Project 3

Objective

Design and build a remote sensing switch to activate a light.

Previously you replaced an incandescent bulb in a lamp with LED(s) that produce the same light output. You will now modify the manual switch to sense an external output and react by modifying the light output. You will need to determine power requirements for your integrated circuits (op-amps and/or 555 timers). You will need to demonstrate that your power source provides a stable voltage supply. Since the additional circuit consumes some power include an analysis of the increased power requirements.

The (optional) advanced part of the project is to have the lamp react to at least two different external sensors. Other advanced lab options are possible but must be approved by the instructor.

Project Design

Due: November 12 (preliminary), November 19 (final)

- Schematic diagram of proposed circuit.
- Detailed analysis of the proposed circuit.
    - Power supply design (transformer plus rectifier)
    - Sensor states
    - Power consumption
- Discussion concerning your design that addresses
    - Max power dissipation for circuit – a good design limits the circuit to 80% of any component maximum
    - Parts identification – use DigiKey to specify components
    - Optimization – Why choose a particular power supply design?

Completed Project

Due: December 10

Your report will include your (modified) project design information and the following.

- Characterization curves for power supply.
    - V(t) (DC and ripple voltages)
    - Maximum current for different loads
- Characterization information for the sensing circuit
    - Actual power consumption
    - Operational sensitivity
- Working energy efficient lamp with an external sensing circuit
    - The lamp must pass an "operational" test – i.e. can the instructor turn the lamp on and does the lamp operate according to specifications.
    - Total power consumption – and anticipated operational lifetime

Advanced Components

- Schematic diagrams of proposed circuit(s)

- Detailed analysis of the proposed circuit.