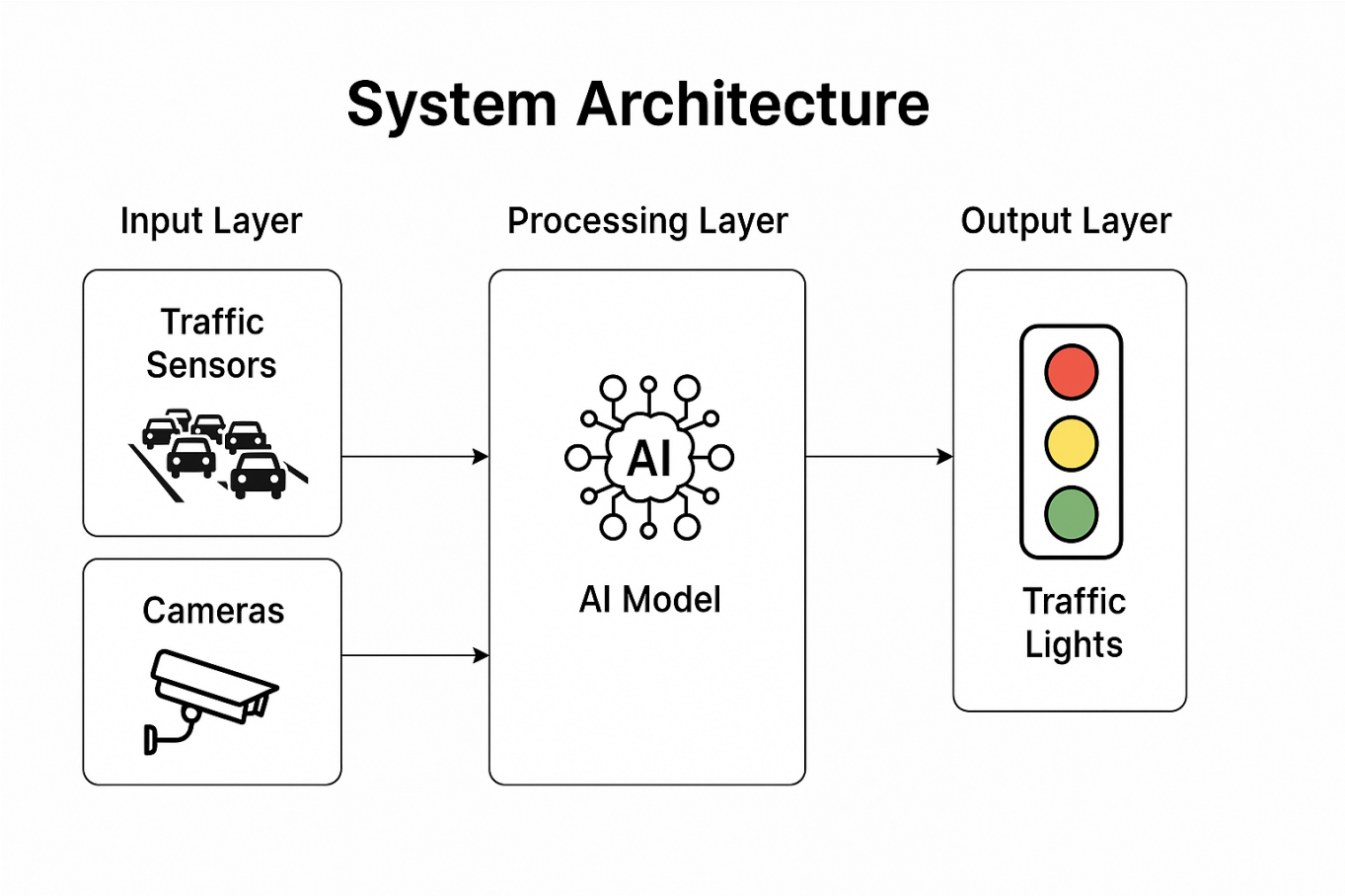
AI-Powered Smart Traffic Light System - With Diagram

This project aims to optimize traffic light systems using AI to reduce traffic congestion and increase flow efficiency. The diagram below represents the current system architecture.

System Architecture



Progress Overview

1. Problem Identification and Research:
   - Reviewed inefficiencies in current traffic systems.
   - Studied global smart traffic approaches.
2. Architecture Design:
   - Created a modular system: input, AI logic, output.
3. Data Simulation:
   - Used SUMO and Python to simulate traffic behavior.
4. AI Development:

- Implemented reinforcement learning (Q-learning, DQN).

5. Prototype Testing:

- Ran virtual tests using synthetic traffic data.

Next Steps

1. Connect real-world cameras or sensors.
2. Build a physical demo with Raspberry Pi or Arduino.
3. Develop a live dashboard/interface.

Future Vision

- Emergency vehicle and pedestrian priority support.
- Coordinated control for multiple intersections.
- Real-time monitoring via cloud.
- Solar-based versions for rural deployment.

Learning Takeaways

- AI decisions must be explainable and robust.
- Real-time systems have strict performance demands.
- Designing the right reward system is key for learning.