Project 1

Objective

Design and build an energy efficient flashlight.

Replace the incandescent bulb in a flashlight with LED(s) that produce the same light output. You will need to demonstrate that your modified flash light produces the same (or greater) light and uses less power than the unmodified flash light.

The (optional) advanced part of the project is to have at least two different modes (high and low). Other advanced lab options are possible but must be approved by the instructor.

Project Design

Due: October 17, Thursday

- Schematic diagram of proposed circuit.
- Detailed analysis of the proposed circuit.
    - LED operation point (theoretical – based on I vs V graph)
    - Power consumption with lifetime for proposed energy source (typically a battery)
    - Light output (theoretical – based on Lux vs I graph)
- Discussion concerning your design that addresses
    - Max power dissipation for LED and other circuit components – a good design limits the circuit to 80% of any component maximum
    - Theoretical power consumption and lifetime (for proposed energy sourse)
    - Optimization – Why choose parallel or series connection for your LEDs?

Completed Project

Due: October 24, Thursday

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

- Characterization curves for the actual LEDs used. If you have manufacturer graphs you just need to verify these graphs.
    - I vs V graph
    - Lux vs I graph
- Characterization information for the unmodified flash light
    - Power consumption – (lifetime given batteries used)
    - Light output using incandescent light bulb and batteries
- Working energy efficient flashlight
    - The flashlight must pass the "dark room" test – ie the ability to navigate in the dark.
- Actual power consumption and lifetime for the power source used.

Advanced Components

- Schematic diagrams of proposed circuit(s)
- Detailed analysis of the proposed circuit.