

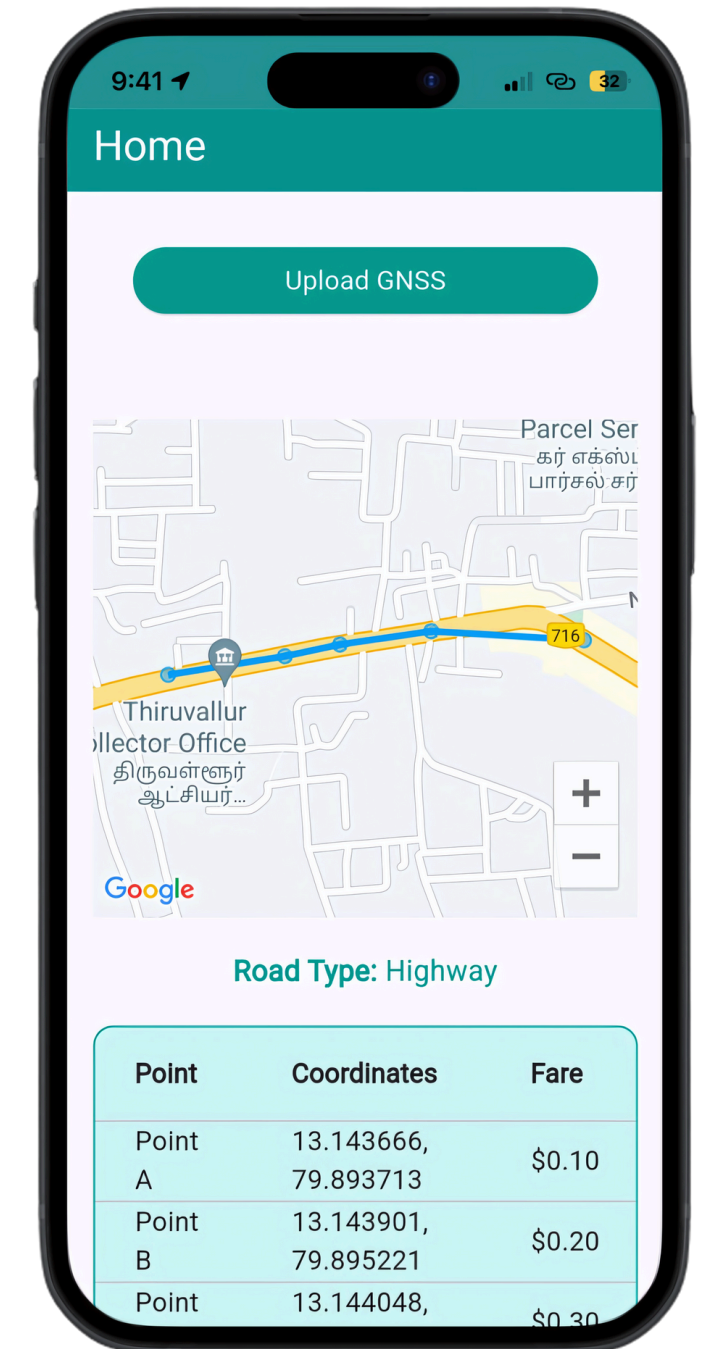
## TITLE PAGE

- **Problem Statement ID** - 1740
- **Problem Statement Title** - Development of map-matching algorithm using AI-ML techniques to distinguish vehicular movement on highway and service road.
- **Theme** - Software Automation
- **PS Category** - Software
- **Team ID** -
- **Team Name** - SNEAKY BYTES



## Proposed Solution

- Using AI-driven map-matching algorithm for distinguishing highway versus service road movements
- The solution leverages GPS data, ML, and GIS to accurately map vehicles to specific road segments based on movement patterns.
- The solution combines real-time data processing with AI models that use supervised learning to enhance adaptive map matching.



## Frontend

- Flutter 3.24.1v
- Figma Prototyping

## Backend

- Python 3.12.5v
- Firebase 2.4.0v

## Frameworks & API

- TensorFlow
- Google Maps API
- Scikit-Learn

## Hardware

- Intel i5 Core CPU
- 8+ GB RAM
- Nvidia RTX GPU

GNSS Data Collection

ML Model For  
Classification of Road  
Type

Developing Map  
Matching Algorithm

Model Evaluation  
and Deployment

Frontend UI  
Enactment

## Feasibility

1. **Data Availability:** High-resolution GPS, detailed map data are essential for precise road classification.
2. **ML Approaches:** Supervised learning (Random Forests, neural networks) can be applied.
3. **Applications:** Key uses include traffic management, navigation systems, and autonomous vehicle accuracy.

## Challenges

1. Real-Time Data Issues
2. Bias and Inaccuracy
3. Correct Identification of Road Type

## Overcome

1. Enhancing Accuracy and Precision
2. Precise Toll Fare Calculation
3. Correct API for Map Matching

## Potential Impact

1. Improved Tolling Accuracy
2. Enhanced Traffic Management
3. Cost Efficiency
4. Fairer Charging System

## Benefits

1. Revenue Optimization
2. Reduced Congestion
3. Seamless User Experience
4. Accurate Fares

## Research Sources

- **GNSS Toll Free System** - <https://www.youtube.com/watch?v=SCbk7QXAL2gv>
- **Python Documentation** - <https://www.python.org/documentation>
- **GNSS Data** - <https://igs.org/data>
- **Flutter Documentation** - <https://flutter.dev>

## Articles Used

- **Articles Based on GNSS** - <https://www.researchgate.net/publication/35757952>
- **Articles Based on Virtual Tolling System** - <http://ieeexplore.ieee.org/document>