CSE 408 Project

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Introduction

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Objectives:

Reduce energy consumption with a low-cost system
Ensure the safety of pedestrians

Inspiration

Current methods of energy reduction in street lamps tend to be unsafe.
This inspired us to think of a system that achieved the same goal, without compromising safety.
Human detection was the best solution.

Achievements

Our system can:

- Respond to environment (Atmospheric light, fog)
- Respond to human presence
- Estimate a target’s position, speed, and direction of movement on a linear path
- Communicate with other nodes to provide a path of light in front of a target

The video

No fog, half bright.

The video

Full brightness.

Simple Detection Approach

Basic Human Sensing:

Power the system on when there is low atmospheric light.
If people are in front of the sensor, turn on all lights. If no people are around, turn on energy-efficient LED's

Humidity & Temperature sensor:

When Humidity is unusually high, there must be fog, and lights should be bright.

Path Prediction Approach

Speed Calculation:

Hardware:

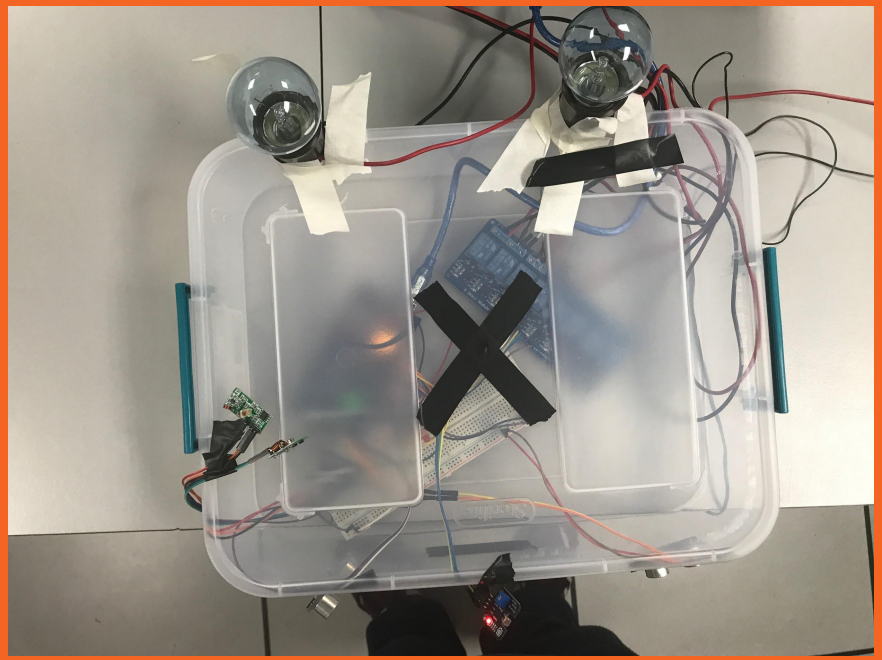
We used 2 motion sensors to detect a moving object. A transmitter and receiver are used to send and receive data between motes, which is used to provide light along a person's path.

The Code:

1-We used a timer that keeps track of the amount of time a person spends in front of a sensor.

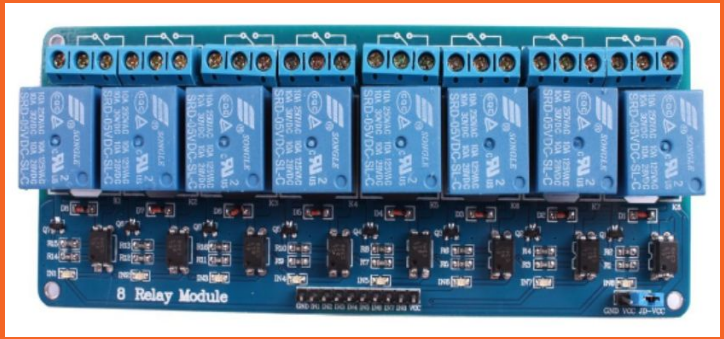
2- A simple physics equation to determine the speed. The distance between the 2 motion sensors / change in time.

