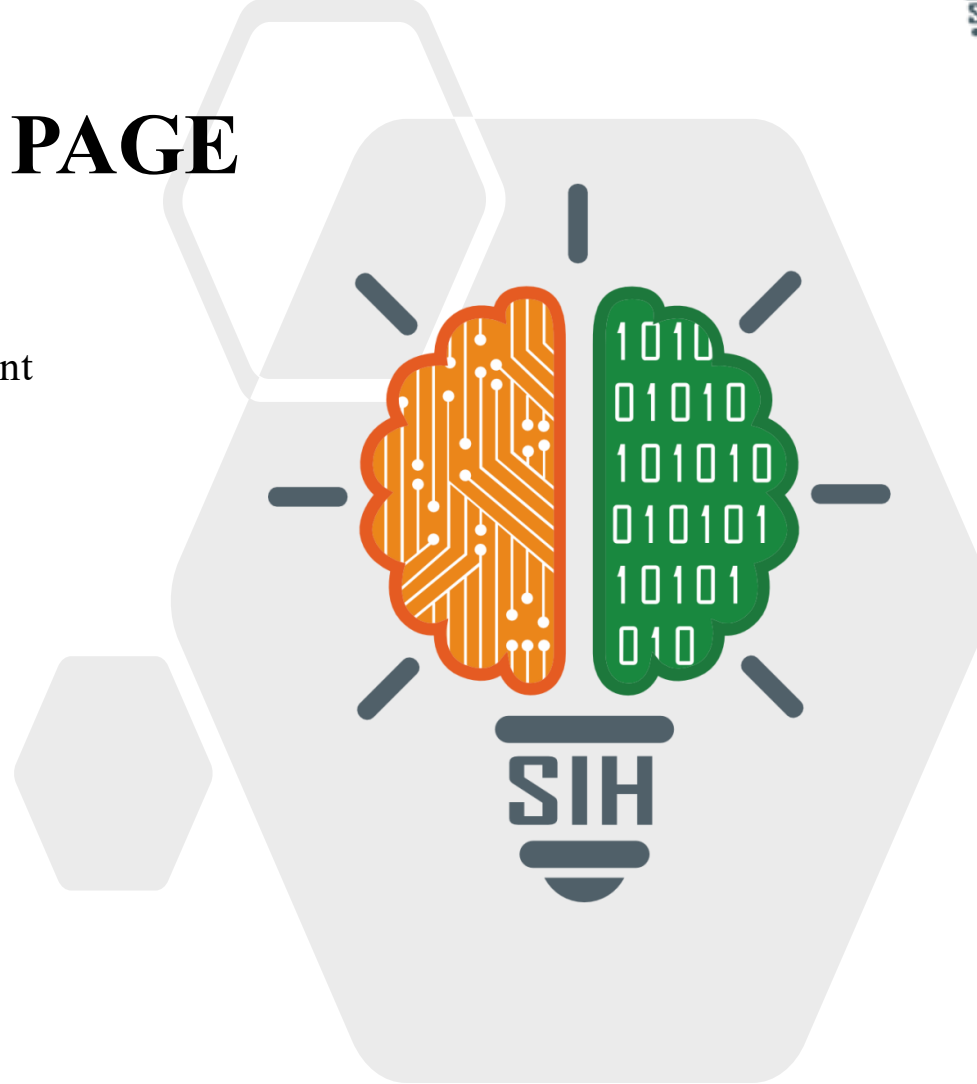# SMART INDIA HACKATHON 2025

TITLE PAGE

- **Problem Statement ID** – 25050

- **Problem Statement Title -** Smart Traffic Management System for Urban Congestion

