

Experiment – LDR CIRCUIT

1. Light Dependent Resistor(LDR)

A Light Dependent Resistor (LDR, photoconductor, or photocell) is a device which has a resistance which varies according to the amount of light falling on its surface. LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically. A typical light dependent resistor is pictured in Figure 1 together with (on the right hand side) its circuit diagram symbol.

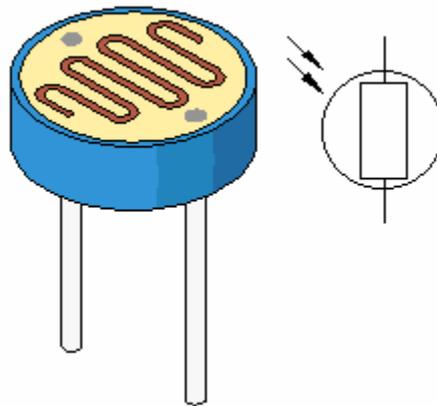


Figure 1. LDR symbol

Light dependent resistors are a vital component in any electric circuit which is to be turned on and off automatically according to the level of ambient light - for example, solar powered garden lights, night security lighting, flashes of the photograph machines, webcams, door bells and etc.

In this experiment, we will have a LDR circuit that lights a LED when there is no light around.

2. Printing the Circuit:

We will use Proteus program in order to draw our circuit and then printing out the circuit. Proteus program is a circuit simulation program and software for microprocessor simulation, schematic capture, and printed circuit board (PCB) design. In Proteus, we will use the circuit design which is shown in Figure 2:

