

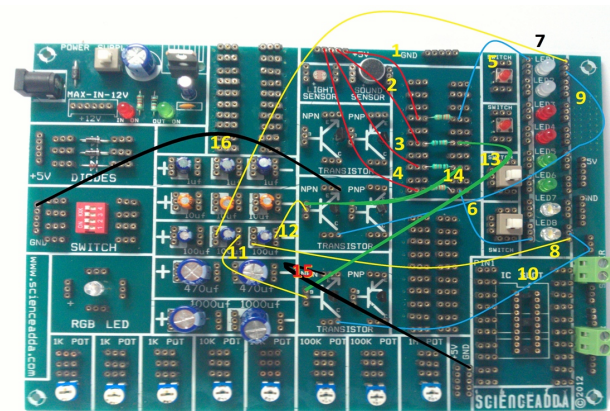
Do :

- Be gentle while handling the board
- Power ON the board ONLY after making the complete connection.
- Keep the board on a dry surface.
- Use RED wire for 5V [+ve] and BLACK wire for GND[GROUND -ve] in experiments for better clarity
- See the complete circuit once before starting the experiment.
- Read about the components before using them in experiments
- Check your connections TWICE before powering ON the board

Don't:

- Spill any liquid on board. Always keep it dry.
- Never drop the board. Components will be damaged.
- Never connect +ve to GND or -ve to 5V of any component.
- Turn the POT knob slowly and carefully.
- Never change any or make new connections when power [GREEN light] is ON.

How to connect?



Output:

- The two LEDs turn ON and turn OFF with some amount of delay.

Observation:

- Can you change the duration for which led flashes?

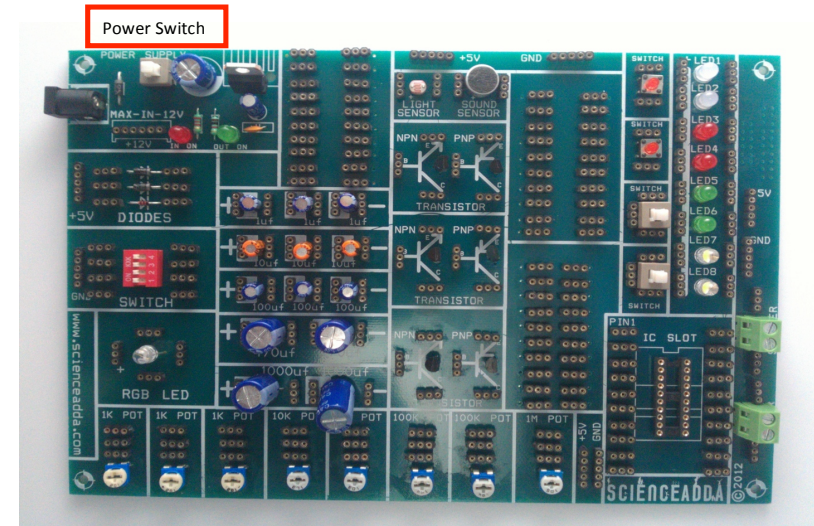
More Details at:

www.scienceadda.com/hobbyzone/electronics/led_flasher

Notes:

User Manual

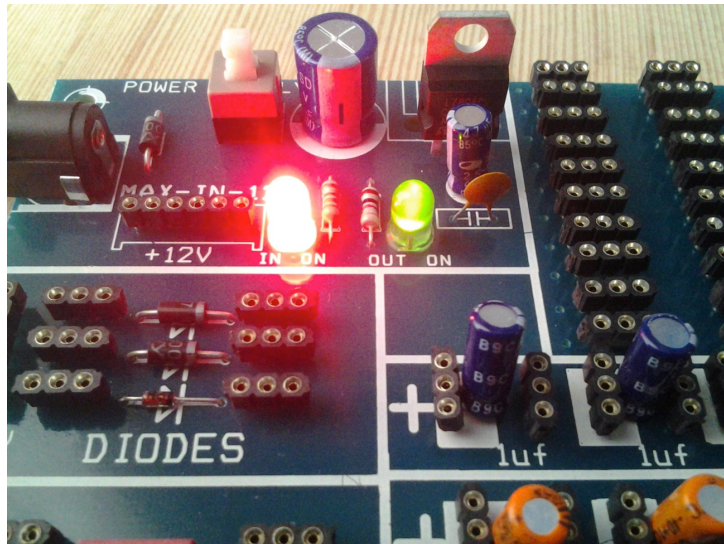
Jump Start Board



Components on board:

