

# CHILD'S LAMP

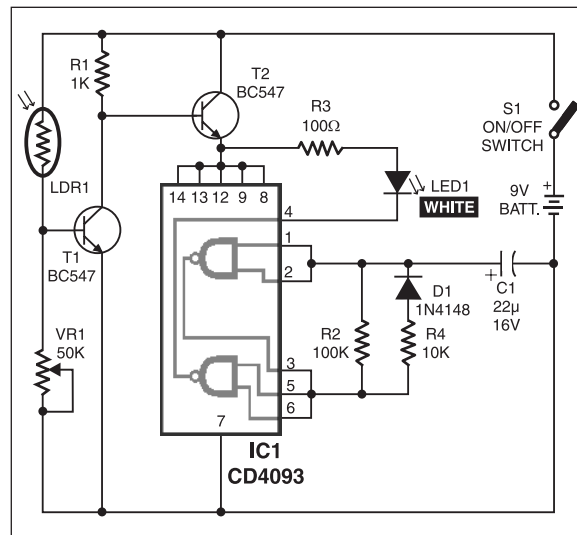


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Here is a mini emergency lamp that you can use as a tabletop lamp in your child's study room. It is battery-operated and gives sufficient light for the child to move out of the room when power fails. The white LED in the circuit automatically turns on when light in the room goes off following a power cut. The LED gives a flashing light instead of glowing continuously to reduce power consumption.

The circuit comprises a light sensor and an LED flasher designed around CMOS IC CD4093 (IC1). The light sensor switch comprises a light-dependent resistor (LDR) and npn transistors T1 and T2. When ambient light is present, the low resistance of LDR1 drives transistor T1 into conduction. This keeps transistor T2 cut-off due to low base bias. The flasher circuit does not get power as long as ambient light falls on LDR1. When the resistance of LDR1 becomes high in darkness, transistor T1 stops conducting and transistor T2 starts conducting to turn on the LED lamp.

IC1 is designed as a simple oscillator using its gate 1 (comprising input pins 1



and 2 and output pin 3). The oscillator's external components comprise resistor R2 and capacitor C1. Diode D1 and resistor R4 help in rapid charging of capacitor C1. When capacitor C1 charges to around 50% of Vcc, output of gate 1 of IC1 goes low to discharge capacitor C1. The output from pin 3 of IC1 again goes high to charge capacitor C1 again. This cycle repeats and sets up an oscillation, which is given to

gate 2 (comprising input pins 5 and 6 and output pin 4) of IC1. Gate 2 serves as a buffer to drive the white LED (LED1).

For the given values of resistor R2 and capacitor C1, the flashing rate of LED1 is one per second (1 Hz). It can be increased by decreasing the value of capacitor C1. Pin 14 of IC1 is Vcc and all the unused input pins are tied to the positive rail (pin 14) to prevent floating.

The circuit can be constructed on a small veroboard. Use a reflective holder for LED1, which should be directed downwards at an angle of 45 degrees to prevent direct viewing of LED1 which gives a high-intensity light that is harmful for eyes. Preset VR1 can be adjusted to control the sensitivity of LDR1.

You can enclose the circuit in a plastic doll with LED1 as its headlamp to make it an attractive gadget for your child. Mount LDR1 such that ambient light falls on it directly.