The package:



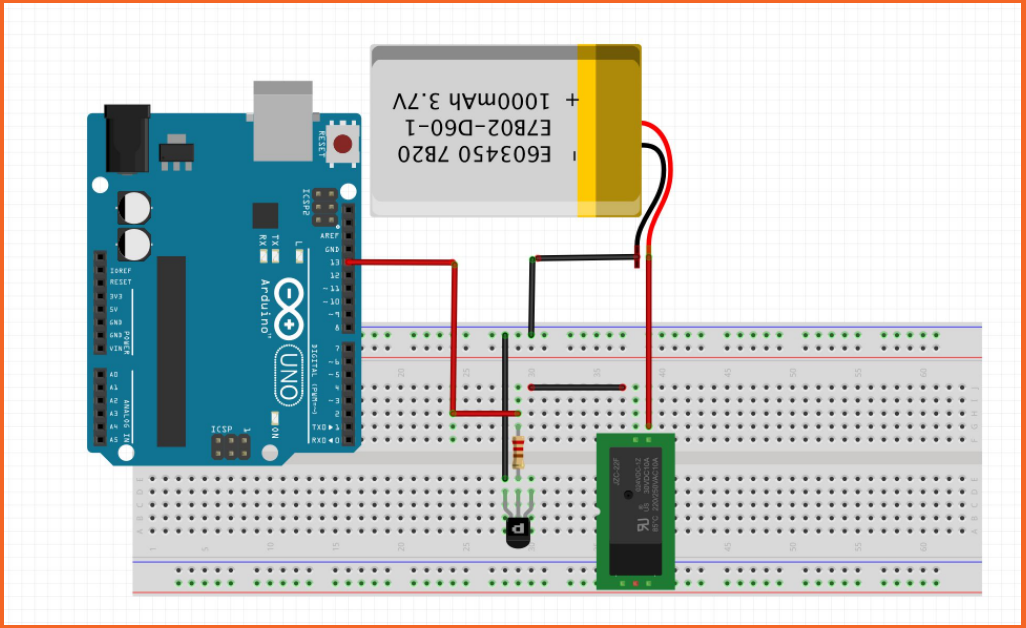
The circuit:

Using relays to control the light and its intensity.



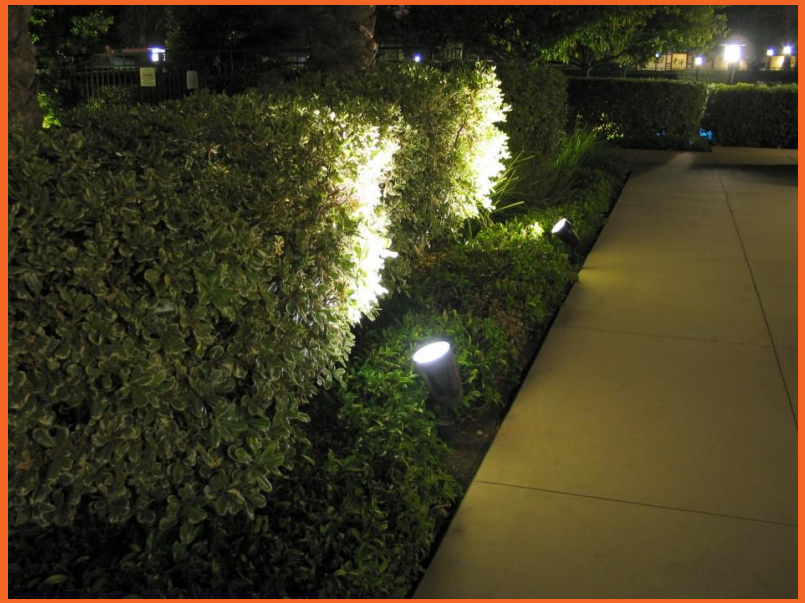
The circuit:

