Software Engineering Lab (CS331)

Project Title : Smart Traffic Signal Automation System

Project Goal

The goal is to build a computer program that looks at traffic through a camera and automatically changes the traffic lights. If one road has many cars and another has very few, the busy road will get a green light for a longer time.

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1. Functional Requirements (What the system does)

- **Counting Cars:** The system must look at a video of a road and count how many cars, trucks, and bikes are in each lane.
- **Changing Lights:** The program must decide how long the green light should stay on based on the number of cars it counted.
- **Emergency Mode:** If the system sees an ambulance or a fire truck, it must change the light to green immediately to let it pass.
- **Safety Timers:** Even if a road is empty, the light must stay green for a minimum time (e.g., 5 seconds) so pedestrians can cross safely.
- **Screen Display:** The system must show a screen that displays the current video, the number of cars counted, and a timer showing when the light will change.
- **Manual Control:** A person (like a traffic officer) should be able to click a button to take control of the lights if there is a special problem on the road.

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2. Non-Functional Requirements (How the system performs)

- **Speed:** The system should count cars and change the lights almost instantly (in less than 1 second) so it stays "real-time."
- **Easy to Use:** The display screen should be simple enough that anyone can understand which light is green or red.
- **Work Without Internet:** The main program should be able to run on a local computer without needing a constant internet connection.
- **Reliability:** If the camera stops working, the system must go back to a simple "fixed-timer" mode (like 30 seconds for each side) so traffic doesn't stop.