Faculty of Science & Technology

Project Title :

"Eco-Friendly Streetlights with Vehicle Activated Sensors "

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Eco-Friendly Streetlights with Vehicle-Activated Sensors

The urban environments are constantly seeking innovative solutions to reduce energy consumption and minimize environmental impact. One such innovation is the the integration of vehicle-activated sensors in streetlights. These intelligent lighting systems offer a groundbreaking approach to street illumination, balancing energy efficiency with enhanced safety and visibility.

Problem Statement

Safety and Security Concerns: Inadequate lighting can lead to increased crime rates and accidents, particularly at night.

High Maintenance Costs: Traditional street lights require frequent maintenance and replacement, resulting in high costs and resource waste.

Inefficient Resource Allocation: Traditional street lights are often not optimized for energy efficiency, resulting in wasted resources and increased costs.

Reduced Energy Consumption

Type of Streetlight	Average Energy Consumption (kWh/year)
Traditional High-Pressure Sodium	1500-2000
Vehicle-Activated LED	500-1000

Vehicle-activated streetlights can reduce energy consumption by 50% or more compared to traditional streetlights. This significant reduction is attributed to the fact that the lights are only activated when necessary, eliminating the need for continuous operation.
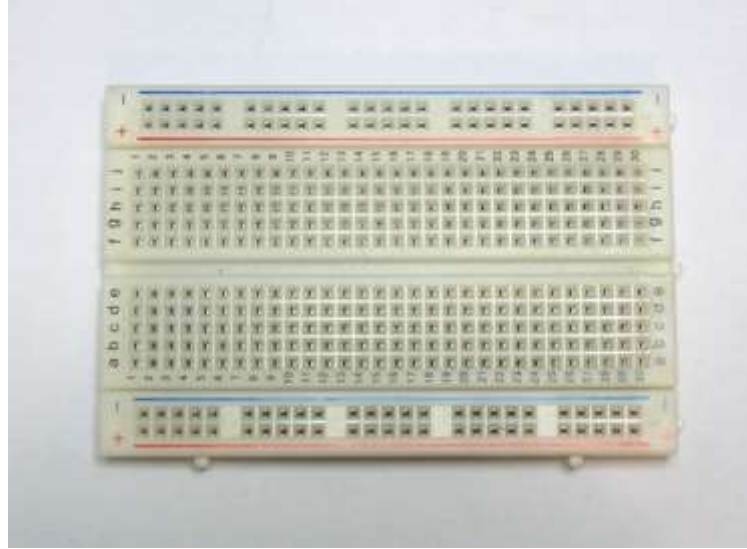
What are the Components Used?

- Arduino UNO
- Breadboard
- IR Sensors
- Jumper wires
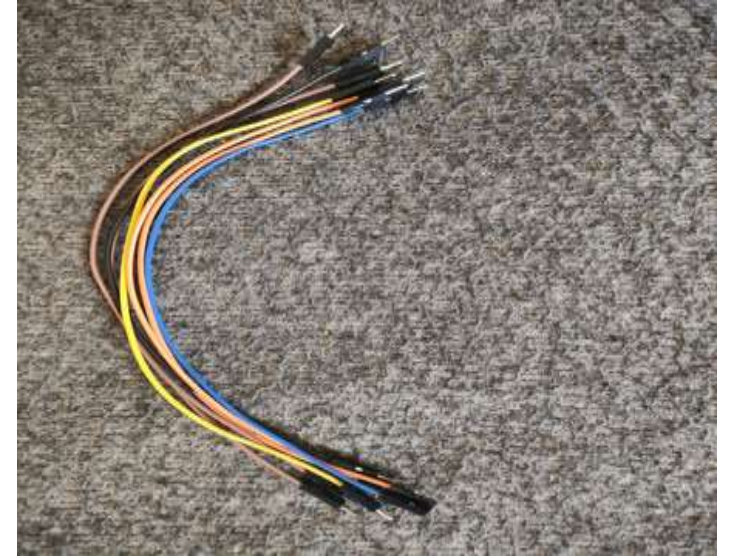- LED
- Resistor
- Power Supply Cable
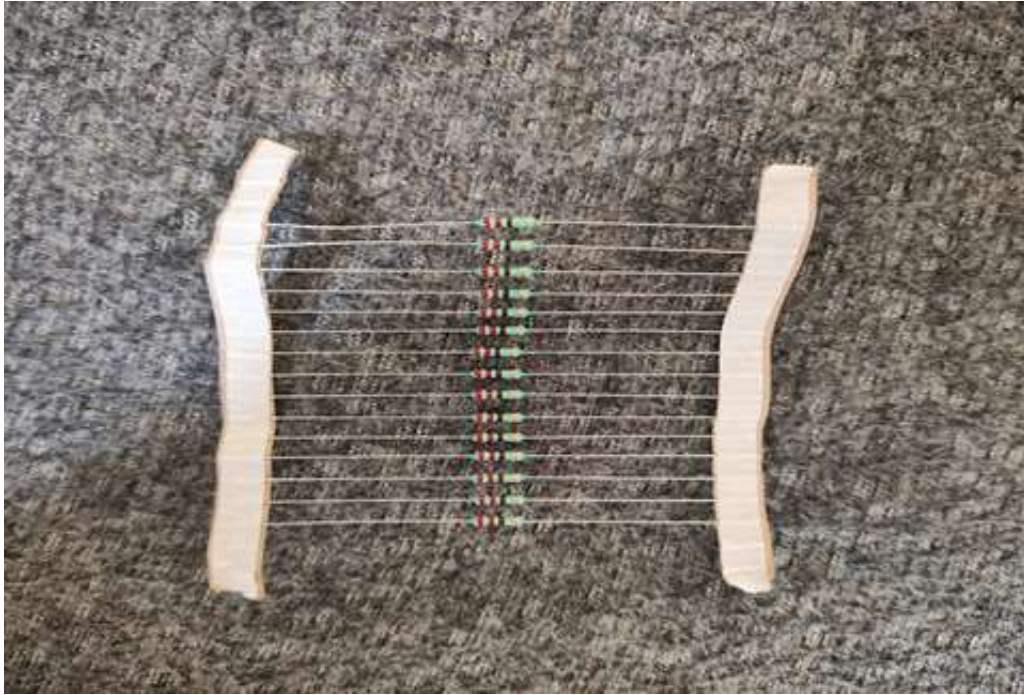
Components

Hardware Requirements

IR Sensors: Used to detect the presence of vehicles and pedestrians.

Bread Board: A platform for building and testing electronic circuits

Jumper Wires: Used to connect components on breadboard

Resistors:
Resistors are electronic components that resist the flow of electric current

LED Lights:
Light Emitting Diodes (LEDs) are used to produce light

Software Requirements

The Arduino Uno receives data from the IR sensor, which detects vehicle movement, and the Light Dependent Resistor (LDR), which monitors ambient light levels. This real-time data is crucial for determining when to activate or deactivate the street lights.

Python using MySQL: Adding a MySQL database to this project allows for the storage and analysis of sensor activity data.

Purpose of MySQL Database Integration

Tracking System Usage: Logs data on when the light was activated, indicating periods of higher vehicle traffic

Energy Consumption Analytics: Tracks how often the light was activated to estimate energy savings compared to constant lighting

Maintenance Alerts: Detects irregular patterns, such as sensor malfunctions or connection issues, based on expected activity.

Historical Data for Traffic Analysis: Analyzes trends over time, helping with traffic studies and city planning.