

# GPS TOLL BASED SIMULATION USING PYTHON

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# Problem Statement

**Simulation Objective:** Model a GPS-based toll system using Python.

**Vehicle Movement:** Simulate vehicles moving along predefined routes with GPS coordinates.

**Toll Zone Definition:** Define toll zones or points using GPS coordinates.

**Distance Calculation:** Calculate the distance traveled by vehicles within toll zones.

**Toll Calculation:** Compute toll charges based on distance traveled or zones passed.

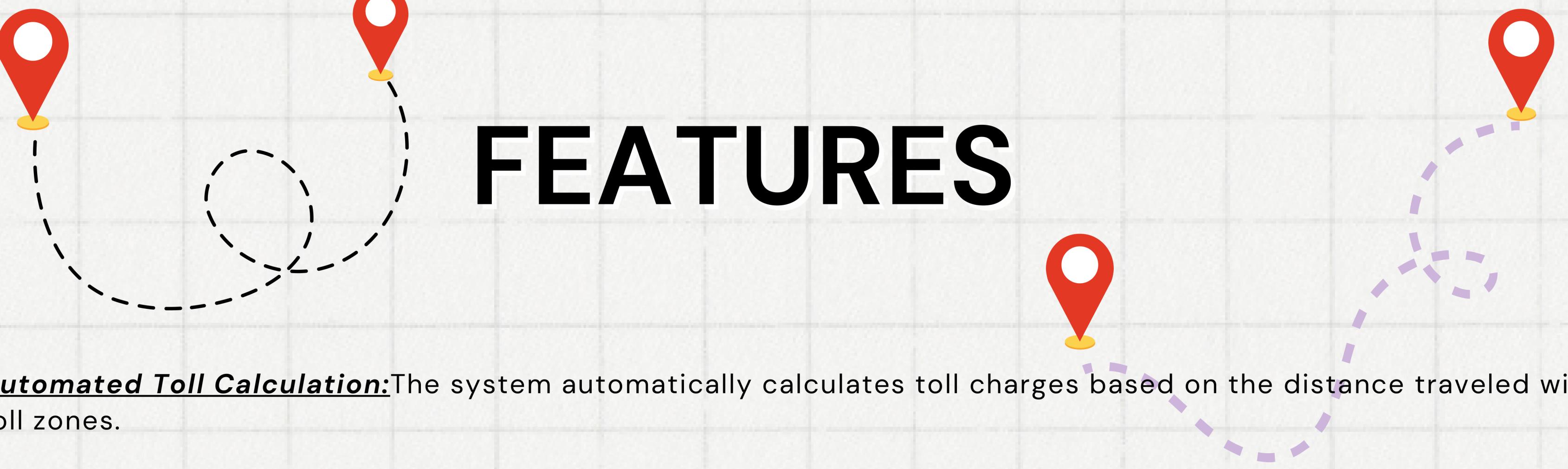
**Payment Simulation:** Deduct toll charges from user accounts.



# Unique Idea Brief(Solution)

- Define vehicle routes and toll zones.
- simulate vehicle movements.
- Continuously update vehicle positions and process toll charges.
- Plot vehicle routes and toll zones using Matplotlib.
- Create an interactive Folium map to visualize real-time vehicle positions and toll transactions.





# FEATURES

- **Automated Toll Calculation:**The system automatically calculates toll charges based on the distance traveled within toll zones.
- **Toll Zone Identification:**The system identifies when a vehicle enters or exits a toll zone to determine applicable charges.
- **Distance-Based Tolling:**Toll fees are calculated based on the distance traveled within the toll zones, promoting fairness.
- **Detailed Reporting:**The system generates detailed reports on vehicle movement, toll charges, and payment transactions for users and administrators.
- **Vehicle Categorization:**Differentiates between various types of vehicles (e.g., cars, trucks, buses) to apply appropriate toll rates.
- **Geo-Fencing:**Creation of virtual geographic boundaries to manage and control toll zones efficiently.

# Process flow

- *Define road network and toll zones*
- *Simulate Vehicle Movement*
- *Detect Toll Zone Crossings*
- *Calculate Distance Traveled*
- *Compute Toll Charges*
- *Simulate Payments*
- *Analytics and Reporting*
- *Visualization*

# Technologies used

HTML

Geopandas

CSS

Simpy

Javascript

Folium

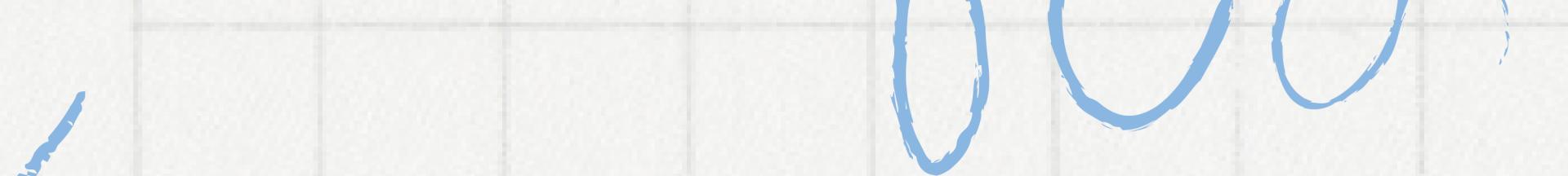
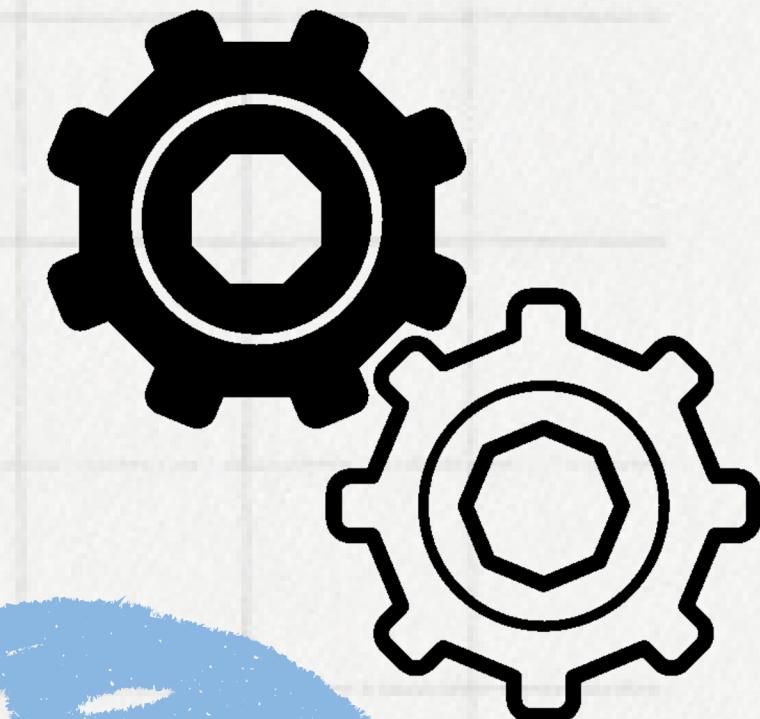
Leaflets

Shapely

Python

Matplotlib

Pandas



# Team members and contribution

## 1.Om Lakshkar

- Project manager
- Backend

## 2.Tanupriya Agrawal

- Frontend
- Ui Design

## 3.Pankhuri Agrawal

- Frontend

## 4.Srikant Choubey

- Backend



**Thank You**