

An aerial night view of a city street intersection. The image shows multiple lanes of traffic with light trails from cars moving through the intersection. Buildings and streetlights are visible in the background, creating a dark, urban atmosphere.

CAP4001 : CAPSTONE

A NOVEL APPROACH USING FUZZY LOGIC TO DETECT TRAFFIC CONTROL SYSTEMS

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LET'S TALK ABOUT

- ✓ **Motivation**
- ✓ **Objectives**
- ✓ **Hypothesis**
- ✓ **Problem Survey**
- ✓ **Project Domain**
- ✓ **Time Plan**



MOTIVATION

- Traffic congestion is one of the crucial aspect of the urban planning.
- However, with the rapid increase of traffic (both public and personal transport); these days there are a lot of traffic congestion problems.



OBJECTIVES

- One of the alternative and potential solutions can be -
Fuzzy Logic based Traffic Lights Control System
- A method of reasoning that resembles human reasoning.
- The approach of fuzzy logic imitates the way decision making in humans that involves all intermediate possibilities between digital values YES and NO.

HYPOTHESIS (CONSTRAINTS)

1. The Python Community is not accessible for debugging source code.
2. Fuzzification rules and limitations are prior established.
3. Because each vehicle's speed is preset, the problem can only be partially addressed and partially optimized, which is not how real-world situations work.
4. Handling erroneous data and the intuitive inference made by human cognition.
5. We assume that the vehicle moves in forward direction and not any other ways.
6. Stick to the project timeline and keep checking the deadline.

PROBLEM SURVEY

- The congestion of urban traffic is becoming one of the critical issues with increasing population and automobiles in cities.
- Traffic jams seems to pervade everywhere, megacities are the ones most affected by it. And its ever-increasing nature makes it imperative to know the road traffic density in real-time for better signal control and effective traffic management.
- The traffic controller is one of the critical factors affecting traffic flow. The current traffic management systems that are in place are generally static, which means that they do not adjust according to the needs of the traffic flow.

PROJECT DOMAIN

- Fuzzy logic provides a way to solve complex and non-linear problems easily and effectively.
- Fuzzy logic has a wide range of applications in the areas such as decision making, control theory, pattern recognition, image processing, health care and so on.
- The proposed system can calculate the green light time duration by using the information about the number of waiting for vehicles at the red-light phase and the number of vehicle's frequency during the green phase.
- The system will use **Min-Max inference** procedure and **Centroid Defuzzification** strategy to get the crisp value for the green light time duration as the output.

ESTIMATIONS

Name of the Task	Duration
Work on Frontend design according to the Idea proposed using Pygame	2 weeks
Study of some research papers and look up Fuzzy Logic documentation and make references	1 week
Install necessary dependencies and Python requirements - Numpy, scikit_fuzzy, Scipy libraries, etc.	1 week
Working on Project Backend and parallel testing of the same	1.5 weeks

Total Duration – 40 days

THANK YOU