- Diodes - 3 nos
- DIP switch - 4 nos
- RGB LED - 1 no
- Potentiometers - 8 nos
- Electrolytic Capacitors - 13 nos
- Light Sensor (LDR) - 1 no
- Sound Sensor - 1 no
- Transistors - 6 nos
- Switches - 4 nos
- IC slot - 1 nos
- Colour LED - 8 nos
- Connecting Terminal - 2 nos

- Make the connections of the experiment. Check your connections twice and press the Power supply switch. The Green Light indicates board is powered and you can check your output.



Output:

- The intensity of the RGB LED changes when the 1K POT is varied.

Observation:

ACTION	OUTPUT
Change the POT for Red, Green and Blue	

More Details at:

www.scienceadda.com/hobbyzone/electronics/rgbLed

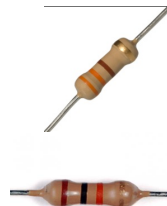
Experiment 07 - LED FLASHER

How it works?

A simple pair of resistor and capacitor when connected in a specific manner creates a time delay in the path of the electricity. If this delay has to be repeated to blink an LED, a set of two such pairs are needed. Such a circuit can be seen at railroad signals, blinking rear light for bicycles, decorations, etc.

What do you need?

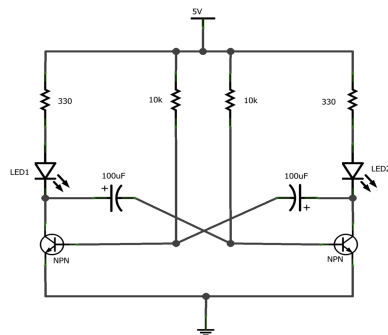
- Board
- 2 x 330 ohm resistors - (| | |) Orange Orange Brown
- 2 x 10k ohm resistors - (| | |) Brown Black Orange
- 2 x 100uF capacitors (already on board)
- 2 x BC547 transistors (already on board)
- 2 x LEDs (any colour)



Caution

1. Capacitors have polarity, i.e. + (**POSITIVE**) and - (**NEGATIVE**) marked on them.
2. DO NOT connect 5V to **NEGATIVE** of the Capacitor or GND to **POSITIVE** of the Capacitor, it will explode.
3. Transistors have three pins - Emitter [E], Base [B] and Collector [C]. Connect them properly as shown in the wiring diagram.

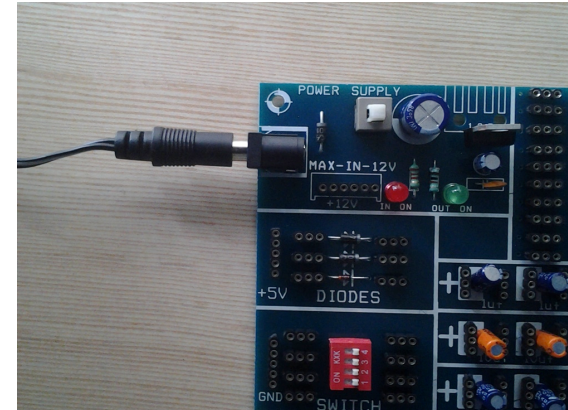
What to do?



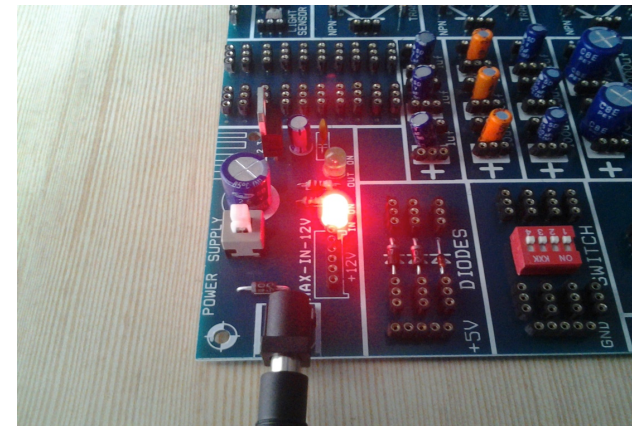
Getting started with board:

Powering ON:

- Connect the DC Adapter to the board as shown.



