LIGHT SENSOR SWITCH CIRCUIT USING JK FLIP FLOP

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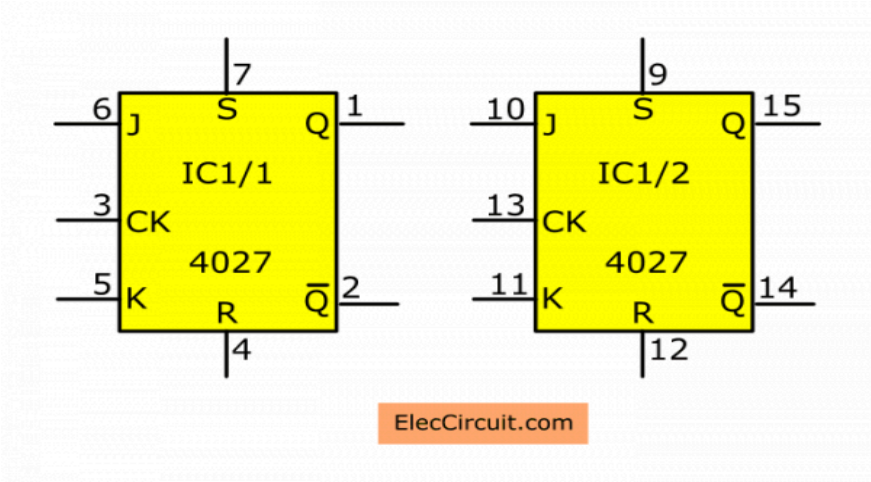
ABSTRACT

In this experiment, we use the phototransistors in the circuit diagram. When the light shines, it will have a collector current flow through R1 and VR1. They are set in the voltage divider form. There will be a voltage drop across its collector change from 12 volts into 0 volts. When the light goes out, the voltage at this point is 12 volts, as before.

So, it is the pulse signal to CK of JK-FF. And, this pulse is the positive-edge triggering, too. Then, the flip-flop changes state from logic "0" into "1". The output Q will supply to drive the transistor through R2-resistor. The transistor-Q2 will increase the current and drive coil of the relay by the DC voltage of 12-volts.

Next, the contact of the relay will be used to turn on/off the electric appliance. If the pulse signal changes from high to lower than 0.3 volts per uS. It may cause flip-flop run errors. We should place this phototransistor in a room and no sunlight shines directly on it.



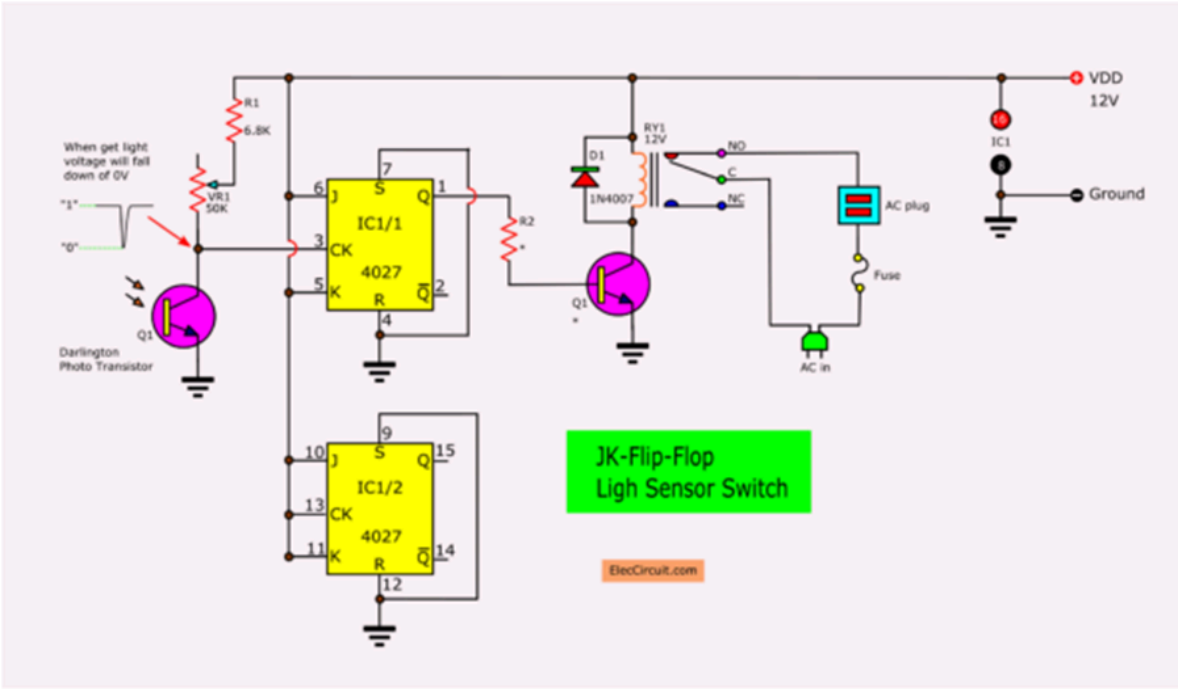
In this project, we will use CD4027. It has dual flip-flop:

