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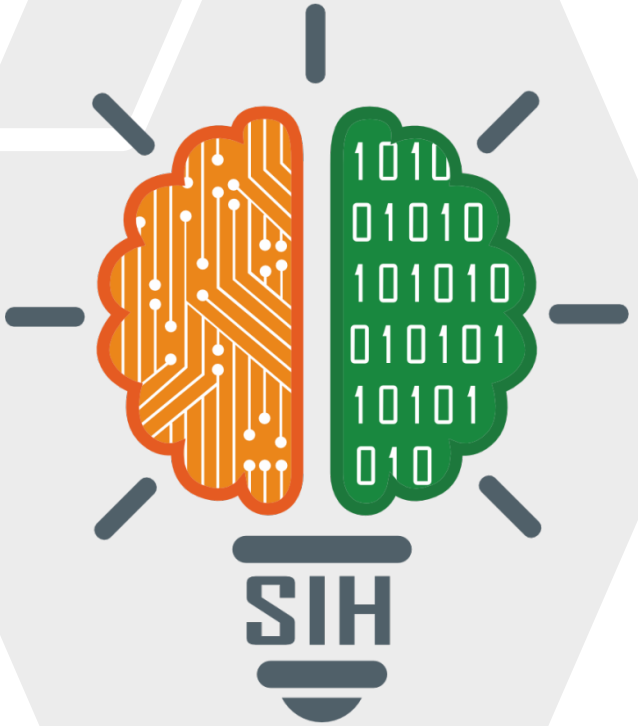
Real-Time Public Transport Tracking for Small Cities

- **Problem Statement ID –** SIH25013
- **Problem Statement Title-**Real-Time Public Transport Tracking for Small Cities
- **Theme-** Transportation & Logistics
- **PS Category- Software**
- **Team ID-**
- **Team Name -** Bytes with Bites



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Driver-Mobile-Based Bus Tracking System

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Solution Highlights:

- Use **driver/conductor smartphones** instead of GPS hardware.
- A **toggle button** allows drivers to enable/disable location tracking.
- Passengers view **live bus location, routes, ETA** via mobile app.
- **Low-cost and scalable** → specially designed for small cities

Innovation & Uniqueness:

•**No GPS Hardware Needed:** Unlike traditional systems that require costly GPS devices in every bus, our solution leverages the **driver's smartphone** for live tracking.

•**Shift-Based Smart Toggle:** Innovative **toggle + shift reminder system** ensures drivers only share location during duty hours → reducing errors & respecting privacy.

•**Optimized for Low Bandwidth:** Designed to work even with **weak internet connectivity** common in rural/urban-fringe areas.

•**Passenger-Centric Transparency:** Passengers see **"Last Active Time"** and only reliable buses →trust in public transport and a **Whatsapp Chatbot**.

•**Future-Ready:** Can integrate **predictive ETAs, ticketing, and data analytics** without major system changes.

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TECHNICAL APPROACH

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- **Technologies:**
  - ❑ App: Flutter / React Native
  - ❑ Backend: Node.js / Spring Boot
  - ❑ Database: PostgreSQL / MongoDB (GeoSpatial support)
  - ❑ Mapping: Google Maps API / OpenStreetMap
- **Architecture:**
  - ❑ Driver App → Sends GPS data
  - ❑ Backend Server → Processes and stores
  - ❑ Passenger App → Displays live bus location, ETA
- **Scalability:** Cloud-based system for city-wide adoption

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FEASIBILITY AND VIABILITY

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•Feasibility:

- ❑ No need to install GPS in old buses.
- ❑ Works with drivers' smartphones.
- ❑ Easy adoption, low infrastructure cost.

•Challenges & Mitigation:

- ❑ **Forgetfulness:** Shift-based toggle reminders.
- ❑ **Network issues:** Offline caching + low-bandwidth protocols.
- ❑ **Scalability:** Cloud infra + GeoSpatial DB.

