SMART INDIA HACKATHON 2024

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- **Problem Statement ID:** **SIH 1607**
- **Problem Statement Title:** **Smart AI based solution for traffic management on the routes with heavy traffic from different directions, with real-time monitoring and adaptation of traffic light timings**
- **Theme:** **Smart Automation**
- **PS Category:** **Software**
- **Team ID:**
- **Team Name:** **NexSpy**

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IDEA OVERVIEW

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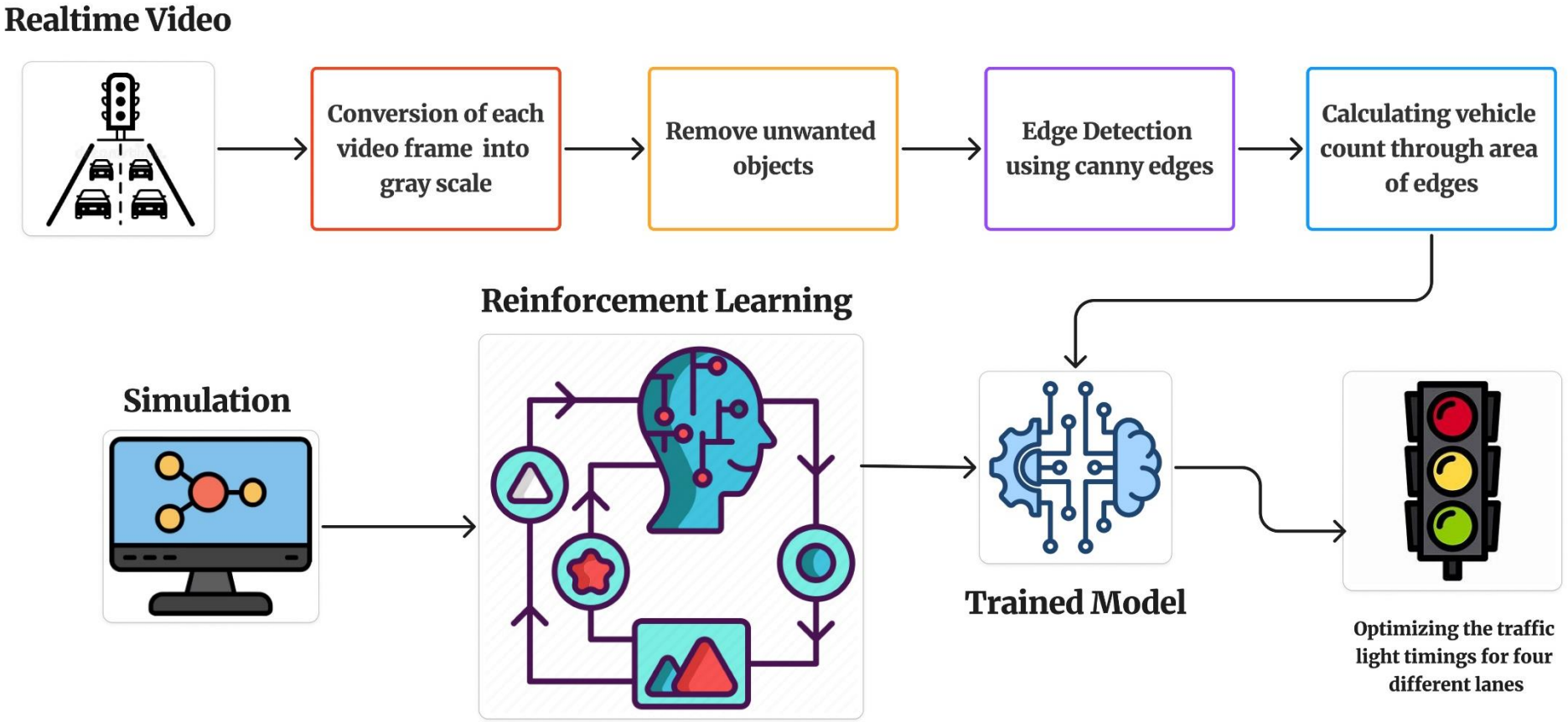

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TECHNICAL APPROACH

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FRAME ACQUISITION

Begin by capturing the frames of the roads at intersection from video using OpenCV

1

LANE SEPARATION

Isolate and crop the incoming vehicles lane using semantic segmentation

2

EDGE DETECTION

Highlight boundaries of the vehicles and other key elements using canny edges

3

AREA COMPARISON

Road with largest area corresponds to the highest traffic density

4

TRAINED MODEL

Predicts green light timings for each lane based on real time traffic counts

3

REINFORCEMENT LEARNING

Define the reward function to encourage efficient traffic flow, train the model using simulation data

