Automatic Night Lamp With Alarm

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Objectives:

- To design an Automatic Night Lamp with Morning Alarm , act as Light Source when the Bedroom lights are switched off & also helps you to study (or) do any work with light without electricity…

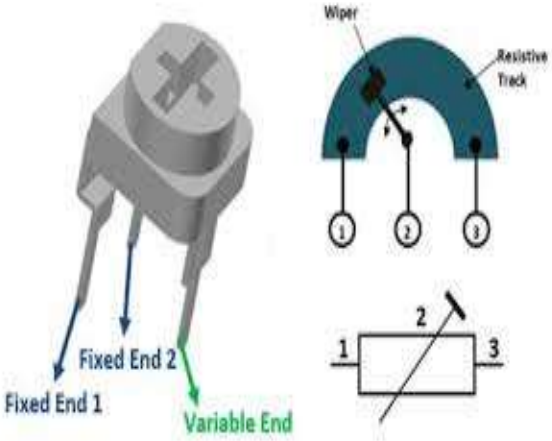
Materials Required:

- Resistors – (1K - 2, 120K - 1, 220- 1, 550 - 1)
- Preset - 47K - 2
- Capacitors - 2
- PN Junction Diode – IN4007 - 1
- Zener Diode – 3.3V - 1
- IC- (7806 REG IC – 1, NE555 - 1 , UM66 - 1) & 8 Pin Base
- Transistor – BC548 - 2
- LDR - 10K - 2, LED – 1
- Switch – 3 leg slider – 1
- Speaker - 1
- 9V Battery and Snap
- JE074 – PCB - 1

Preset – 47K – PR1, PR2 :

A trim pot (or) trimmer potentiometer is a small potentiometer which is used for adjustment , tuning and calibration in circuits.

When they are used as a variable resistor.

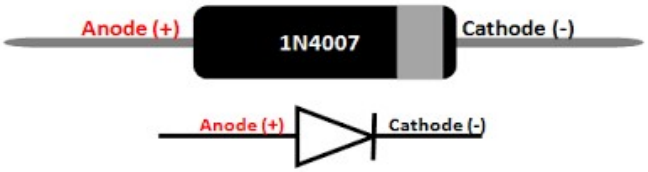


LDR – Light Dependent resistor – LDR1 , LDR2:

- **Features:**
  - It has no polarity.
  - Can be used to sense light.
  - small, cheap & easily available.

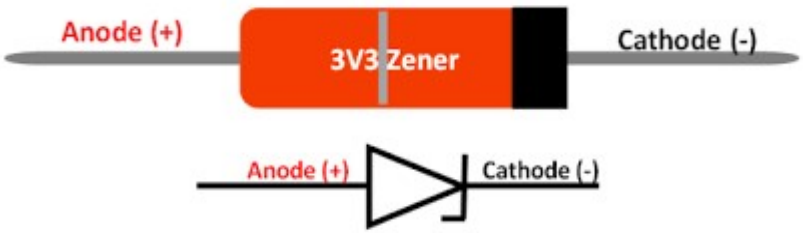
PN Junction Diode – 1N4007 - D1:

- A diode is a device which allow current flow through only one direction.
- For 1N4007 diode , the maximum current carrying capacity is 1A , it withstands peaks up to 30 A & power dissipation is 3W.
- The reverse current is 5 micro A which is negligible.
- Prevent reverse polarity problem ,used as protection device & used as current flow regulators.



3.3 V /0.5V Zener Diode - ZD1:

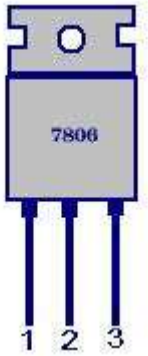
- Nominal Zener voltage : 3.3V , Power dissipation : 500mW , Zener current : 76 mA , package : DO – 35.
- Used in voltage protection circuits, used as low current voltage regulator & input voltage protection for microcontrollers or other IC's

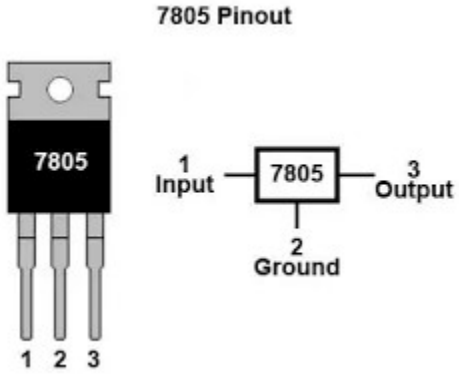


IC's:

