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LETRETURE REPORT ON *AUTOMATIC LIGHT SWITCH*

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Introduction:

Solid-state analog switches and multiplexers are important devices for manipulating analog signal. The analog IC (Integrated circuit) which work for continuous signals with different frequency's according to the components used, in contrast digital signals only have two levels and are discreet – low and high i.e. binary. These signals are used to modulate signals to perform specific beneficial actions. Networks that make use of oscillators, dc amplifiers, audio amplifiers, and multi-vibrators need to use analog ICs. Linear analog ICs are important for generating variable output signal for radio-frequency and audio-frequency amplifiers. The basic operational amplifier is one of the most widely used linear IC; consisting of resistors, transistors and diodes; Op amps are used in a wide variety of applications in electronics. Some of the more common applications are:

As a voltage follower, selective inversion circuit, a current-to-voltage converter, active rectifier, integrator, a whole wide variety of filters, and a voltage comparator. Analog IC's are gradually being utilized in various LED lighting applications such as traffic light indicators, stadium displays, and data communication for managing power efficiency.¹

Project:

A sun-light controlled switch which feeds current into a light bulb, is a very useful circuit for automatic switching-on of light sources as natural light dims. Our project; a switching circuit is concerned with making a device with the following specification:

- Response time

A response time of 5 mins was one of the design implications, the idea behind it is to avoid switching on of light while a cloud passes or etc....

- Voltage

220V

- Current

10A

- Temperature

Choice of materials and devices to withstand temperatures of up to 60 degrees.

- Light Sensor

To detect the amount of light in the environment for automatic switching.

- Indicator of operation

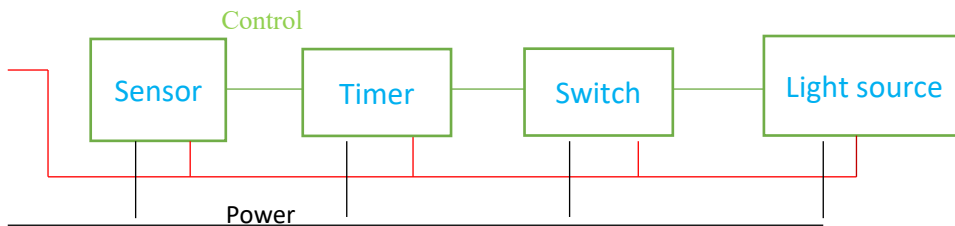
Used to show status of the circuit

¹ Hank Zumbahlen, Basic Linear Design, Analog Devices, 2006, ISBN: 0-915550-28-1. Also available as Linear Circuit Design Handbook,

Preliminary design:

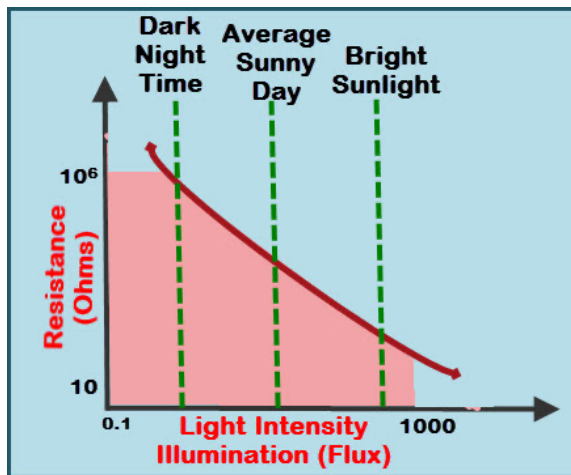
This segment should entail the basic initial design for our circuit. It doesn't include the completed produce; without using Pspice or any simulation.

*Modules:



Sensor:

For light sensing there are various options. The most common light sensor type that's used in a light sensor circuit are photoresistors, also known as a light-dependent resistor (LDR). Photoresistors are used to simply detect whether a light is on or off and compare relative light levels throughout a day.



Photodiodes are another type of light sensor. But instead of using the change in resistance like LDR, it's more complex to light, easily changing light into a flow of electric currents. The last light sensor type is the phototransistor. The phototransistor light sensor can be described as a photodiode + amplifier. With the added amplification, light sensitivity is far better on the phototransistors.

Timer:

The **555 timer IC** can be used for pulse generation, delay and oscillator applications. It is one of the most popular IC ever made due to its ease of use affordability and stability. I have found no need to list more options for making a delay.

Switch:

There are many different types of relays that can be used. I will try to list those better suited for our application. A contactor is a heavy-duty relay with high-current ratings, used for switching electric motors and lighting loads. Continuous current ratings for common contactors range from 10 amps to several hundred amps. So, it can handle our current target easily

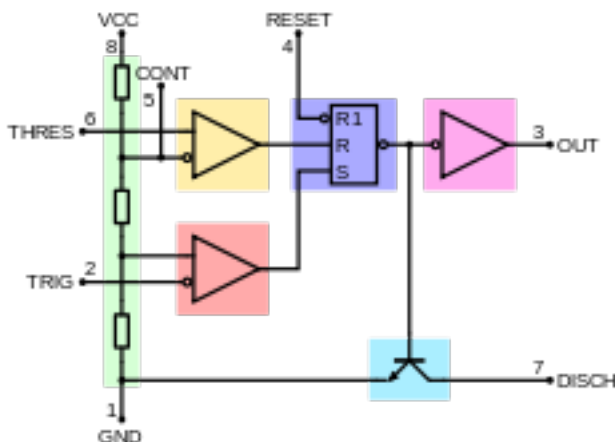
A latching relay, maintains either contact position indefinitely without power applied to the coil. The advantage is that one coil consumes power only for an instant while the relay is being switched, and the relay contacts retain this setting across a power outage. A latching relay allows remote control of building lighting without the hum that may be produced from a continuously (AC) energized coil. However, it is bulky and may not be suitable for our project.

A solid-state contactor is a heavy-duty solid state relay, including the necessary heat sink, used where frequent on-off cycles are required, such as with electric heaters and lighting loads. There are no moving parts to wear out and there is no contact bounce due to vibration. Better durability

Light source:

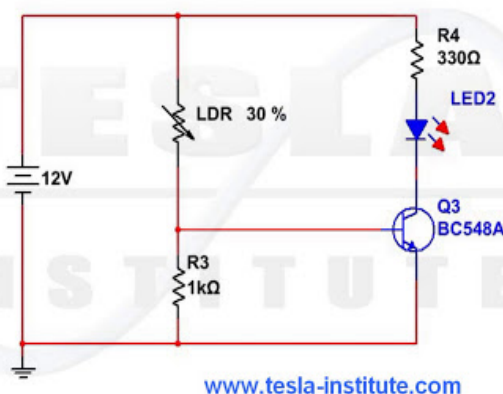
The watt rating and price of the light source to be used will be considered along the specifications of our project (220 V, 10 A). Power consumption and lumens(light intensity) should be chosen according to our needs.

*Module circuits:



The 555 timer's circuit.

LDR Light Sensor Switch circuit



Photoresistor(LDR) circuit using BJT as a Switch.