- **Theme -** Transportation & Logistics

- **PS Category -** Software

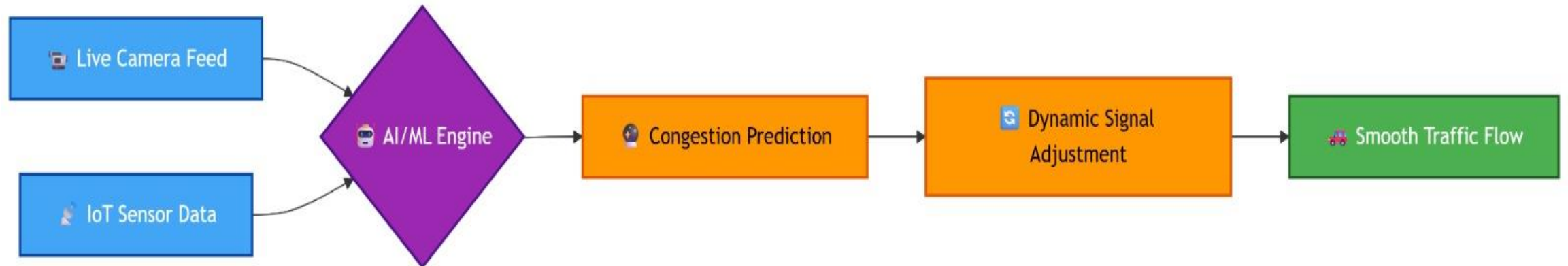