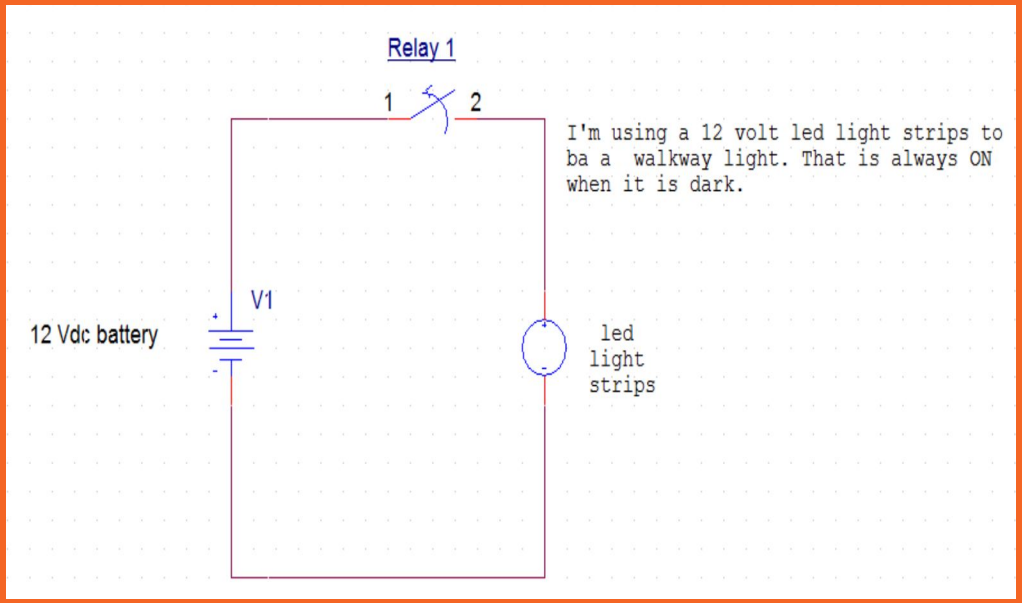
I failed the first time to control the relay with arduino.



The circuit:

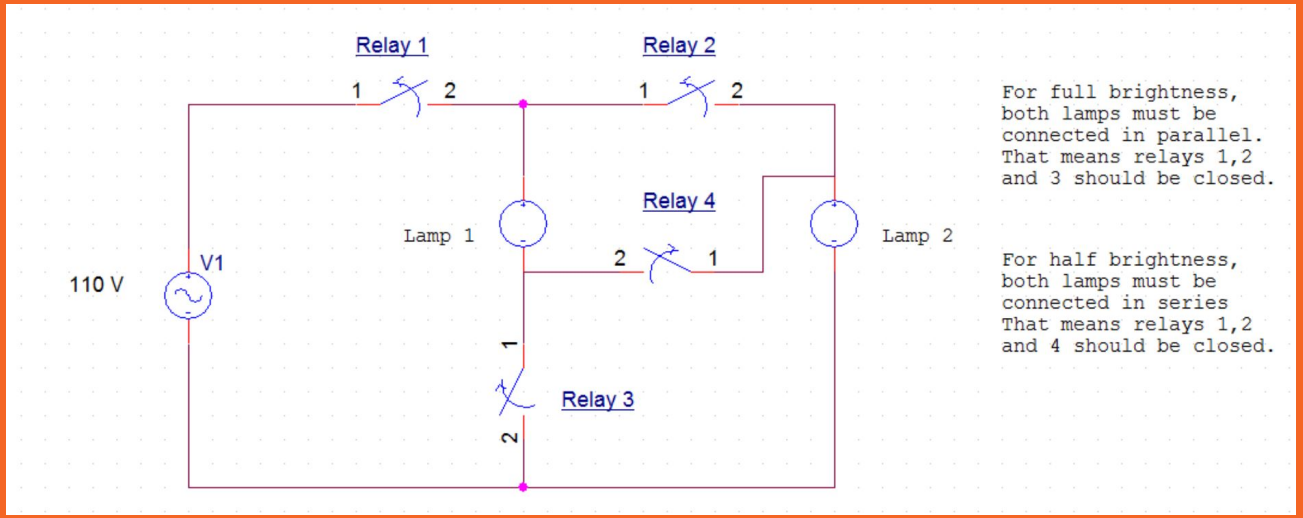
Walkway light that is always ON when it is dar.





The circuit:

Controlling light brightness with 4 relays.
The main goal is to reduce energy consumption.



