**Project Title**: Automatic Road Reflector Light **(“Without Arduino”)**

**Overview:**

This project is a smart lighting system designed to automatically turn ON road reflector LEDs at night and turn them OFF during the day — without using any microcontroller or coding. It is fully hardware-driven and built using analog components.

**Introduction**

Road safety is one of the most important aspects of transportation infrastructure, especially during the night or in low visibility conditions. Traditional road reflectors rely only on vehicle headlights, which may not be sufficient in extremely dark or foggy environments.

This project, titled "Automatic Road Reflector Light", aims to enhance road visibility by automatically switching ON road LEDs during low-light conditions and turning them OFF during the day — without the use of any coding or microcontroller.

By using an LDR sensor along with a comparator IC and a relay module, this system intelligently detects the surrounding light level and controls the reflector lights accordingly. This makes it energy-efficient, cost-effective, and highly suitable for rural or remote areas where regular maintenance and electricity supply might be limited.

The project showcases the power of pure analog electronics, making it an ideal learning platform for students to understand basic components like sensors, comparators, and relays without diving into programming.

**Key Components Used:**

**LDR** (Light Dependent Resistor) – Senses the ambient light level.

**LM358 Comparator IC** – Compares voltage from LDR to a reference voltage.

**Relay Module** – Acts as a switch to turn LEDs ON/OFF.

**LEDs** – Act as road reflectors.

**Resistors, Capacito**rs – For voltage division and filtering.

**Working Principle:**

In daylight, the LDR has low resistance, so voltage at the comparator input is high.

**Result: Relay OFF, LEDs OFF.**

In darkness, the LDR’s resistance increases, voltage drops.

**Result: Comparator output triggers the relay, LEDs turn ON.**

The whole process happens automatically based on light intensity, no user input needed.

**No Coding Used Because:**

This project uses analog components.

There is no Arduino or microcontroller.

Behavior is fully handled by voltage and circuit logic.

It's an example of pure electronics-based automation.

Logic is achieved purely with components.

No programming, no need for USB uploading or code debugging.

Easy for non-CS students or basic electronics learners.

**Applications:**

Highway edge lighting

Village roads with no streetlight system

Temporary construction zones

Smart traffic signs and reflectors