7806 REG. IC – IC1:

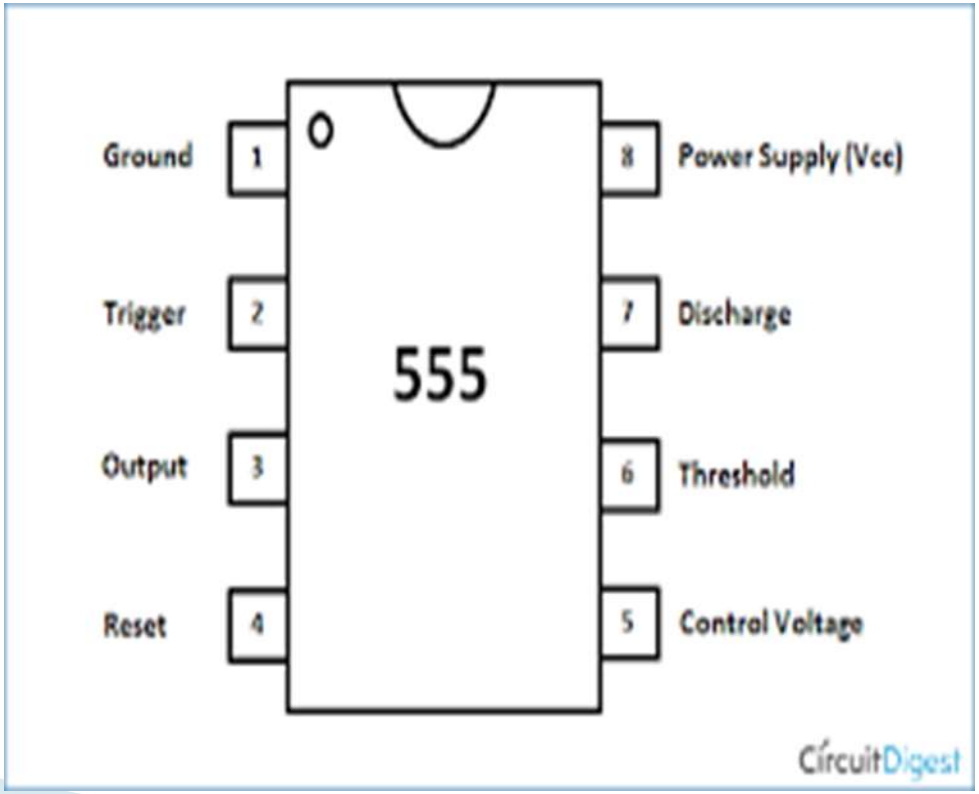
- 3 terminal 1 A positive voltage regulator
- Features:
  - output current up to 1 A.
  - Thermal overload protection , short circuit protection & output transistor safe operating area protection.





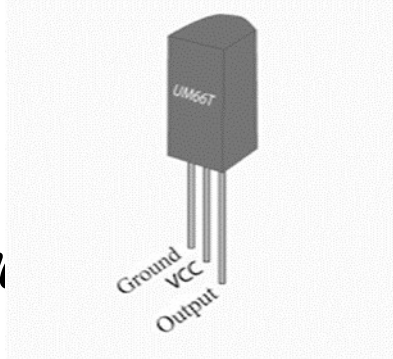
NE555 IC - IC2 & Pin Diagram:

- 555 Timer IC is an integrated circuit used in variety of time ,delay , pulse generation and oscillator application.
- NE comes from sigNEtics , NE parts- commercial temperature – (0 to 70) degree C, SE parts – military temperature – (-55 to 125) degree C.
- Standard 555 package includes 25 transistors, 2 diodes, 15 resistors in a Si chip with DIP-8 (8 pin dual in-line package)



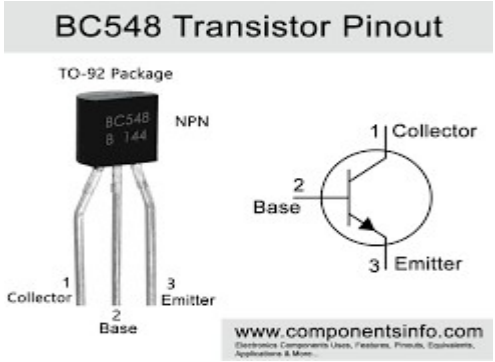
UM66 IC - IC3 :

- It is melody generating IC used in calling bells.
- It's a 3 pin IC , first pin is ground , second pin is VCC and third pin is melody output.
- supply voltage that can be given to the IC is in the range of 1.5V to 4.5V.
- The melody generator has an inbuilt beat and tone generator .