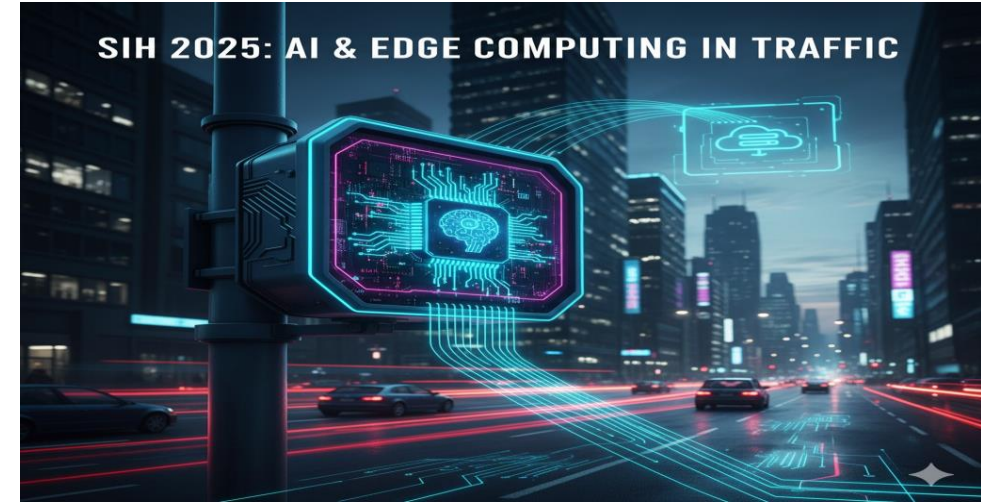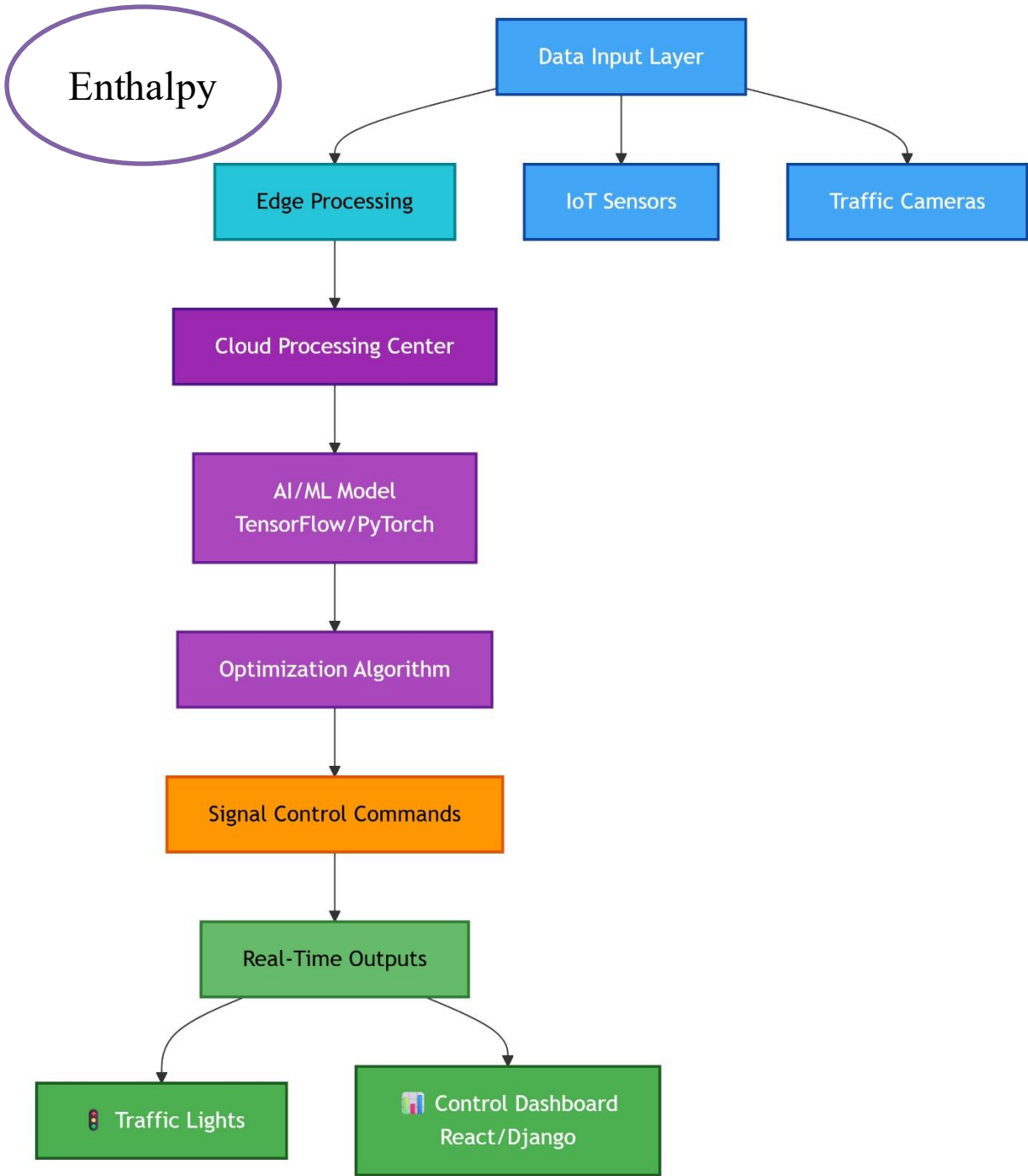- **Team Name -** Enthalpy