The circuit:

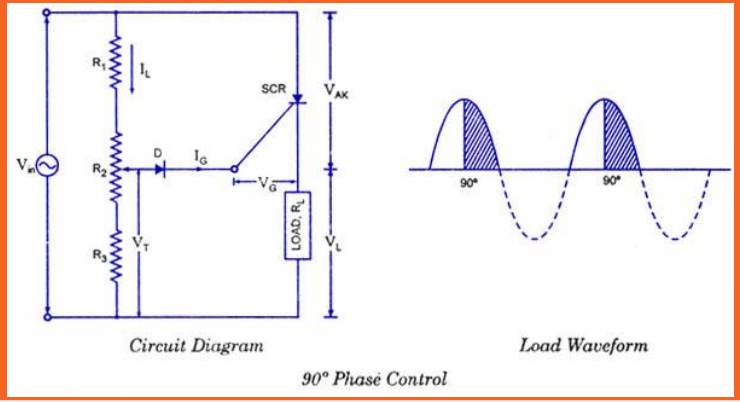
Alternative solutions:

1- Using TRIAC instead of the relays to control light brightness. I did not use TRIAC because:

A) I wanted to use relays.

B) Relays are used in a variety of electrical load-switching applications. And we can replace the one used in the system with a 3 phase solid state relays (SSRs) real application.

C) I would need more components in the circuit and the circuit going to be messy.

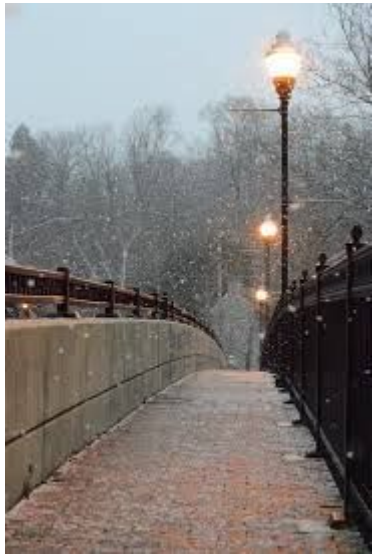


The circuit:

Alternative solutions:

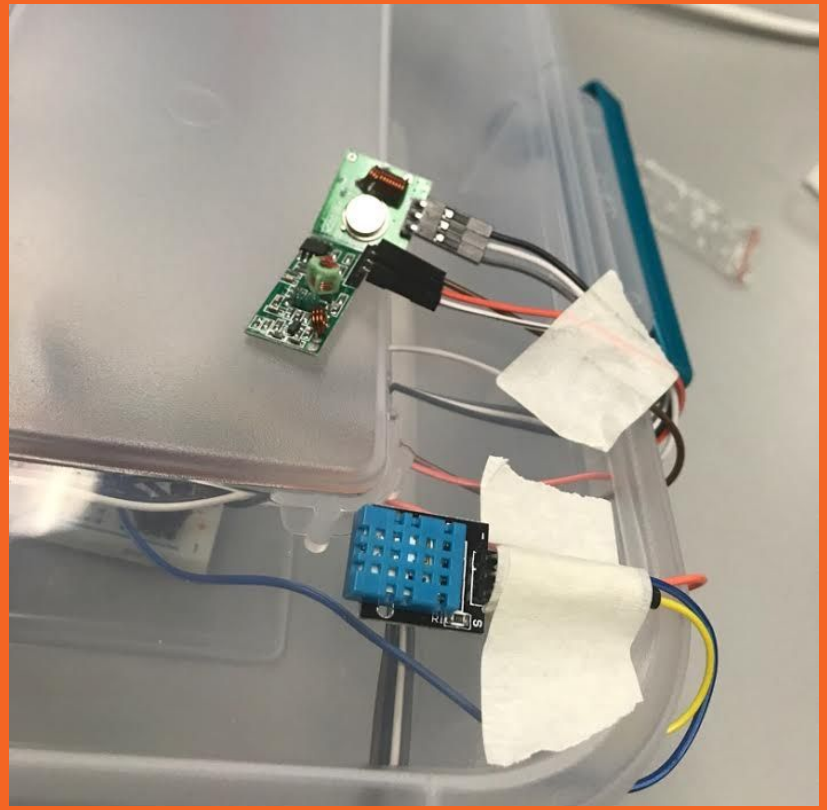
2- Using solar panel and then I would not worry about reducing energy consumption. But it is costly.

System is energy efficient, modular, and inexpensive to put together



Predictive technology is good for long pathways, such as tunnels or bridge walkways

Simple human sensing is good for virtually any light control application



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Conclusion