SRM
INSTITUTE OF SCIENCE & TECHNOLOGY

(16)

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Faculty of Engineering and Technology

Department of Electronics and Communication Engineering

MINI PROJECT REPORT

Academic Year -2022-23 Even Semester

Subject code & Name : 18ECC202J & Linear Integrated Circuits

Year & Semester : 2nd & 4th

Project Title : Light Sensor using LDR and IC741

Lab Supervisor : Dr. S.UmaMaheswari

TeamMembers : Dhananjay Srinivas (RA2111004010200)

Kartik Gowda (RA2111004010203)

Saket Kumar (RA2111004010207)

Particulars	Maximum Marks	Dhananjay Srinivas RA2111004010200	Kartik Gowda RA2111004010203	Saket Kumar RA2111004010207
Objective, Abstract & Introduction	5	5	5	5
Concepts/Working Principle	5	5	5	5
Block diagram	5	5	5	5
Approach/ Methodology/ Programs	5	5	5	5
Output, Conclusion, References	10	10	10	10
Total	30	30	30	30

Signature
(With date and seal)

Department of ECE
SRM IST
Kattankulathur - 603 203

Light Sensor using LDR & IC741

OBJECTIVE :

To Perform the experiment of Light Sensor using Light dependent resistor & Op-amp IC741

ABSTRACT:

In this circuit, we have demonstrated a Dark/Light Detector using a LM741 Op-Amp and LDR (Light Dependent Resistor). If the circuit fails to detect light, it triggers the IC and illuminates the LED attached to it. To use it as a dark detector alarm, we can also use a buzzer or speaker instead of LEDs. This LDR circuit is based on the LDR's working and is quite simple.

INTRODUCTION: Working Principle of Light Dependent Resistor: LDRs work based on photoconductivity, which is an optical phenomenon. A material's conductivity increases when light is absorbed by it. When light falls on the LDR, the electrons in the valence band of the material are ready to move to the conduction band. In order to jump from one band to another (valance to conduction), the photons in the incident light must have energy greater than the bandgap of the material

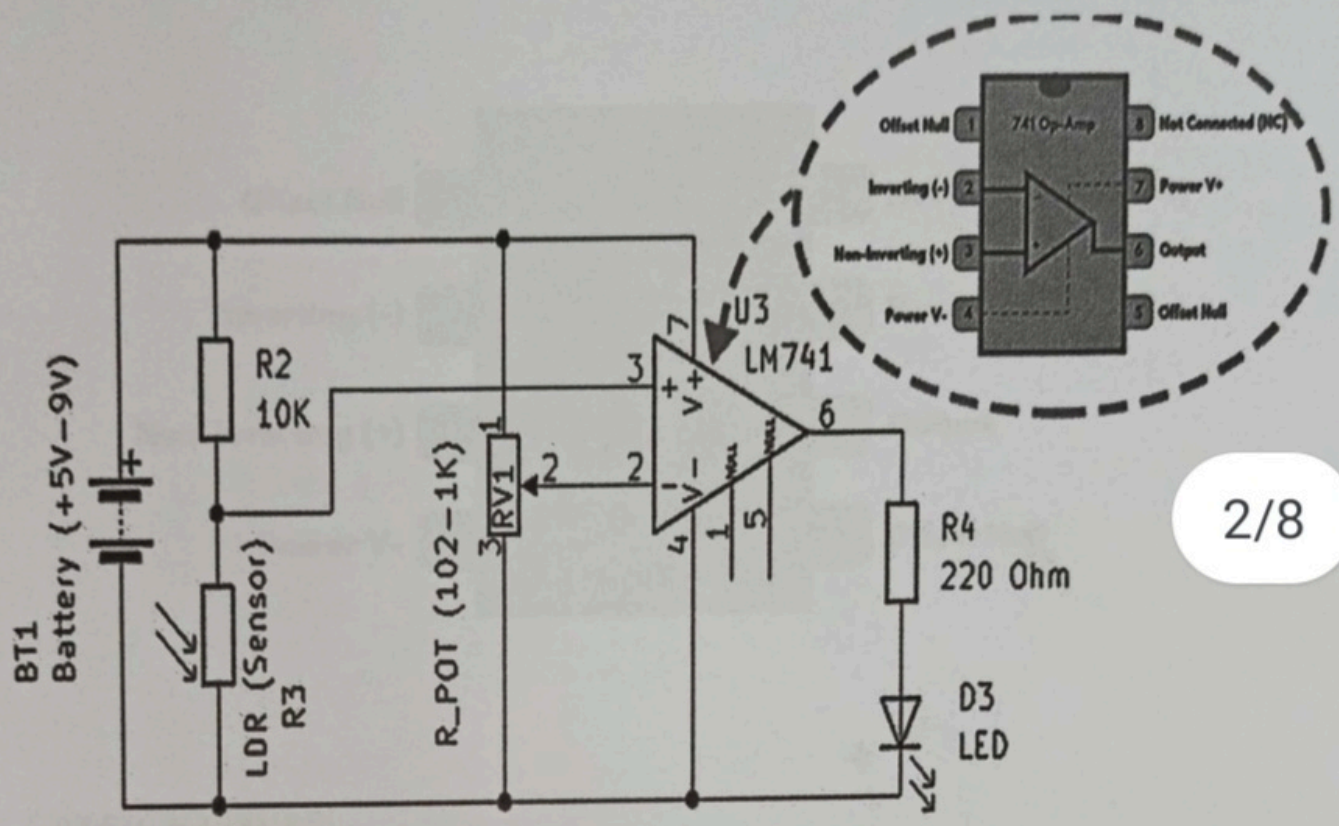
HARDWARE REQUIREMENT/DESCRIPTION:

