USER REQUIREMENT SPECIFICATION (URS): I-TRAV – Road Safety Oriented Intelligent Public Transport Management System -Idukki District

1. Introduction

The Motor Vehicles Department (MVD), Government of Kerala, proposes to implement an **Intelligent Public Transport Management System (I-TRAV)** in **Idukki District** with the objective of improving **road safety, regulatory compliance, and operational efficiency** of stage carriage services.

Given the district's hilly terrain and dependence on public transport, there is a need for a **technology-driven system** to monitor approved routes, time schedules, and compliance in real time.

This User Requirement Specification (URS) document defines the **functional, technical, and operational requirements** of the proposed system.

2. Purpose of the URS

The purpose of this URS is to:

- Clearly define user and system requirements for the I-TRAV project
- Serve as a baseline document for **system design, development, and implementation**
- Enable evaluation by **KSITM, NIC, State Data Centre (SDC)**, and other stakeholders
- Facilitate engagement of **startup companies and technical service providers**
- Act as a reference for testing, acceptance, and future enhancements

3. Project Objectives

The key objectives of the I-TRAV system are:

- Ensure strict adherence to **RTA-approved routes and timing schedules**
- Improve **road safety** through monitoring and analytics
- Enable **real-time visibility** of stage carriage operations
- Provide **decision-support dashboards** for authorities
- Establish a **scalable and replicable model** for statewide rollout

4. Stakeholders and User Groups

Stakeholder / User Group	Role
Regional Transport Authority (RTA)	Route and timing approvals
Motor Vehicles Department (MVD)	Monitoring, enforcement, analytics
District Transport Office	*Operational supervision*
NIC	Permit and route data provider
State Data Centre (SDC)	Hosting and infrastructure
Technical Service Provider / Startup	System development & maintenance

5. Overall System Overview

I-TRAV shall be a **web-based, modular, and scalable application** integrating route management, geo-mapping, AI-based analytics, and dashboards. The system shall consume verified data from **NIC Vehicle Permit systems** and operate within Government-approved IT infrastructure.

6. Functional Requirements (Module-Wise)

6.1 Stage Carriage Route Management System

- Digital repository of **RTA-approved routes and time schedules**
- Creation, modification, and versioning of routes only through **authorized RTA workflows**
- Audit trail for all changes and approvals
- Role-based access for RTA officials, MVD officers, and authorized users
- Search and reporting of route and permit details

6.2 Smart Bus Stop & Bus Station Geo-Mapping

- GIS-based mapping of bus stops, terminals, and stations
- Geo-tagging using latitude and longitude
- Route overlay on mapped infrastructure
- Capability to support future passenger information systems

6.3 AI-Based Time Sheet Management

- Monitoring adherence to approved time schedules
- Identification of:
    - Delays
    - Early running
    - Missed or skipped trips
- AI-assisted trend analysis and compliance scoring
- Auto-generation of exception and compliance reports

6.4 Geo-Fencing and Live Monitoring

- Geo-fencing of approved routes, bus stops, and terminals
- Detection of:
    - Route deviations
    - Unauthorized halts
- Configurable alerts and notifications

- Real-time visualization on dashboards

6.5 Dashboard and Analytics (Web-Based)

- District-level, route-level, and depot-level dashboards
- Key Performance Indicators (KPIs) including:
    - Punctuality
    - Route compliance
    - Safety indicators
- Exportable MIS reports (PDF / Excel)

6.5 Adroid APP version

- Provide real time running data
- Provide Fare collection
- Accommodate concessions based fare collection
- User friendly system.

6.6 API Integration

- Secure API integration with **NIC Vehicle Permit and Route Databases**
- Periodic data synchronization and validation
- Logging and audit of all data exchanges

7. Non-Functional Requirements

Category	Requirement
Performance	Support concurrent users without degradation
Availability	Minimum 99% uptime
Scalability	District-level to State-level expansion
Usability	Intuitive, role-based UI

Interoperability	Open standards and APIs

8. Data and Integration Requirements

- Structured storage of route, permit, geo-spatial, and compliance data
- Secure data exchange with NIC systems
- Data integrity and validation mechanisms
- Historical data retention for analytics and audits

9. Security and Compliance Requirements

- Role-based access control (RBAC)
- Secure authentication and authorization
- Audit logging of all critical activities
- Compliance with Government cyber security and data privacy guidelines
- Hosting within Government-approved infrastructure

10. Deployment and Hosting

- Web application hosted at:
    - **State Data Centre (SDC)** or
    - MeitY-empanelled Government cloud
- Secure access over Government networks
- Backup and disaster recovery mechanisms

11. Implementation Timeline

Phase I – 1 Month

- Finalization of requirements
- Core web application and dashboards
- Basic route management and geo-mapping
- Bus stop identification Numbers /Lat long based
- Input of RTA secured Time schedule in to digital data

Phase II – 2 Months

- Advanced RTA-based route and timing management
- NIC API integration
- AI-based time sheet monitoring
- Geo-fencing and alert systems

Phase III

- Real time Monitoring of Buses
- User friendly Mobile phone APP for public
- Realtime Running time display boards at bus stands

Phase IV

- Digital fare collection by means of cards/QR code etc
- Digital fare collection enabled ID cards for students with pre marked Boarding, off boarding points

12. Assumptions and Constraints

- Availability of verified permit and route data from NIC
- Difficulty in providing approved time schedules in certain cases
- Timely approvals from RTA and Department
- Project execution within approved timelines and infrastructure
- Initial implementation limited to Idukki District

13. Future Scalability

- Extension to other districts
- Integration with passenger information systems
- Mobile applications and public dashboards
- Advanced AI-based safety analytics

14. Acceptance Criteria

The system shall be accepted upon:

- Successful deployment at SDC / Government cloud
- Functional validation of all modules
- Successful NIC API integration
- Security and performance testing clearance
- User acceptance by MVD and RTA officials