- Power ON the Adapter. The RED light indicates power ON



2) Capacitor:

Capacitors are components that can store electrical pressure (Voltage) for long periods of time. It has polarity, i.e Positive and Negative terminal marked on its sides.



3) Potentiometer [POT]:

Potentiometers are variable resistors. Turning the knob varies its resistance.



4) Light Dependant Resistor [LDR] [Light Sensor]

LDR is a resistor which has high resistance normally and very low resistance when there is lots of light falling on it.



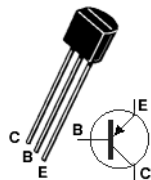
5) Diode:

An electronic device that allows current to flow in one direction only.

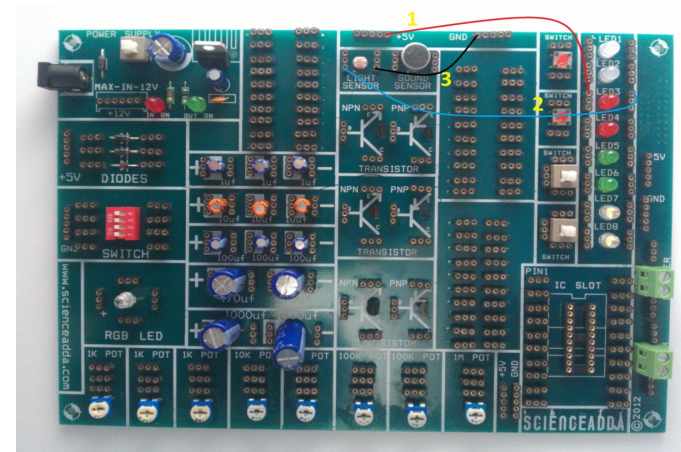


6) Transistors:

A device that amplifies or switches the flow of current, between its terminals [Collector(c) and Emitter(e)]. The switching or amplification is controlled through Base [b]



How to connect?



Observation:

ACTION	OUTPUT
LDR covered in hands	
LDR in open	
Shine a torch directly on LDR	

More Details at:

www.scienceadda.com/hobbyzone/electronics/Led_Ldr

Experiment 06 - RGB LED Colour Mixer

Why?

Red, Green and Blue are the most basic colours. By mixing them in different proportions, we can get different colour output. In a TV screen, each point is similar to RGB led. By mixture of these three colours, it creates white, black, violet, pink and much more. Let us try it by mixing red, green and blue colours.

How it works?

RGB led contains a red, a green and a blue led in a single pack. By using a pot, you can vary the resistance in the circuit, which results in varying intensity of the particular colour.

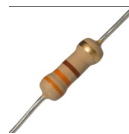
What do you need?

- Board
- 3 x 330 ohm resistors - (| | |) Orange Orange Brown
- 1 x RGB LED

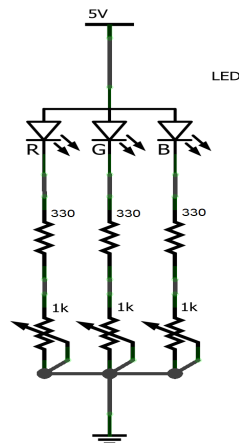


Caution!

3. RGB LED had 4 pins in which + pin goes to +5v and the rest 3 pins goes to 330 Ohms resistors.



What to do?



Know your Component

1) Resistor:

The resistor is an electronic component that has electrical friction. It opposes the flow of electrons in the circuit.

Color	Digit	Multiplier
Black	0	1
Brown	1	10
Red	2	100
Orange	3	1000
Yellow	4	10000
Green	5	10^5
Blue	6	10^6
Violet	7	10^7
Grey	8	10^8
White	9	10^9
Gold		10^{-1}
Silver		10^{-2}

Example 1:

The colours here are Yellow-Violet-Orange-Gold.

The value of the colours (refer to the table) are, yellow=4; violet=7; orange=3 [ignore gold]

$$47 \times 10^3 = 47000 \Omega \text{ Or } 47k\Omega$$

Example 2:

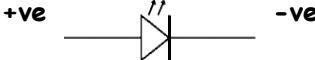
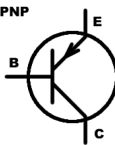
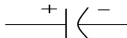
The colours here are Brown-Black-Red-Gold.

