

# Light and Proximity Detection Mirror

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# SUMMARY

Our product is a vanity mirror that turns ON/OFF based on its surroundings, considering factors such as proximity of a user and light in the room.

The mirror will turn on a varying number of lightbulbs depending on how much natural light is in the room.

This project focuses on providing an effortless experience for users that have a busy schedule and want an easy method to adjust lighting while getting ready.

# DESIGN OVERVIEW

The subsystems that exist in the project are:

- PIR sensor
- Photoresistor
- Light bulb circuit (relay, terminal block, etc.)

The different subsystems work together with the RaspberryPi to create a product that detects the light in the room triggered by the user's motion and proximity to the mirror.

# SENSORS AND SOFTWARE DESIGN

## Sensors

- PIR Sensor
  - Directly connected to the GPIO pins on the raspberry pi, and then 5V and GND
- Photoresistor
  - Connected to channel 0 of the MCP3008 chip, the different values recorded by the chip determine how much light is in the room.

## Sensor Functionality

The sensors soldered on a PCB board near the front of the mirror trigger the 6- lightbulb system to turn on light bulbs based on described conditions.

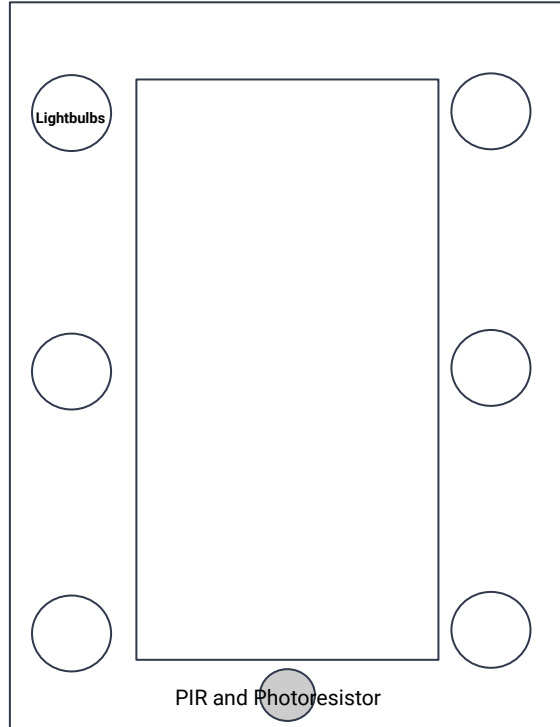
# HARDWARE DESIGN

The sensors in the system together trigger the 6- lightbulb system that consists of:

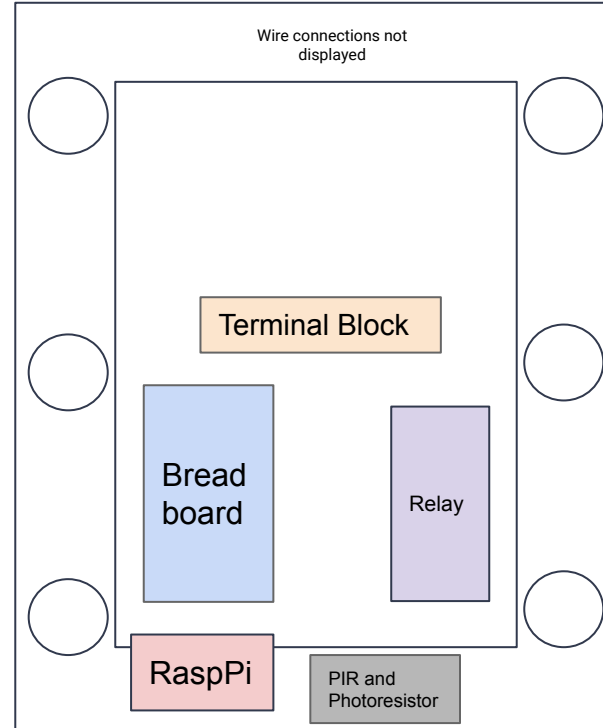
- the relays which act like a switch to turn on light bulbs based on described conditions
- the terminal block which is used for power distribution amongst the light bulbs.
- The raspberry pi that controls the relay switches, as well as the sensor functionality.
- The breadboard that houses the MCP3008 chip as well as the GPIO pinouts.

# HARDWARE DESIGN LAYOUT

Front:



Back:



# CLASSIFICATION METHODS

The software program controls the different settings of lightbulbs that are turned on and off based on the amount of light in the room. Initially, the PIR sensor will sense motion in its proximity to trigger the overall system. Next, the photoresistor reads the amount of light in four different amounts:

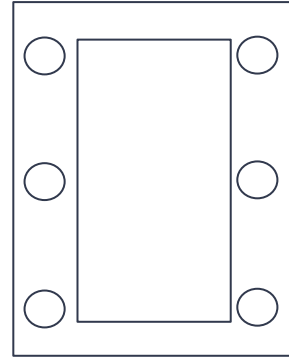
- If there is an excess amount of light in the room.
- If there is a high amount of light in the room.
- If there is a medium amount of light in the room.
- If there is little amount of light/no light in the room.

The output for each setting is discussed in detail next.

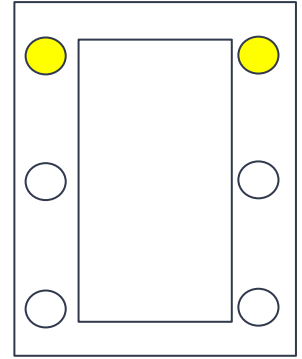
# OUTPUT

The overall system will output a display of on/off light bulbs based on the conditions described previously to display either:

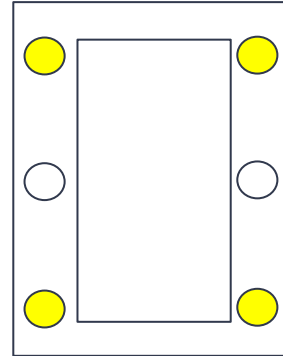
- Zero bulbs on,
- Two bulbs on,
- Four bulbs on,
- or Six light bulbs on at a time.



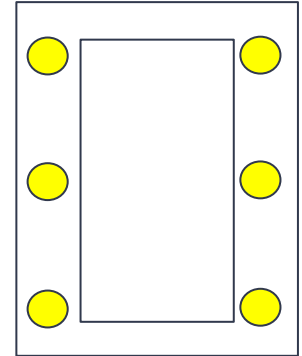
Zero bulbs on



Two bulbs on



Four bulbs on



Six bulbs on

Figure: Different light bulb outputs



# CONCLUSION

At a high level design, the light and proximity mirror is designed to read it's surroundings (light & motion) to determine how much light it must emit.

We intend to provide this to users that want to have an effective solution to use vanity lights in an automated way, so that they will not have to manually turn it on or adjust the lighting to view themselves while getting ready, thus providing an effortless way to check their appearance before leaving for the day.