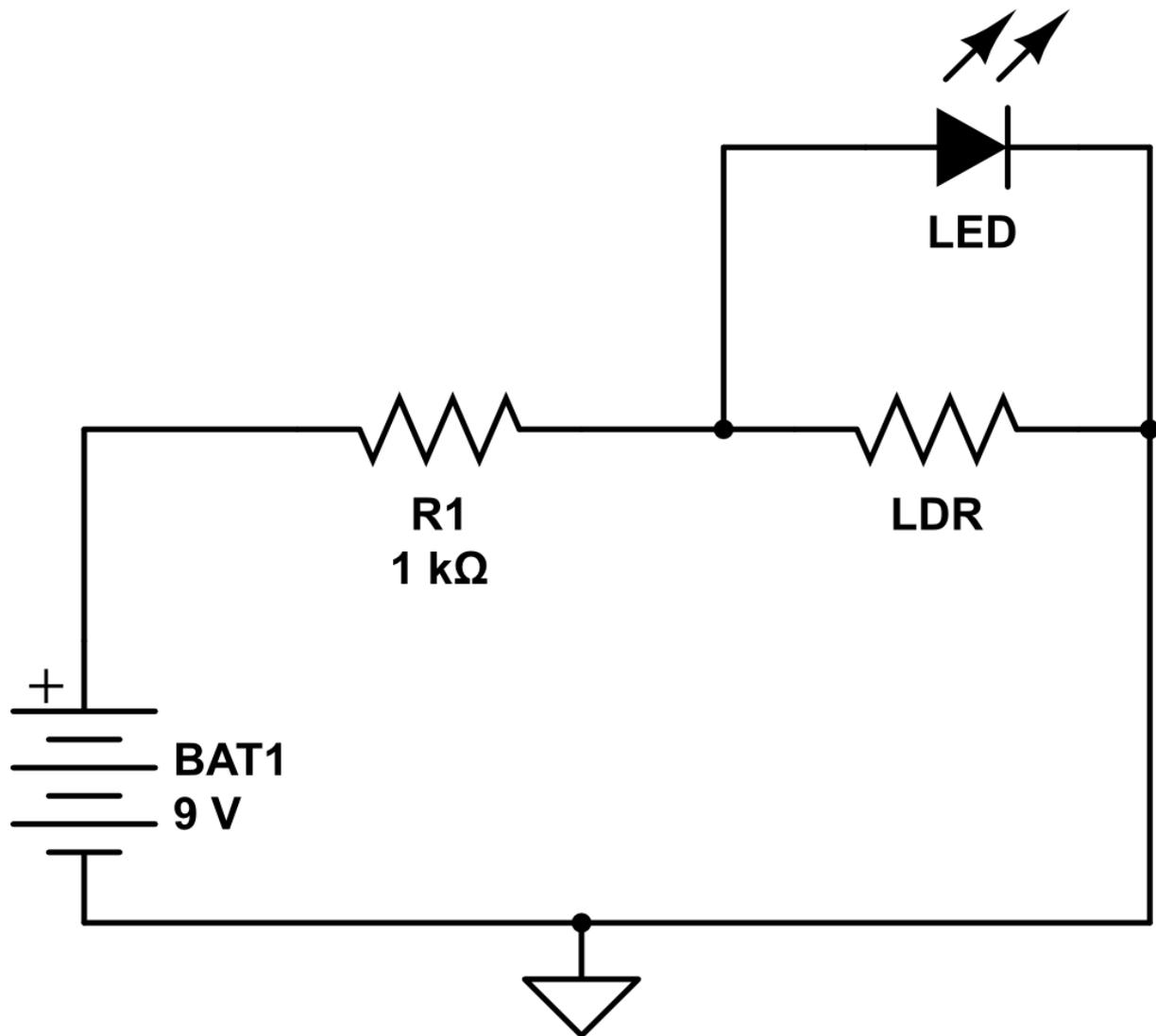


Figure 2. Circuit scheme

The required components of the circuit are:

- 1x 1k resistor
- 1x LED
- 1x LDR
- 9V Voltage source
- A light source (like torch)

Then we will adjust the circuit size for the choice of the copper which we will cut and place the components on it, by choosing the appropriate sizes by selecting "board edge" on Proteus. And then, we will choose the drill holes diagram of the circuit in order to place the components on the copper easily, and then we are taking the mirror side of the roads for the top coat and then we will take the print out of our drawing because when the printed part comes onto the copper, the ink will be turned into its mirror sight.

In this printing circuit method, we drew our circuit on Proteus program and we chose an appropriate copper sheet according to the length of our drawing on the Proteus again. Then we will print out the circuit by using ARES onto a special thin paper. Then we will place the thin paper onto the copper sheet and we will make ironing. With the help of the heat from the iron, the schematic will be printed on the copper by ink.



Figure 3. Printing the ink onto the copper

Then we will scratch the roads on the copper and make them clearer. We will make holes with the driller on the copper in order to place the circuit elements on the board.