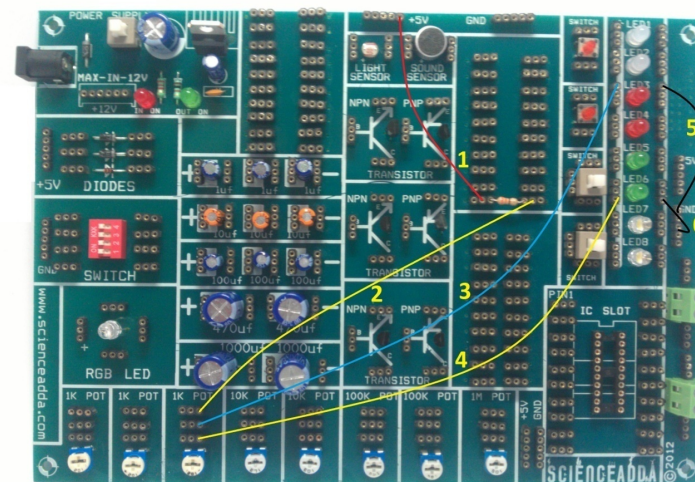
The value of the colours (refer to the table) are, Brown=1; Black=0; Red=2 [ignore gold]

$$10 \times 10^2 = 1000 \Omega \text{ or } 1K \Omega$$



How to connect?

Resistor	
LED	
Transistor:	 
Switch	
Potentiometer [POT]:	
Light Sensor [LDR]:	
Capacitor	



- The LEDs will turn ON and turn OFF based on pot value, turn the pot in clockwise and Anti-clockwise to make out the changes in the brightness of the LEDs.

ACTION	OUTPUT
POT varied clockwise	
POT varied anti-clockwise	

www.scienceadda.com/hobbyzone/electronics/led_pot

Experiment 05 - Light Based LED Intensity

Why?

Smart Street Lights will turn ON during night times and turn OFF during the day automatically. These lights use a LIGHT SENSOR called LIGHT DEPENDANT RESISTOR [LDR]. Try a simple experiment using a LDR in the board and record the output.

How it works?

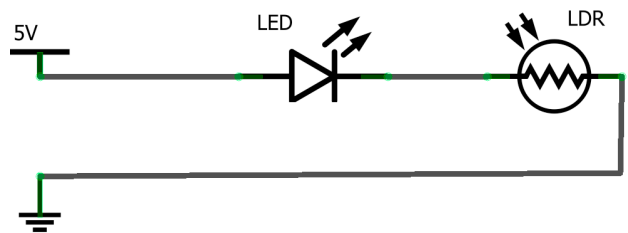
As light falling on the LDR increases, its resistance decreases. As a result more current flows through the LED, increasing its brightness.

When you cover the LDR, its resistance increases. So due to high resistance, brightness of the LED reduces.

What do you need?

- Board
- 1 x LDR [LIGHT SENSOR]
- 1 x LED (any color)

What to do?



Made with  Fritzing.org

7) LED [Light Emitting Diode]:

A device which emits light when powered ON. It is available in various colours. As it is a diode, it works only in one direction. It has polarity, so



8) Switch:

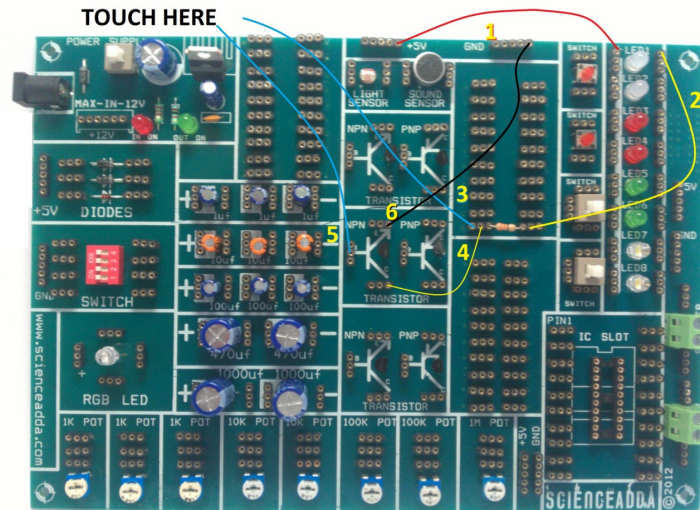
A mechanical device which opens or closes a circuit. It is used to turn ON or turn OFF Lights and speakers.



box 1

box 2

How to connect?