OP-AMP IC741,Resistors,Potentiometer,LDR,LED,Breadboard.

CIRCUIT/ COMPONENTS SPECIFICATIONS:

Supply voltage (V_{CC})	+9V to +12V
Operational Amplifier	IC741
Resistors	220ohm,10K
Potentiometer	10K
LDR(Light dependent resistor)	1
LED(Light emitting diode)	1
Breadboard	-

CIRCUIT DIAGRAM:

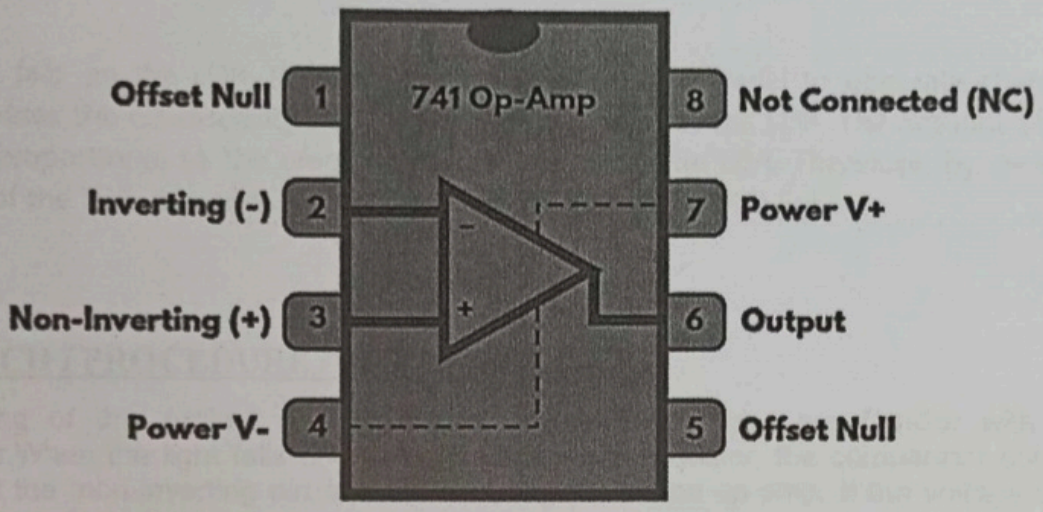


2/8

LM741 Pin Configuration

Pin Number	Pin Name	Description
1,5	Offset Null	This pin is used to remove the offset voltage and balance the input voltage.
2	Input-	Inverting signal Input
3	Input+	Non-Inverting signal Input
4	V-	Ground or Negative Supply Voltage
6	Output	Output of op amp
7	V+	Positive Supply Voltage
8	NC	Not connected

LM741 Op-Amp



DESIGN ISSUES:

1. Maximum supply voltage should not exceed 15V
2. Proper placement of LDR: The LDR should be placed in a position w sense the ambient light conditions accurately. It should not be obst any other components or the enclosure of the circuit.
3. Biasing of the IC741: The IC741 needs a proper DC biasing to ensure that it operates in the linear region. Use a voltage divider circuit to bias the non-inverting input of the IC741.
4. Noise: The LDR can be sensitive to noise and interference. To minimize noise, use good quality components,and keep the circuit layout neat and tidy

RINCIPLE:

A light sensor using a light-dependent resistor (LDR) operates based on the principle that the resistance of an LDR changes in response to the amount of light it receives. An LDR is made of a semiconductor material that has a high resistance in the dark and a low resistance when exposed to light.

When light falls on the LDR, it causes the semiconductor material to generate charge carriers, which increases the conductivity and lowers the resistance of the LDR. The amount of resistance change is proportional to the amount of light falling on the LDR. Therefore, by measuring the resistance of the LDR, it is possible to determine the intensity of the light.