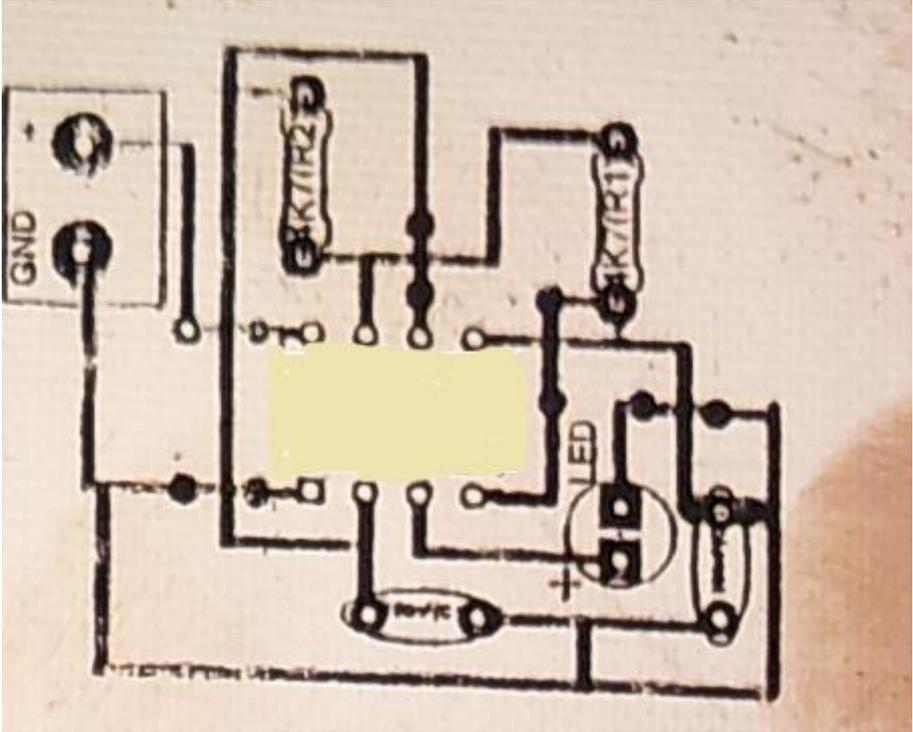


Figure 4. The printed copper

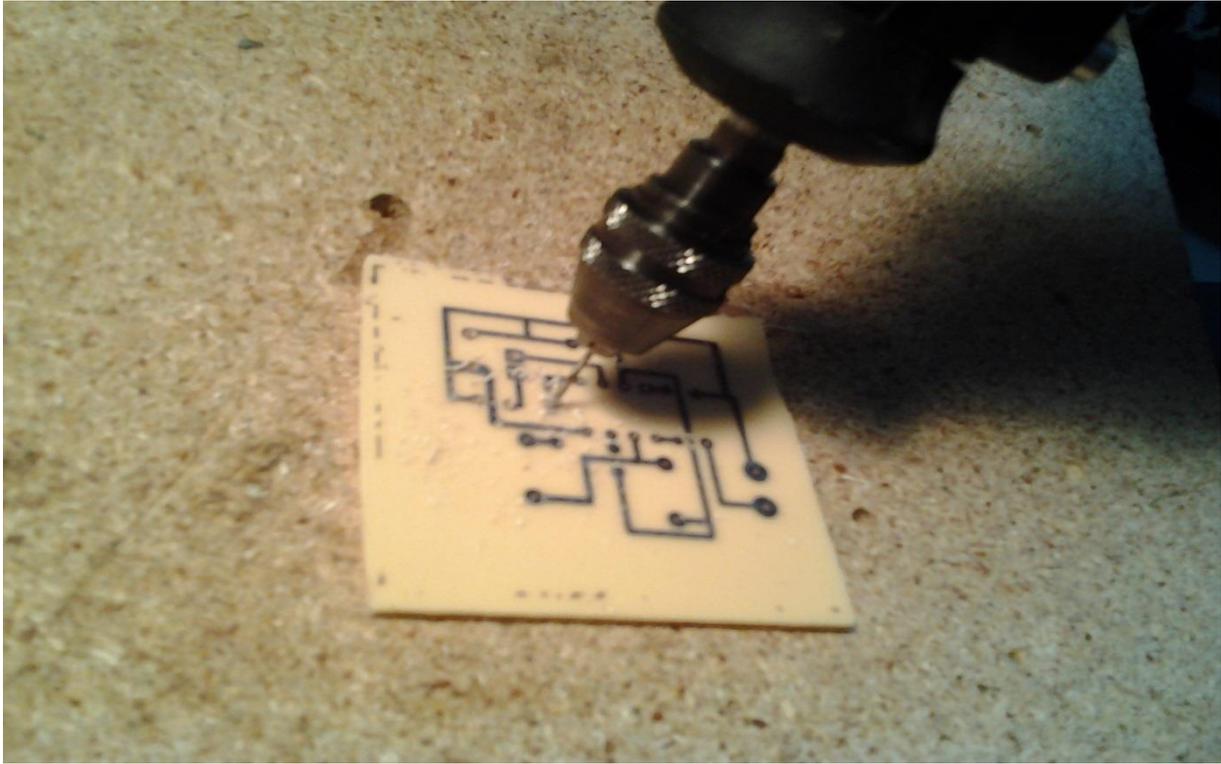


Figure 5. Drilling the holes

Then we will put down the copper into FeCl_3 solution and we will make soldering to the through-hole components on the circuit.