Output:

- The LED turns ON when two wires are touched with hands.

Observation:

ACTION	OUTPUT
Wire touched with hands	
Wire touched with shade no 1	
Wires touched with shade no 2	

More Details at:

www.scienceadda.com/hobbyzone/electronics/led_touch

Experiment 04 - LED Intensity using Potentiometer

Why?

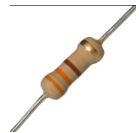
When you want to control the flow of water in two different pipes, you will use a master tap and regulate the flow. You can let more water through tap1 and less through tap2. Let us try something similar.

How it works?

Intensity of LED1 and LED2 changes on turning the Pot Knob. When the resistance varies, the LED with least resistance in its path glows with more brightness.

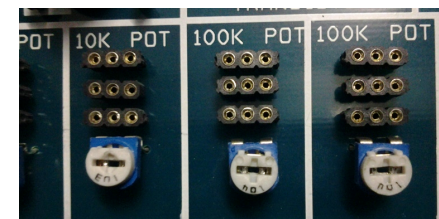
What do you need?

- Board
- 1 x 330 ohm resistors - (| | |) Orange Orange Brown
- 2 x LED (any color)
- 1 x 1K pot



CAUTION:

- Handle the POT very carefully using hands.
- Don't use sharp objects to turn the POT
- Do NOT move the POT beyond the given limit as shown below.



NORMAL POSITION

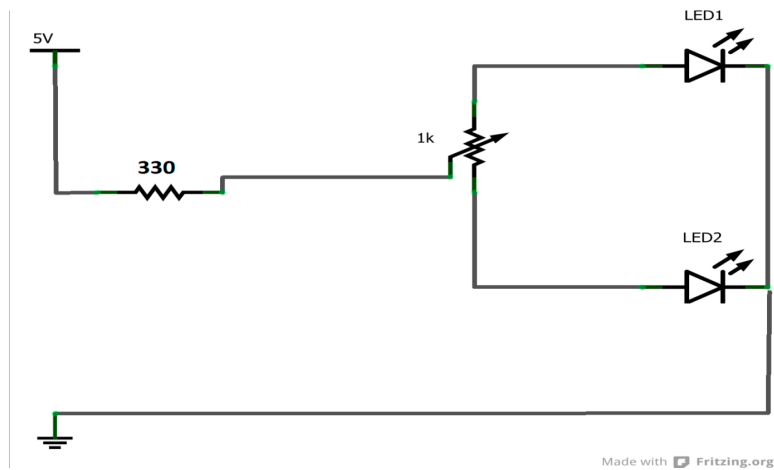


Anti - Clockwise
MAXIMUM



Clockwise MAXIMUM

What to do?



Experiment 01 - LED Control with Touch and Graphite

Why?

How does resistance change with length and width of a conducting body? Does human body offer resistance? Let us find out.

How it works?

The human body is very much like a thin rubber bag full of salt water. By touching the wires the Circuit will be closed and thereby causing the LED to GLOW. Also shade the box given using pencil and make the wires touch its end and observe the change.

What do you need?

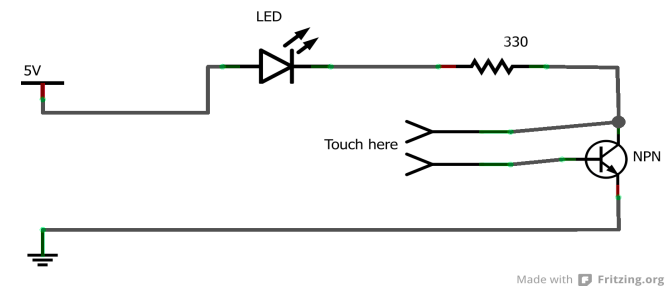
- Board
- 1 x 330 ohm resistors - (| | |) Orange Orange Brown
- 1 x BC547(NPN) transistors (already on board)
- 1 x LED (any colour)



Caution

1. Transistors have three pins - Emitter [E] , Base [B] and Collector [C]. Connect them properly as shown in the wiring diagram.