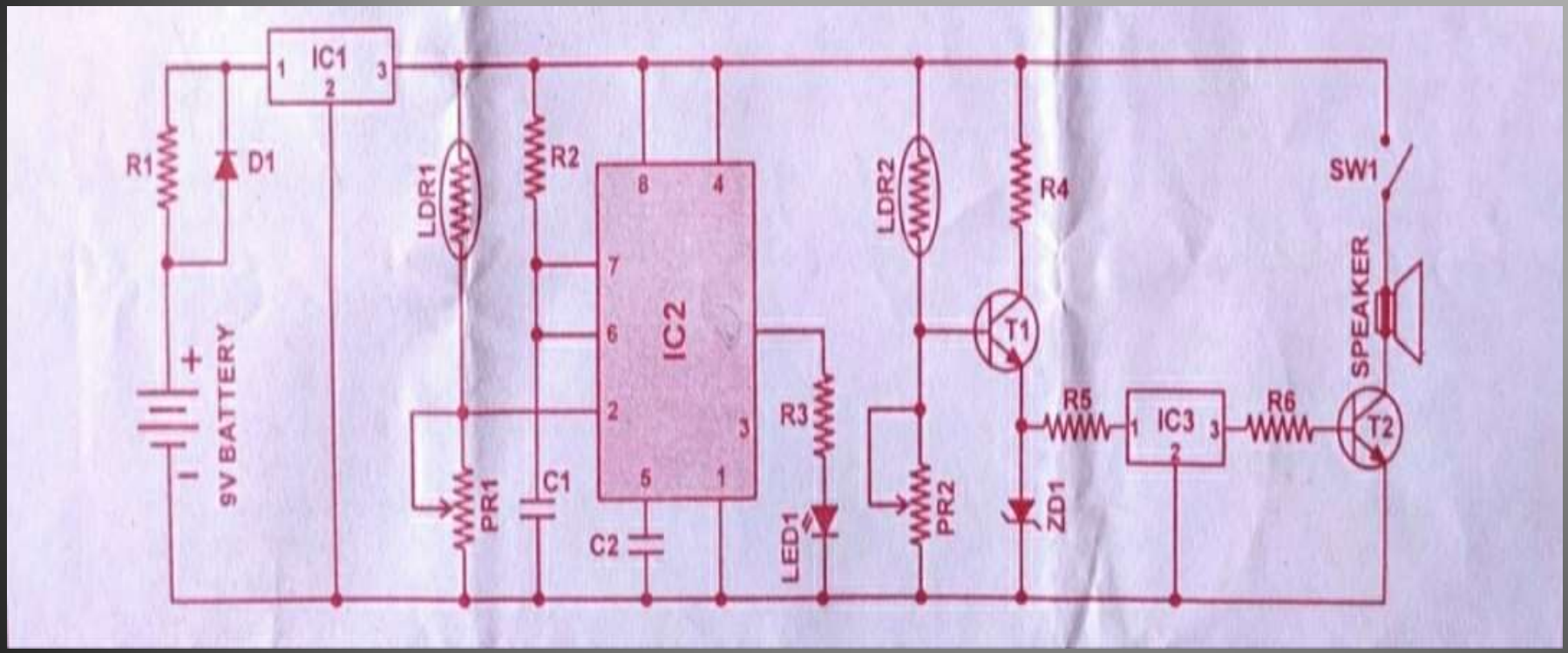


Transistors – BC548 –T1,T2:

- BC 548 is a general purpose NPN bipolar junction transistor, wh
  Si, C stands low frequency (100MHz).



Circuit Diagram:



Product Description & Applications:

- This circuit automatically turns on night lamp when bedroom light is switched off, the lamp remains ON until the light sensor(LDR!, LDR2) senses daylight in the morning, a super bright white LED (LED1) is used as the night lamp.
- It gives bright & cool light in the room, when sensor(LDR1 , LDR2) detects the daylight in morning , a melodious morning alarm sounds.
- The circuit is powered from a standard 9V battery , regulator IC7806 (IC1) gives regulated 6V DC to the circuit.
- The circuit utilizes light dependent resistors for sensing darkness and light in room , the resistance of LDR is very high in darkness , which reduces to minimum when LDR is fully illuminated , LDR 1 detects darkness while LDR 2 detects light in the morning....

- *The circuit is designed around the popular timerIC NE555 (IC2)which is configured as monostable , IC 2(IC NE555) is activated by a low pulse applied to its trigger(pin 2), once triggered pin 3 of IC 2 (IC NE555) goes high and remains in that position until IC 2 is triggered again at its pin 2.*
- *when LDR 1 is illuminated with ambient light in room, its resistance remains low, which keeps trigger (pin 2) of IC2 at a positive terminal .*
- *As a result, output (pin 3) of IC2 (IC NE555) goes low and when the white LED remains off, as the illumination of LDR1 sensitive window reduces, the resistance of device increases.*
- *In total darkness, the specified LDR has a resistance in excess of 280 kilo ohms , when the resistance of LDR1 increases, a short pulse is applied to trigger pin 2 of IC2 (IC NE555) via resistor R2 (120K ohm) ,this activates the monostable and its output goes high , causing the white LED to glow.*

- *Low value capacitor C2(0.01 micro F) maintain the Monostable(output voltage becomes high for a set duration when a falling edge is detected on pin2) for continuous operation ,eliminating the timer effect, by increasing the value of C2, the ON time of LED can be adjusted to predetermined time.*
- *LDR 2 and associated components generate the morning alarm at dawn, LDR 2 detects the ambient light in room at sunrise and its resistance gradually falls and T1 (BC548) starts conducting.*
- *When IC1 (7806 REG.IC) conducts, melody generator IC3 (IC UM66) gets supply voltage from emitter of T1 (BC548) and it starts producing conducting.*
- *The musical tone generated by IC UM66 is amplified by T2, resistor R5 limits the current to IC3 and Zener diode limit the voltage to a safer level of 3.3V.*
- *Use reflective holder for LED to get a spotlight effect for reading , place LDR away from white LED , preferably on backside of case , to avoid unnecessary illumination.*
- *The speaker should be small so as to make gadget compact!!...*

Thank You !!....