UrbanFlow AI: A Smart Traffic Management System

Enthalpy

SMART INDIA HACKATHON 2025

SIH 2025: AI & EDGE COMPUTING IN TRAFFIC

Live Camera Feed → AI/ML Engine
IoT Sensor Data → AI/ML Engine
AI/ML Engine → Congestion Prediction → Dynamic Signal Adjustment → Smooth Traffic Flow

TECHNICAL APPROACH

Enthalpy

Flowchart:
- Data Input Layer
  - Edge Processing
  - IoT Sensors
  - Traffic Cameras
- Edge Processing → Cloud Processing Center
- Cloud Processing Center → AI/ML Model TensorFlow/PyTorch
- AI/ML Model → Optimization Algorithm
- Optimization Algorithm → Signal Control Commands
- Signal Control Commands → Real-Time Outputs
- Real-Time Outputs → Traffic Lights
- Real-Time Outputs → Control Dashboard React/Django

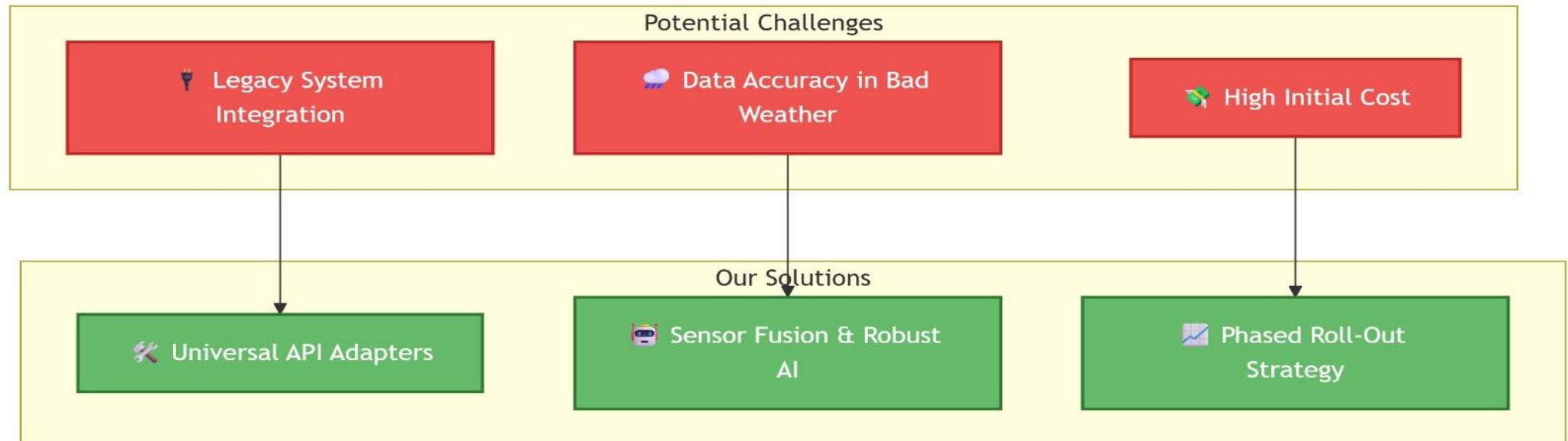| TECH STACK:	CORE METHODOLOGY:
🦖 AI & Data Science: Python, TensonFlow, PyTorch.	1. Ingest: Collect real-time data from cameras and sensors.
dj Backend & Logic: Django Framework,Express.js.	2. Predict: AI models analyze data to forecast traffic flow and detect anomalies.
⚛ Live Dashboard: React.js	3. Optimize: Algorithms calculate optimal signal timings to prevent congestion.
⬡ Simulation & Testing: SUMO Software	4. Actuate: Commands are sent instantly to traffic signals. The system continuously learns from the outcomes.
📹 Hardware: IoT Sensors, City CCTV Cameras	

FEASIBILITY AND VIABILITY

Potential Challenges

🔌 Legacy System Integration	🌧️ Data Accuracy in Bad Weather	💸 High Initial Cost

Our Solutions

🛠️ Universal API Adapters	🤖 Sensor Fusion & Robust AI	📈 Phased Roll-Out Strategy

IMPACT AND BENEFITS

Enthalpy

SMART INDIA HACKATHON 2025

Core Outcome
30-40% Reduced Travel Time

Social Impact

😌 Less Commuter Stress
🚑 Faster Emergency Response

Economic Impact

⛽ Lower Fuel Costs
⏱️ Higher Productivity

Environmental Impact

🌍 Reduced Emissions
🌳 Better Air Quality

Our solution delivers a multi-faceted positive impact, creating a faster, cleaner, and more efficient city for everyone

RESEARCH AND REFERENCES

Enthalpy

Road Accidents in India 2023 — Ministry of Road Transport & Highways
https://morth.gov.in/sites/default/files/Road-Accident-in-India-2023-Publications.pdf

AI-Powered Smart Traffic Management System for Urban Congestion Reduction (IJSRET, 2025)
https://ijsret.com/wp-content/uploads/2025/03/IJSRET_V11_issue2_492.pdf

Adaptive Traffic Signal Control for Developing Countries Using Fused Parameters Derived from Crowd-Source Data — arXiv (Delhi case)
https://arxiv.org/abs/2205.01640