APPROACH / PROCEDURE / METHODOLOGY:

The working of this project is very simple and in fact if you are familiar with LDR and comparator.When the light falls on the Light Dependent Resistor, the comparator compares the voltages at the non-inverting pin and the inverting pin of the op-amp. If the voltage at the non-inverting pin is greater than the voltage at the inverting pin, its output will be LOW and if the voltage at non-inverting pin is less than the voltage at the inverting pin, the output of the comparator will be HIGH.

In my case, under normal room light conditions, the output of the Op-Amp is LOW and hence, the Light Bulb stays OFF. When I apply some light on the LDR (with the help of a small torch), the output of the Op-Amp becomes HIGH and the Light Bulb turns ON.

1. Place the IC741 on the breadboard with the notch facing left.
2. Insert the 10kΩ resistor between pins 2 and 3 of the IC741.
3. Insert the LDR between pins 2 and 6 of the IC741.
4. Insert the 220kΩ resistor between pins 6 and 7 of the IC741.
5. Connect a jumper wire from pin 4 of the IC741 to the negative rail (-) of the breadboard.
6. Connect a jumper wire from pin 7 of the IC741 to the positive rail (+) of the breadboard.
7. Connect a jumper wire from pin 6 of the IC741 to the junction of the LDR and 10kΩ resistor.
8. Connect a jumper wire from pin 3 of the IC741 to the positive rail (+) of the breadboard.
9. Connect the positive terminal of the LED to pin 6 of the IC741.
10. Connect the negative terminal of the LED to the negative rail (-) of the breadboard.
11. Connect the positive terminal of the 9V battery to the positive rail (+) of the breadboard.
12. Connect the negative terminal of the 9V battery to the negative rail breadboard.

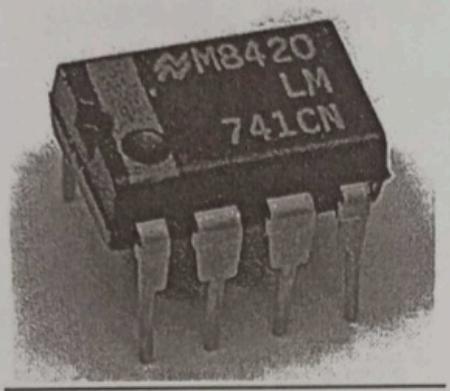
13. Adjust the potentiometer of the breadboard to set the reference voltage.
14. Shine a light on the LDR and observe the LED.
15. Adjust the potentiometer until the LED turns on or off depending on the light intensity.

Optional: Use a multimeter to measure the voltage at pin 6 of the IC741. As the light intensity changes, the voltage at pin 6 should also change accordingly.

APPENDIX:

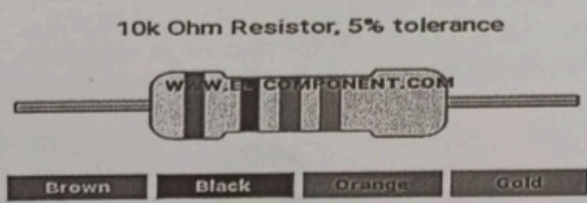
1.OP-AMP IC741

The IC741 is a monolithic amplifier that consists of a single silicon chip containing several transistors, resistors, and capacitors. It has two input terminals (inverting and non-inverting) and one output terminal. The op-amp is designed to have a very high gain, typically around 100,000, and a wide bandwidth.

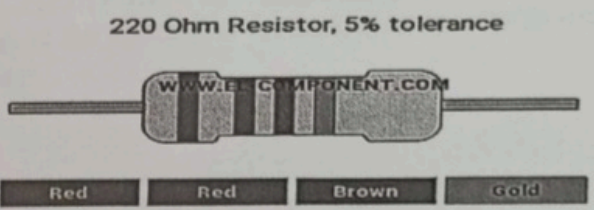


2.Resistors

(a)10K



(b)220ohm

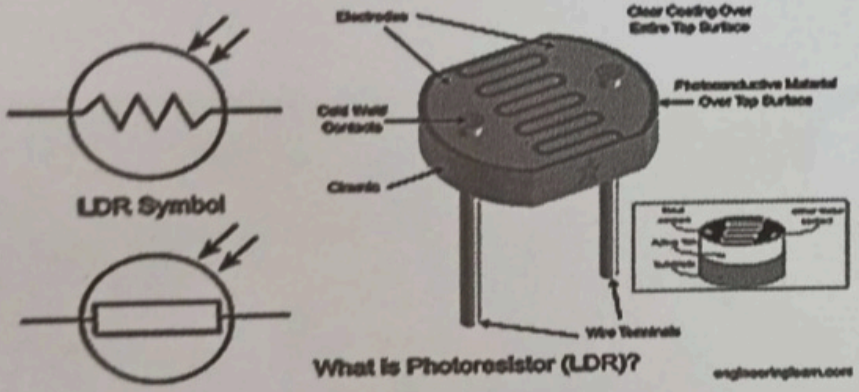


3.Potentiometer :

Device that is used to change the resistance according to our needs in an electronic circuit. It can be used as a three-terminal as well as a two terminal device. Mostly they are used as a three terminal device.