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IMPACT AND BENEFITS

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- **For Commuters:**
  - ❑ Reduced **waiting uncertainty** → improves daily productivity.
  - ❑ **Safer travel**: no need to wait long at bus stops late at night.
  - ❑ Increased **trust in public transport** → more adoption.
  - ❑ **Accessible design**: works even on low-end smartphones and slow internet.
- **For Transport Authorities & Municipalities:**
  - ❑ Better **fleet utilization**: know which buses are running late or underutilized.
  - ❑ **Data-driven planning**: optimize routes, frequency, and scheduling based on real demand.
- **For Society & Economy:**
  - ❑ Encourages **shift from private to public transport** → less congestion.
  - ❑ **Lower fuel consumption** → saves money for both citizens and government.
  - ❑ Potential to integrate with **digital ticketing and UPI payments**.
- **For Environment:**
  - ❑ Fewer cars/bikes → **reduced carbon emissions** and improved air quality.
  - ❑ Supports **sustainable mobility goals** of Smart India initiatives.

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RESEARCH AND REFERENCES

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- **Urban Mobility India Report 2024** – Transport inefficiencies in tier-2 cities.
- Existing apps like *WhereIsMyTrain, Ixigo* (focused on trains, limited for buses).
- Our solution: **Tailored for buses in small cities** with low-cost deployment.

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WORLFLOW

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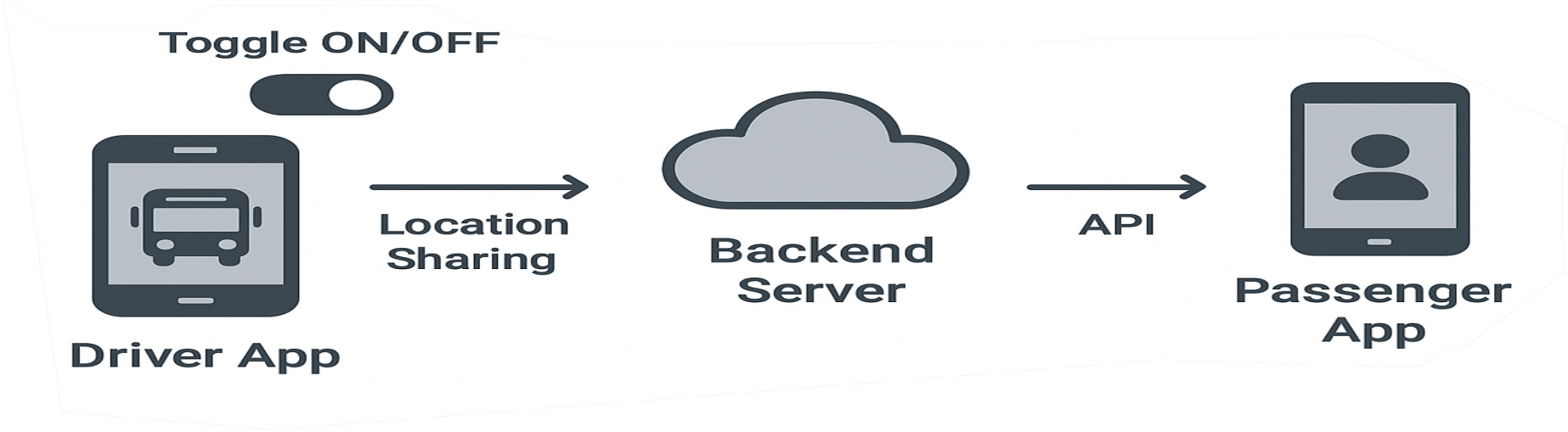

1.Driver App

- Driver selects route & bus ID.
- Turns **ON/OFF toggle** to start/stop tracking.

2. Backend Server

- Receives live GPS updates.
- Processes data into ETA & routes.

3. Passenger App

- Shows **live bus location & ETA**.
- Displays **“last active time”** for reliability.

4. End of Shift

- Driver turns **OFF toggle** after duty.
- Bus marked **inactive** in system.