What to do?





Output:

- The LED will turn ON if any one switch is pressed or even if both switches are pressed.

Observation:

ACTION	OUTPUT
S1 and S2 both pressed	
Only S1 is pressed	
Only S2 is pressed	

More Details at:

www.scienceadda.com/hobbyzone/electronics/or_gate

Experiment 03 - AND GATE

Why?

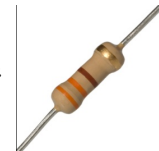
Switches are used to open or close a circuit. Here we work on an AND GATE, where when only both the switches are pressed, the light glows. You can implement a circuit with multiple switches for a single light where until the main switch is ON, the light will not turn ON.

How it works?

When the mains are turned OFF in your home, none of the switches will be able to turn ON fans or TV. Here the MAIN switch is the master and other switches are slaves. Only when the master switch is ON, slave switches can function. Let us try an experiment on this.

What do you need?

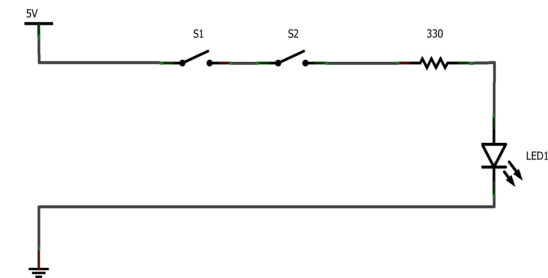
- Board
- 1 x 330 ohm resistors - (| | |) Orange Orange Brown
- 1 x LEDs (any colour)

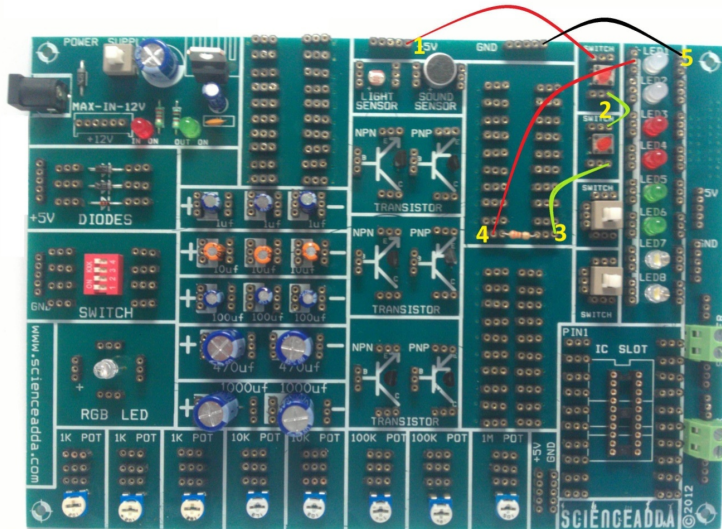


Caution!

- LED's have polarity connect the +VE terminal to 330 Ohm resistor and negative to ground.

What to Do?





Output:

- The LED turns ON only when both the switches S1 & S2 are pressed together.

Observation:

ACTION	OUTPUT
S1 and S2 both pressed	
Only S1 is pressed	
Only S2 is pressed	

More Details at:

www.scienceadda.com/hobbyzone/electronics/and_gate

Experiment 2 - OR Gate [switch]

Why?

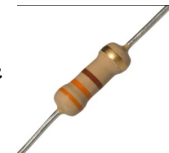
Switches are used to open or close a circuit. Here we work on an OR GATE, where if any of the switch is pressed, the light glows. You can implement a circuit with multiple switches for a single light. If there is a single bulb in a corridor, you can use OR Gate to control it from two different switches in different places.

How it works?

A simple pair of switch (S1 & S2) and a resistor when connected to a LED as shown creates an OR GATE. Here when any of the switch is pressed, it closes the circuit and LED turns ON.

What do you need?

- Board
- 1 x 330 ohm resistors - (| | |) Orange Orange Brown
- 1 x LED (any colour)



Caution

- LED's have polarity connect the +VE terminal to 330 Ohm resistor and negative to ground.

What to Do?