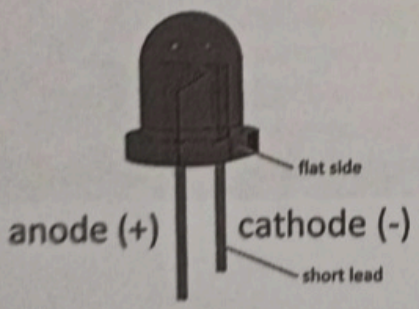
4.LDR(LIGHT DEPENDENT RESISTOR):

A photoresistor is a passive component that decreases resistance with respect to receiving luminosity on the component's sensitive surface. The resistance of a photoresistor decreases with increase in incident light intensity



5.LED(LIGHT EMITTING DIODE):

A **light-emitting diode (LED)** is a semiconductor device that emits light when current flows through it.Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor.



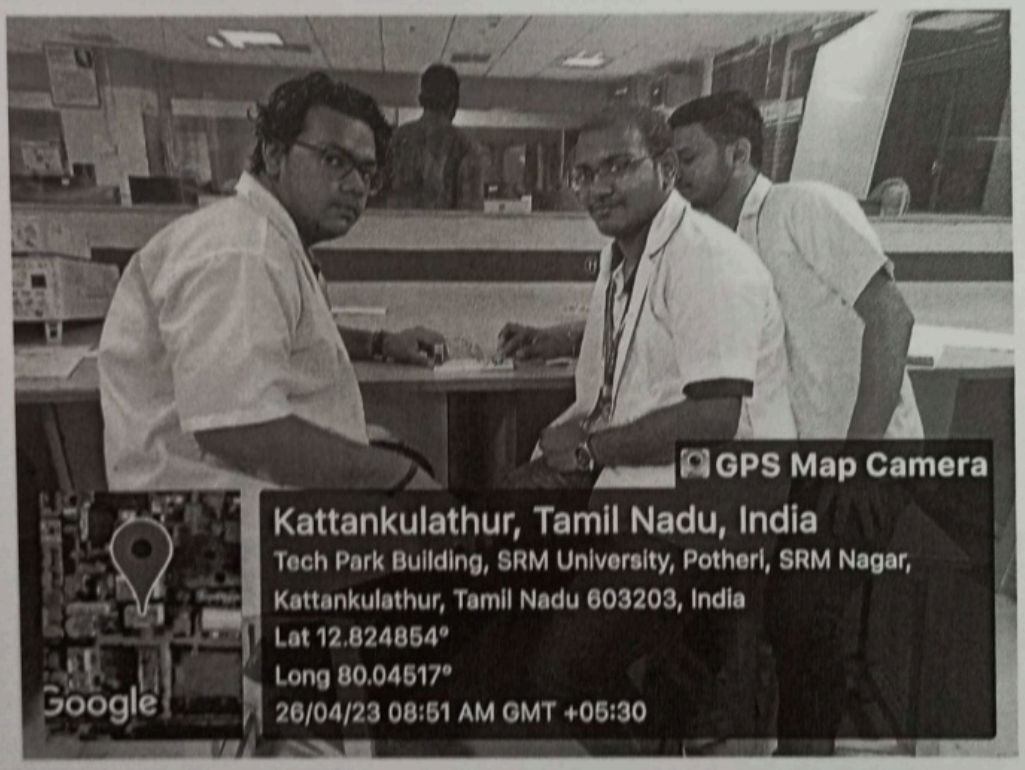
6.Breadboard:

ONCLUSION:

Light-sensitive sensors using LDRs and IC 741s find wide application in various fields, such as automatic lighting systems, security systems, and camera exposure control. the light-sensitive sensor using an LDR and IC 741 is a simple and effective solution for detecting and measuring light intensity. Its flexibility and adaptability make it a popular choice for many applications.

REFERENCES:

https://eleobo.com/how-to-make-light-sensor-circuit-using-ldr-ic-741-op-amp-bread-board-2/
https://www.watelectronics.com/light-dependent-resistor-ldr-with-applications/



RESULT:

Light sensor using LDR and IC741 has been successfully implemented and verified.