16-WAY CLAP-OPERATED SWITCH

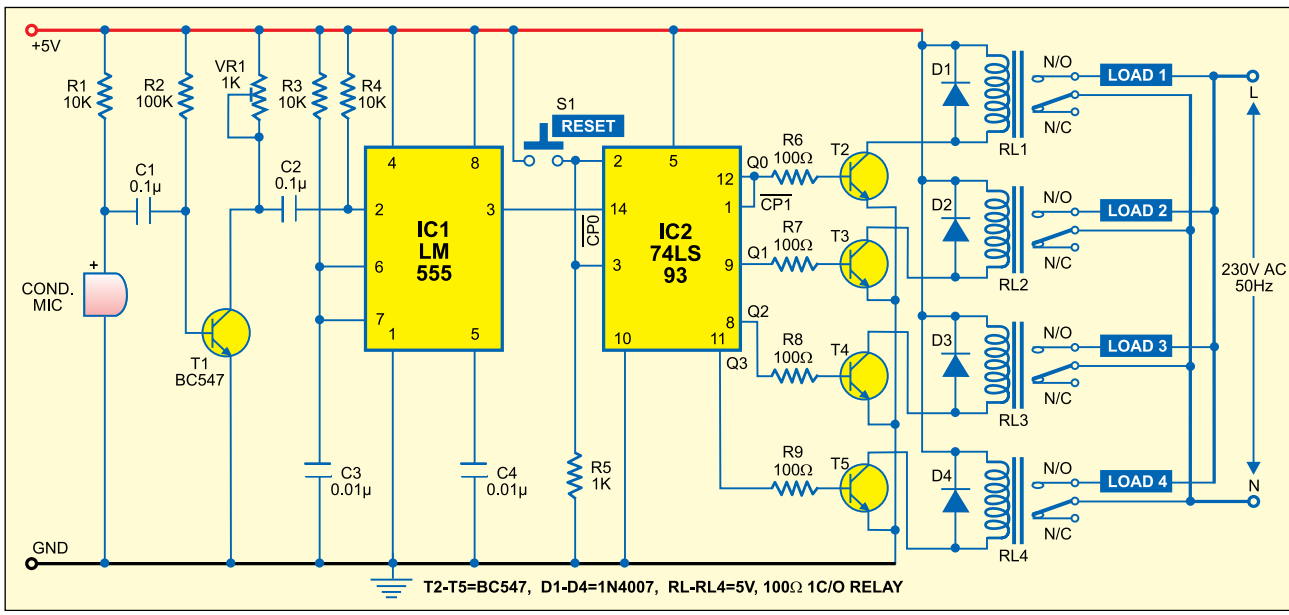
■ **RAJ K. GORKHALI**

Control your home appliances without getting out of your bed. You just have to clap in the vicinity of the microphone used in this circuit, which you can keep by the bedside. You can switch on/off up to four different electrical equipment (TV, fan, light, etc) in 16 different ways.

This circuit is built around timer IC 555 (IC1), CMOS IC 74LS93 (IC2) and five BC547 npn transistors (T1, T2, T3, T4 and T5). Transistor T1 is used as the preamplifier and the rest are used for driving the relays.

A small condenser microphone is connected at the base of transistor T1, which is biased from resistor R1 (10 kilo-ohms). The clapping sound is converted into electrical energy by the microphone and amplified by transistor T1. The transistor output is fed to the monostable circuit wired around IC 555. Output pin 3 of the timer is connected to the clock input of divide-by-16 IC 74LS93.

The outputs of IC2 are fed to npn transistors T2, T3, T4 and T5 via 100-ohm resistors to drive relays RL1, RL2, RL3 and RL4 connected to appliances 1 though 4, respectively. Freewheeling diodes D1 through D4 connected across the relays protect the transistors from the back electromagnetic field (e.m.f.) produced by the relays.



Output of 74LS93

Number of claps	Q0	Q1	Q2	Q3
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	1	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

Note:1. '1' indicates high logic.'0' indicates low logic.
2. At high logic, the corresponding transistor conducts to energise the corresponding relays and activate the load.

The output states of IC 74LS93 (Q0 through Q3) for different numbers of claps are shown in the table.

The circuit is powered from regulated 5V DC. For testing the circuit, disconnect the resistors from the outputs of IC2 and connect four LEDs in series with 220-ohm resistors between the outputs and ground. Now switch on the power supply and clap near the microphone. You can see the four LEDs glowing in the manner shown in the table. A reset push switch is provided to switch off all the 'on' devices.

Now you can connect the desired appliances to the relays and control them with your claps. ●