# STAIRCASE LIGHT WITH AUTO SWITCH-OFF


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We are all familiar with the electrical wiring arrangement that connects an electrical bulb with two switches: one at the bottom of a staircase and the other at the top. Wiring is done such that either of the two switches can be used to switch the bulb on or off. In such a wiring arrangement, while climbing up the staircase which is in dark, the switch located at the bottom of the staircase is used to switch on the light. After you have climbed the staircase, you use the switch located there to switch off the light.

The circuit presented here is an electronic-cum-electrical arrangement to get a similar facility as provided by the hard-wired electrical system, but you need to operate the switch only once. Whereas in the hard-wired arrangement if you forget to switch off the light once you have traversed the staircase, light would remain 'on,' wasting energy.

In this circuit also, we have two micro-switches—one located at the top and the other located at the bottom of the staircase—that can be pushed and released easily during climb-up from the bottom of the staircase or climb-down from the top of the staircase. With every push and release of either of the two switches, bulb L1 lights up for a preset time period of, say, 40 seconds, which is considered adequate for climbing up or going down the staircase. The bulb goes off automatically after the set 40 seconds. You can change this 'on' time by changing the values of resistor R7 and/or capacitor C4 depending upon your requirement.

Switches S1 and S2 are the two micro-switches, which provide low inputs to the respective de-bouncing circuits. Each de-bouncing circuit is built around two NAND gates connected back to back. The de-bouncing circuits ensure a clean, bounce-free pulse at the output every time the micro-switch is pressed and released. The outputs from the two de-bouncing circuits are ORed using diodes D1 and D2 (1N4001). So every time you press and release either of the micro-switches, you get a positive-going pulse at the junction of the cathodes of diodes D1 and D2.

These pulses are used to trigger the monostable circuit built around timer IC2. On the trailing edge of the pulse, the output of the monostable goes high for a time period of 40 seconds. This drives relay-driver transistor 2N2222 (T1) wired as a switch. Relay RL1 gets energised and closes N/O contacts of the relay, wired in series with the mains and the bulb (L1). Bulb L1 switches off when the relay gets de-energised after 40-second pulse period. Free-wheeling diode D4 (1N4001) protects transistor T1 against transients during relay switch-off operation.

The circuit operates off a 9V battery, which gets connected to the circuit through 'on'/'off' switch S3. You can also use regulated 9V power supply. Assemble the circuit on a general-purpose PCB and house in a small box. Connect micro-switches S1 and S2 near top and bottom of the staircase through flexible wires and bulb in the middle of the staircase. ●