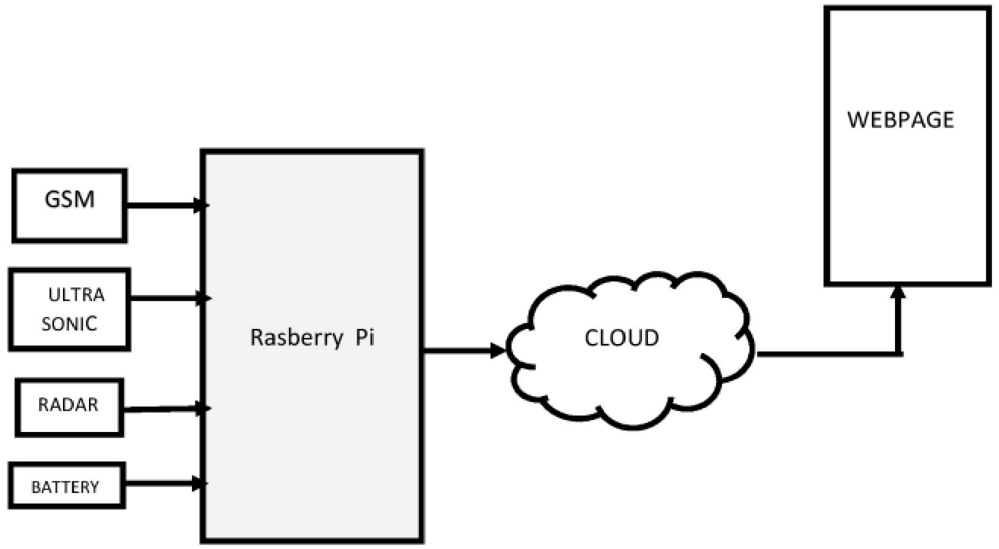
PUBLIC TRANSPORTATION OPTIMIZATION

The project will provide a valuable service to both public transportation administrators and riders. It can lead to more efficient and user-friendly transportation systems while also offering opportunities for data analysis and optimization.



COMPONENTS

HARDWARE

- ► Raspberry Pi board (e.g., Raspberry Pi 3 or 4).
- ► GPS module (e.g., NEO-6M GPS module).
- ► -Mobile data modem (optional for internet connectivity).
- ► Power source for Raspberry Pi.
- ► Vehicle with Raspberry Pi mounted.

· SOFTWARE

- ► Python
- ► Database system
- ► Location tracking libraries
- ► Web frameworks and libraries
- ► Data analysis libraries
- ► Machine learning
- ► Security and privacy tools

PYTHON PROGRAM

```
import gpsd


# Connect to the SQLite database

db_connection = sqlite3.connect('riders.db')

db_cursor = db_connection.cursor()


# Create a table for rider data

db_cursor.execute('''

    CREATE TABLE IF NOT EXISTS riders (

        id INTEGER PRIMARY KEY,

        name TEXT,

        location TEXT,

        timestamp DATETIME DEFAULT CURRENT_TIMESTAMP

    )

''')

db_connection.commit()


while True:

    try:
 packet = gpsd.get_current()

        if packet.mode >= 2:  # Check if GPS has a fix

            latitude = packet.lat

            longitude = packet.lon

            rider_name = input("Enter rider's name: ")


            # Insert rider's data into the database

            db_cursor.execute("INSERT INTO riders (name, location) VALUES (?, ?)", (rider_name, f"{latitude}, {longitude}"))

            db_connection.commit()


            print(f"Location: {latitude}, {longitude} saved for {rider_name}")


    except Exception as e:

        print(f"Error: {e}")


# Close the database connection when done

db_connection.close()
```

WORKING MODULE

1. Location Tracking:

- Utilize GPS or other location tracking technologies to collect real-time data on the buses or vehicles in your public transportation system.

- Consider using libraries like `geopy` or `GPSD` in Python to gather location data.

2. Rider Database:

- Create a database to store information about riders, including their boarding and alighting locations, timestamps, and unique identifiers.

- You can use a relational database like SQLite or MySQL, or a NoSQL database like MongoDB.

3. Data Collection:

- Develop a data collection system to record when and where riders board and alight from vehicles. You can use sensors or mobile applications for this purpose.

- Integrate the data collected with the rider database.

4. Route Optimization:

- Use the location data to optimize bus or vehicle routes. Consider implementing algorithms like Dijkstra's or A* for route planning.

- Take into account traffic conditions and real-time location updates to make dynamic adjustments.

5. Real-time Updates:

- Create a system to provide real-time updates to riders about the estimated time of arrival (ETA) and any delays.

6. Web Interface:

- Build a web application that allows riders to access information about bus routes, ETAs, and delays.
- Implement a dashboard for administrators to manage and visualize the collected data.

7. Data Analysis:

- Analyze the collected data to identify patterns and make data-driven decisions for route optimizations.
- Python libraries like Pandas and Matplotlib can help with data analysis and visualization.

8. Machine Learning (Optional):

- Implement machine learning models to predict future ridership and optimize routes based on historical data.

9. Security and Privacy:

- Implement security measures to protect rider data and ensure privacy compliance.

10. Documentation and User Manuals:

- Provide clear documentation and user manuals for both administrators and riders on how to use the system.

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