Figure 6. Collapsing the circuit

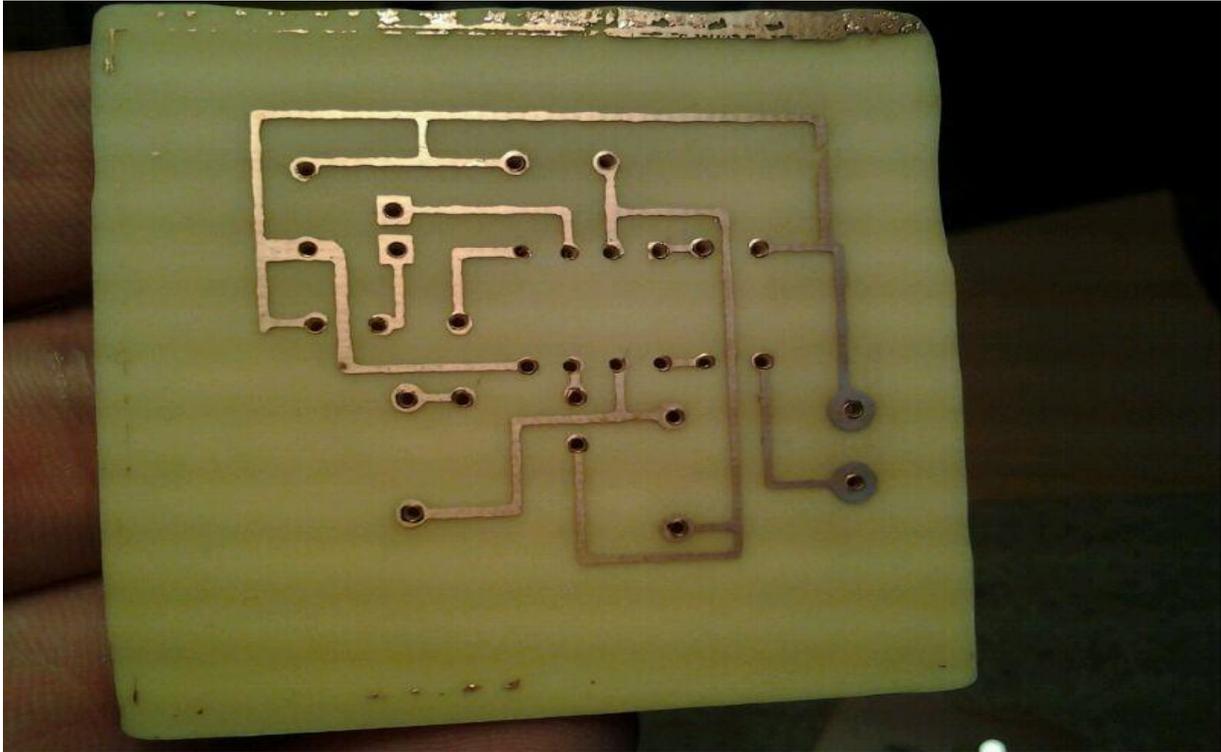


Figure 7. Final state of the circuit

Now we are ready to place the components onto the circuit and then we will make soldering to the components onto the copper.



Figure 8- Soldering the components

3. Working Principle of the Circuit

This is an LDR controlled darkness detector circuit. In this circuit we used a 1.63 M ohm resistor (you can measure the LDR's resistance by using Fluke multimeter), a light dependent resistor (LDR), and an LED. This simply works on the principle of the light depending resistor. When a light is not incident on the LDR, then the resistance of the LDR is very high around the range of 1M ohm but when we illuminate it with the light then resistance of the light decrease rapidly.

We know that if two resistors are in series and we apply a DC Voltage to it then the value of the voltage across each resistor is directly proportional to the value of the resistance of that resistor. Here when there is no light then resistance of LDR is high hence the voltage across it will be more. Due to this, LED will glow. When there is light then the resistance of LDR decreases and voltage across it will also reduced. Now LED will not glow due to low voltage.

Important note: When you are going to solder the LED, keep some distance between LED and LDR so that when LED glows it will not strike on the LDR.