🌇 Smart Emergency Vehicle Priority System (SEVPS)

Objective: Minimize response times for **ambulances, fire trucks, and police** in smart cities using AIoT, V2X communication, and SUMO simulation to dynamically manage traffic, optimize routes, and prioritize emergency vehicles.
Problem: Emergency vehicles face delays due to static traffic lights, congestion, unaware civilian drivers, and lack of V2I/V2V coordination, impacting public safety.
Proposed Solution:

- **System Overview**: SAPS integrates IoT (GPS, RSUs, smart traffic lights), AI (traffic prediction, route optimization, signal control), and V2X to prioritize emergency vehicles.
- **Key Features**:
  - **Dynamic Route Optimization**: Uses **Dijkstra/A*** to calculate real-time optimal routes for ambulances, fire trucks, and police, adapting to traffic via IoT data.
  - **Traffic Light Control**: Implements **Deep Q-Learning (DQL)** to adjust signal phases, prioritizing emergency vehicles (e.g., ambulance > fire truck > police) based on proximity and urgency.
  - **Congestion Prediction**: LSTM/Random Forest forecasts traffic density.
  - **V2X Communication**: V2I alerts infrastructure; V2V notifies civilian drivers to clear lanes.
- **Simulation**: Uses SUMO (e.g., Cologne map), TraCI for real-time control, Python, and ML tools (scikit-learn/TensorFlow). Visualizes via SUMO GUI and Matplotlib/Plotly for metrics (ETA, delays).

Expected Outcomes:

- Reduced response times for emergency vehicles.
- Improved safety via V2V alerts and DQL-based signal control.
- Optimized traffic flow during emergencies.
- Simulation showing dynamic routing, signal adaptation, and performance metrics.

Deliverables:

- SUMO simulation with multi-vehicle prioritization.
- Python codebase for AI models and TraCI.
- Performance charts and documentation.