

Lab 8: Automatic LED Night Light

For this lab you will work with your lab partner, and turn in one report for the group. Your pre-lab must be done before you begin building anything.

Objectives:

The goal of this lab is to design (and build) a circuit that turns on an LED "night light" when the room lights are switched from "ON" to "OFF." You may use any component that we have studied: batteries, switches, OpAmps, photodiodes or photoconductors, logic gates, resistors, capacitors, etc.

PreLab:

[PL1] Design a circuit to turn on an LED when the room lights are turned OFF. Draw your circuit diagram.

Lab Exercises:

You have been tasked with trying to come up with an automatic LED night light. Your circuit needs to respond to the change between ambient light in the lab, and total darkness. If the lab lights are turned off, your circuit should turn on an LED. To give a user more control, they need to be allowed to turn on the LED with a separate switch. They should be able to turn on the LED while it is still bright out. When it is dark, the light should remain on even if the user tries to switch the LED off.

* If you choose to use a photodiode as your light sensor, it will be the same photodiode you've used in previous labs this semester.

* If you choose to use a photoconductor as your light sensor, the measured resistances for the particular photoconductors that we have in the lab, are:

Room lights ON: $R_{\text{photoconductor}} = 2\text{-}3 \text{ k}\Omega$

Room lights OFF: $R_{\text{photoconductor}} \approx 100 \text{ M}\Omega$ (yes, Mega-ohms, essentially an infinite resistance)

You are open to use any components in the lab. GOOD LUCK!

Lab Writeup:

Once this task is completed, make a formal lab report using the outline below. Your lab report should be turned in as a separate written document, single-spaced with figures (and references if necessary). There is no minimum number of pages, but the report should be no more than four pages in length. You should also keep track of your experimental progress in your lab notebook and turn that in as well.

- Objective – Describe what objectives you laid out based on the assignment (specifications, goals, etc.)
- Raw Data – Anything you've acquired to help you design the system (response curves for components, etc)
- Schematics – Your initial schematic (your proposed design) and your final schematic (for your working design!).
- Procedure – How you got from your objective to your final, working circuit. This is the narrative story of your lab experience.
- Analysis – How well did it work?
- Conclusions – "Lessons learned"