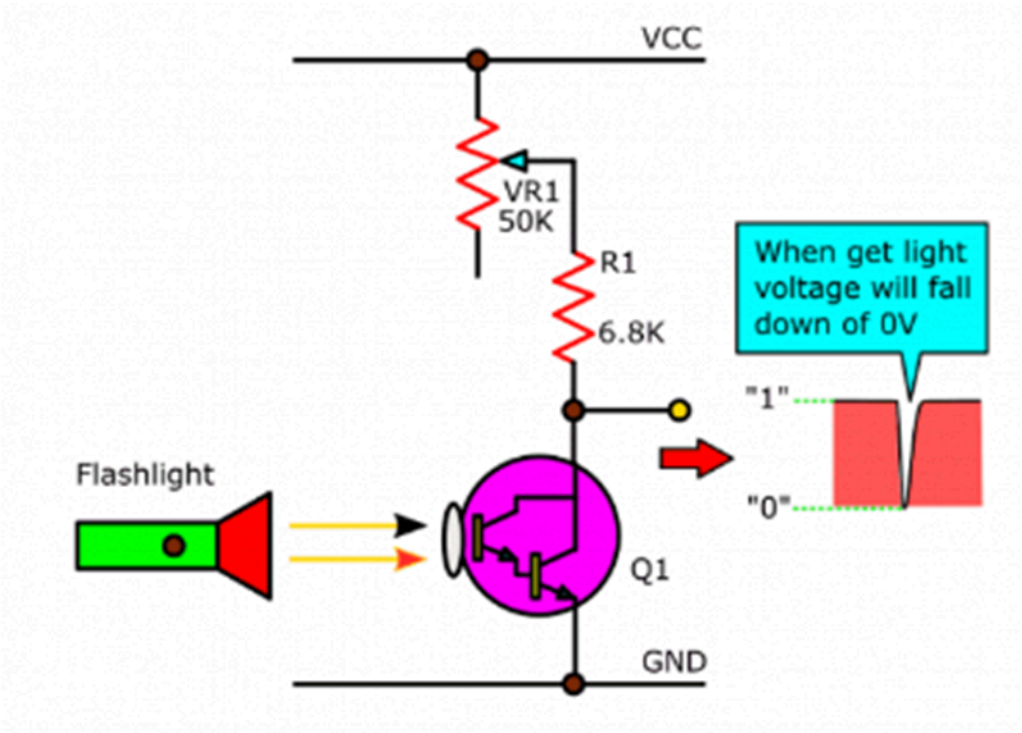
- **Pin 1 to pin 7 are pins of a first flip flop.**
- **Pin 9 to pin 15 are pins of a second flip flop.**

Testing

The first time, we did not insert a load. The experiment at first also will not connect the Load and this section circuit above. We just noticed the operation of the relay is enough. This figure is a photo of connecting the components on the Perforated PCB board to use in the experiment. Firstly, we turn on a power supply switch. The flip-flops may set or reset (Q = “1” or “0”) indefinitely. If Q = “1” will hear the relay “click” indicating the coil pulls the contact.

Secondly, shine a flashlight to the phototransistor. Then, Whisk hand through the beam of a flashlight. We will hear relay work or stop. It shows that it has a pulse into the flip-flop and changes state.


When get light voltage will fall down of 0V
"1"
"0"
R1
6.8K
VR1
50K
Q1
Darlington Photo Transistor
IC1/1
4027
IC1/2
4027
R2
RY1
12V
D1
1N4007
NO
C
NC
AC plug
Fuse
AC in
Q1
VDD
12V
IC1
Ground
JK-Flip-Flop
Ligh Sensor Switch
ElecCircuit.com


VCC
VR1
50K
R1
6.8K
When get light voltage will fall down of 0V
"1"
"0"
Flashlight
Q1
GND