# Adaptive Street Lighting

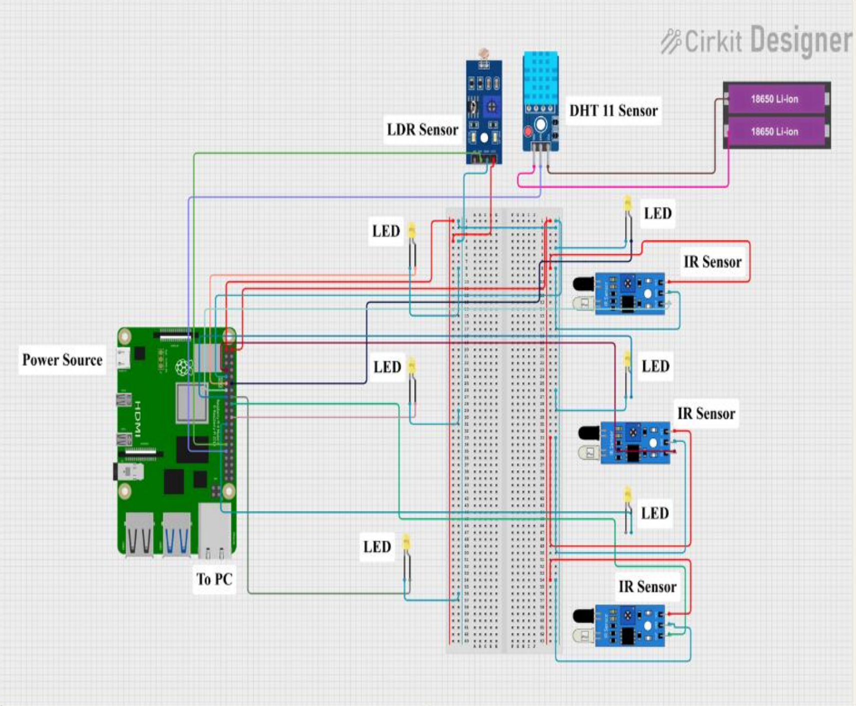
Illuminating the streets intelligently: An adaptive streetlight system using light and motion sensors for optimized energy use and safety.

## INTRODUCTION

Traditional streetlights often operate at full intensity throughout the night, regardless of actual need, leading to energy waste and light pollution. This project explores an adaptive streetlight system that aims to address these issues by intelligently adjusting light levels based on ambient light and the presence of pedestrians or vehicles.

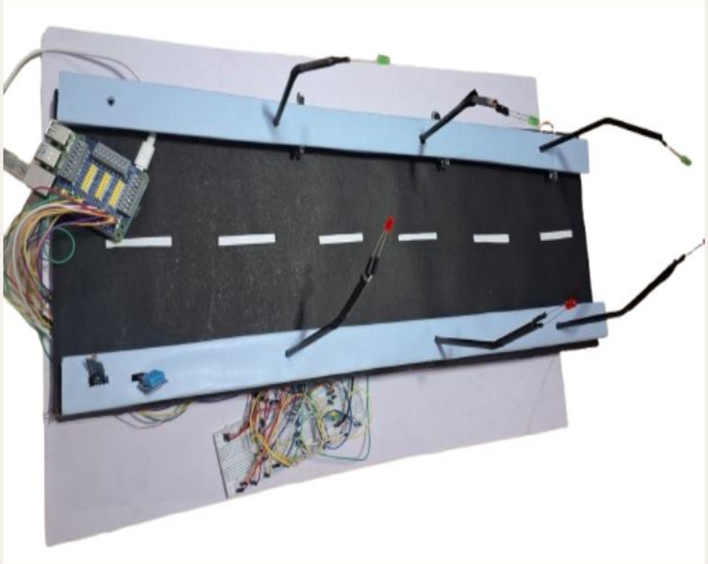
## OBJECTIVE

The primary objective of this project is to design and implement a prototype of an energy-efficient streetlight system that automatically adjusts its brightness based on the surrounding light conditions and detects the presence of moving objects, thereby optimizing energy consumption and enhancing safety.




## METHODOLOGY

This project involved the design and construction of a circuit incorporating a microcontroller (like a Raspberry Pi as shown in the diagram), an LDR (Light Dependent Resistor) to sense ambient light, IR (Infrared) sensors to detect motion, and a DHT11 sensor to measure temperature. LEDs were used as the light source. The LDR continuously monitors the surrounding light level. When the ambient light decreases below a certain threshold, the LEDs are activated at a base brightness. The IR sensors are strategically placed to detect movement within the streetlight's vicinity. Upon detecting motion, the brightness of the LEDs is increased to provide better illumination. The DHT11 sensor continuously monitors the ambient temperature. If the temperature falls below a predefined low threshold, the brightness of the LEDs is also increased, potentially as a safety measure in cold conditions like frost or ice. Once the motion ceases for a defined period, or when the ambient light increases, and if the temperature is above the low threshold, the LEDs dim or turn off to conserve energy. The circuit diagram illustrates the connections between these components. The final project image showcases the physical implementation of this system on a breadboard, demonstrating the integration of the sensors, microcontroller, and LEDs.



## CONCLUSION

In conclusion, the prototype successfully demonstrated adaptive lighting by dimming during low activity and sufficient ambient light, brightening upon detecting motion, and increasing illumination at low temperatures, showcasing a potential for energy savings and enhanced safety in varying environmental conditions.

## TEAM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