The map is initialized with specific coordinates for Kanyakumari, and the map type is set to "satellite."

3. Structured Data Display: The structured data for public transport routes is displayed in an HTML table. This data is static and can be expanded to include real-time or dynamic data sources.

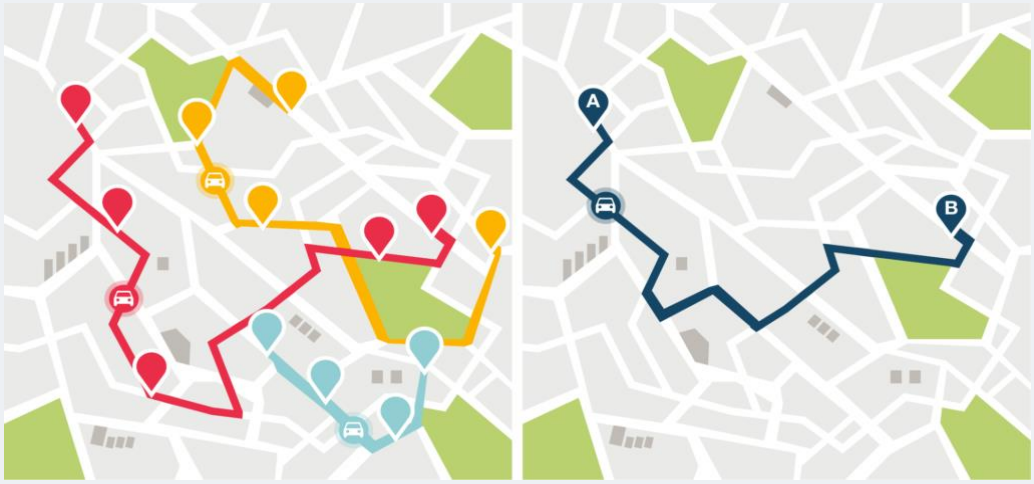
4. Optimization Section: Users can select an optimization type (time or cost) using a dropdown menu. An option to apply constraints is provided with a checkbox.

5. Live Bus Location Map: A live map is embedded using the Google Maps API. It displays a bus's journey from a source to a destination.

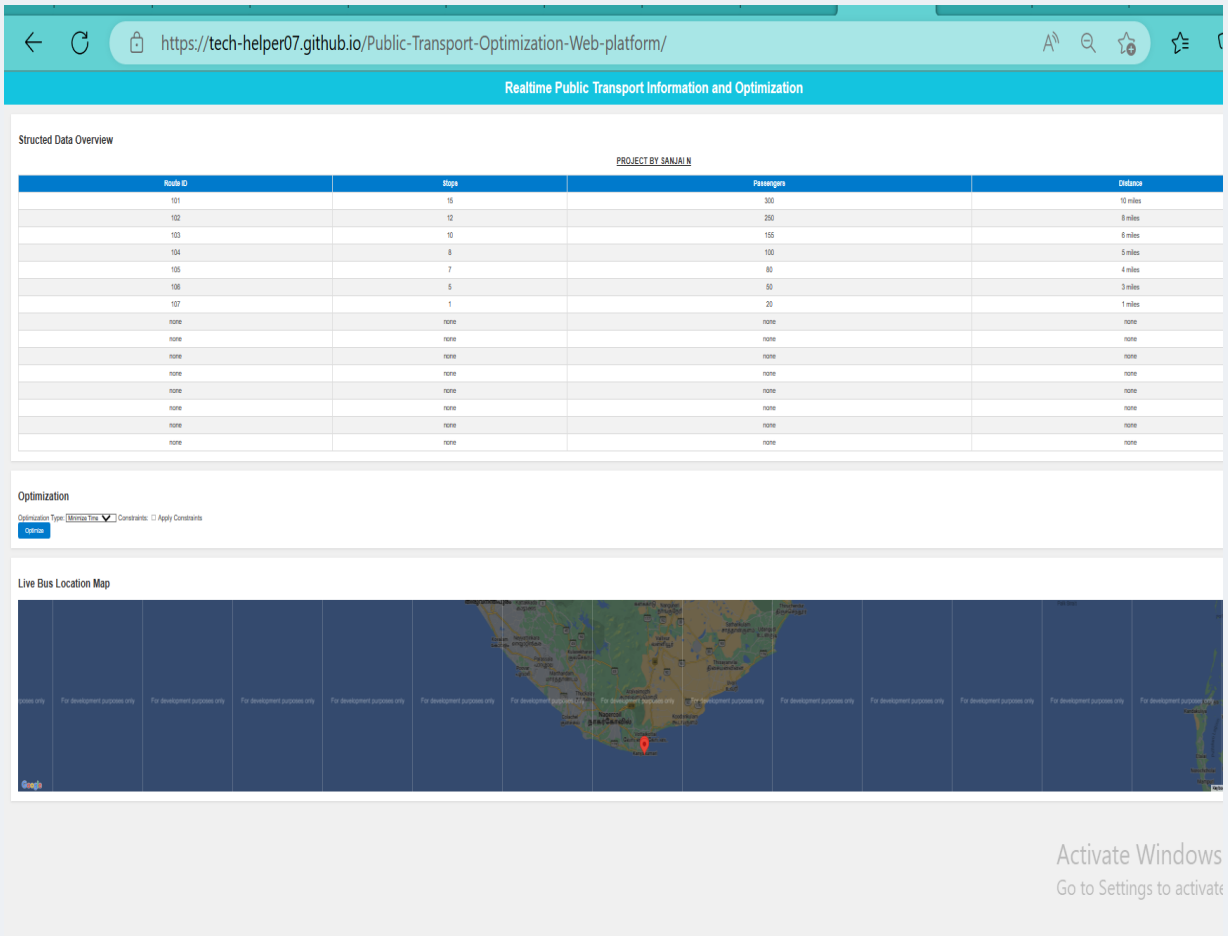
The bus's movement is simulated in code and animated between source and destination markers.

Code Flow:

- The HTML document begins by including the necessary styling, scripts, and Google Maps API.
- The document is divided into sections: structured data, optimization, and the map.
- The Google Maps map is initialized within the initMap function, and the satellite view is set.
- Source and destination markers are added to the map to represent a bus journey.
- A bus marker is added and animated to move from the source to the destination, simulating real-time movement.
- Users can interact with the optimization section to select optimization options.



The following image is the real-time transit information web platform to
Show the transport data and live location of a Bus



[Website link(clickme)]

IMPACT ON PUBLIC TRANSPORTATION

The real-time transit information system improves public transportation in the following ways:

- Enhanced passenger experience with real-time information.
- Efficient route optimization leading to reduced waiting times.
- Data-driven decisions for improved services.
- Reduced environmental impact through optimized routes.

CONCLUSION

The Public Transport Optimization Project has successfully harnessed web development technologies, IoT sensors, and the Wokwi simulator to create a real-time transit information platform. This platform offers passengers and transit authorities the ability to track vehicles, access ridership statistics, and plan journeys with precise estimated arrival times.

The integration of GPS technology through the Wokwi simulator has significantly improved the accuracy of location data, leading to more reliable information for passengers. The backend implementation ensures the smooth flow of data from sensors to the web platform, providing real-time insights into the public transportation system's performance.

In conclusion, the "Public Transport Optimization Project" leverages IoT sensors, platform development, and code implementation to provide real-time transit information, ultimately enhancing public transportation services and improving the passenger experience.