Introduction: Fuzzy Logic-Based Traffic Light Control SystemIn modern urban environments, managing traffic efficiently is a critical challenge. Traditional traffic light systems operate on fixed timers, leading to inefficiencies in scenarios like varying vehicle flow, adverse weather conditions (e.g., fog), or peak hours. To address these issues, Fuzzy Logic offers a dynamic and adaptive solution.This project explores a Fuzzy Logic Traffic Light Control System that intelligently adjusts traffic light timings based on real-time inputs such as:1. Arriving Vehicles: The number of vehicles approaching the intersection.2. Queuing Vehicles: The number of vehicles already waiting at the intersection.3. Fog Level: Visibility conditions affecting safe driving speeds.By integrating these inputs, the system can prioritize traffic flow dynamically, reduce congestion, and enhance road safety under varying conditions.Content: Key Sections1. Objectives•Optimize traffic light switching to minimize waiting time and fuel consumption.•Improve safety during low-visibility conditions caused by fog.•Provide a scalable solution adaptable to diverse intersection layouts.2. System ArchitectureInputs:•Arriving Vehicles: Measured using sensors or cameras detecting incoming traffic.•Queuing Vehicles: Count of stationary vehicles waiting at the signal.•Fog Level: Visibility readings obtained from weather sensors.Outputs:•Adjusted green light duration for each direction.Core Components:1.Input Module:•Sensors or IoT devices capture real-time data for arriving and queuing vehicles.•Weather monitoring devices detect fog levels.2.Fuzzification:•Converts crisp input values (e.g., exact vehicle count, fog density) into fuzzy sets (e.g., "Low," "Medium," "High").3.Inference Engine:•Uses a predefined rule base to evaluate fuzzy inputs and determine the appropriate action.4.Defuzzification:•Converts the fuzzy decision output into crisp values, such as the exact green light duration.