2

SIMULATION

Create a realistic traffic simulation which mimics real-world traffic patterns using SUMO

1

Tech Stack

SUMO
SIMULATION OF URBAN MOBILITY
TensorFlow
scikit learn
NumPy

NexSpy

FEASIBILITY AND VIABILITY

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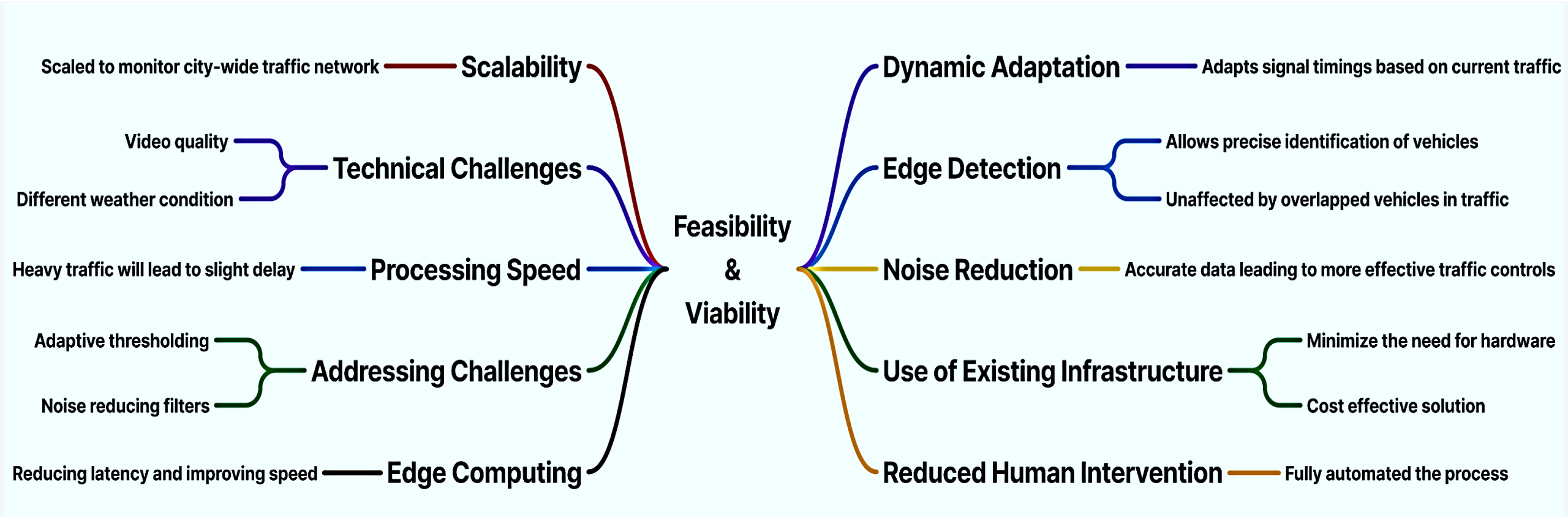

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IMPACT AND BENEFITS

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Potential Impact

- **Reduced Travel Time:** By optimizing traffic signals in real-time, the system reduces intersection wait times and shortens overall travel time
- **Improved Safety:** By effectively managing traffic flow, the system reduces congestion and lower the risk of accidents and road rage.
- **Lower Emissions:** Early numbers indicate a potential for up to 30% reduction in stops and 10% reduction in greenhouse gas emissions
- **Improved Response Times:** By reducing congestion, the system helps emergency vehicles reach destination faster, potentially saving lives.

Benefits

- **Increased Accessibility:** Smoother traffic flow makes urban areas more accessible, particularly for those who rely on public transportation or need to compute long distances.
- **Community Well-Being:** With fewer traffic jams, the overall stress levels in the community decrease, contributing to a more positive and healthy environments
- **Data Driven Decision Making:** AI can collect and analyze traffic data, providing valuable insights for urban planners and transportation authorities

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RESEARCH AND REFERENCES

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Research Paper	Link
AI- based Traffic Management System	Link
Intelligent Road Traffic Control System For Traffic Congestion	Link
An Adaptive Traffic Light Control Algorithm To Mitigate Traffic Congestion	Link
A Dynamic Traffic Light Control Algorithm To Mitigate Traffic Congestion	Link
Review Of Traffic Signal Control Methods	Link

Prototype [Demo]	Link