

Piggyaxe Touch-On, Auto-Off Controller



Electronics is FUN – so let's build a Touch-on-Auto-off control circuit!

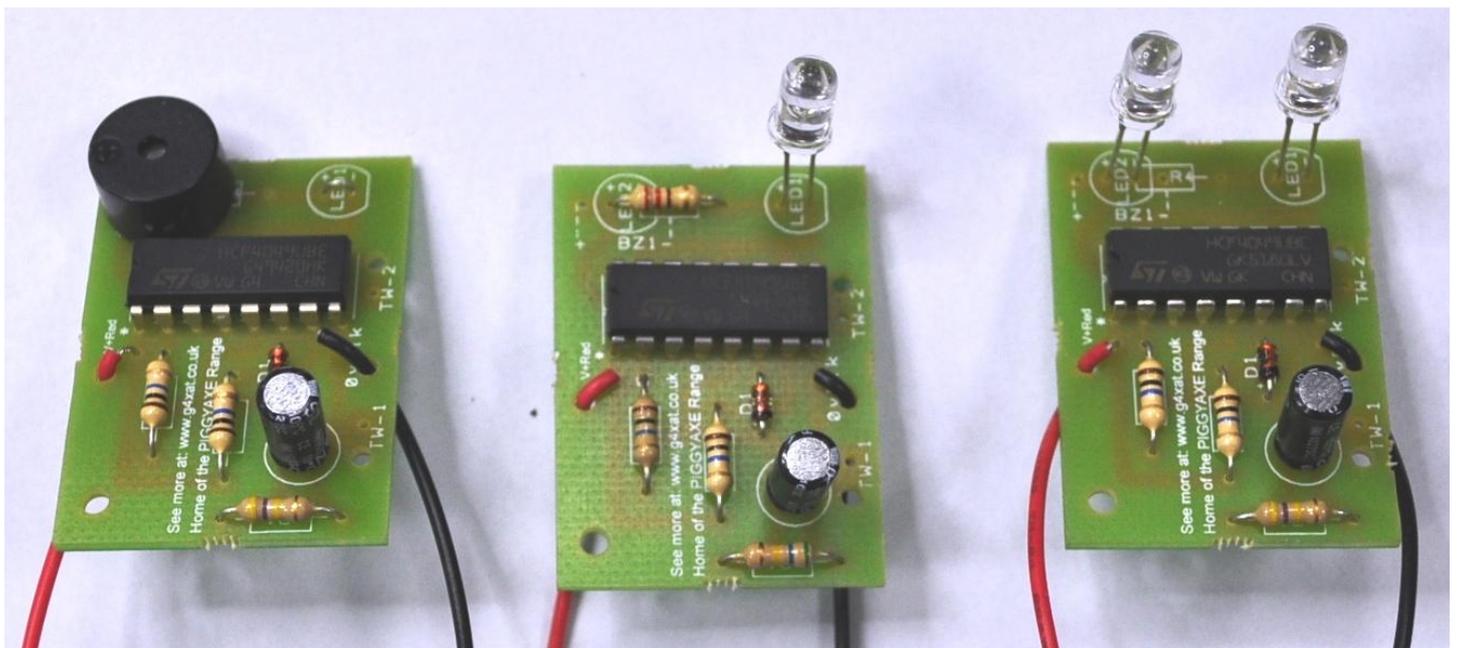
This circuit provides touch-control of a buzzer, or 1 or 2 LEDs. When the circuit is switched on by touching, the buzzer or LED(s) will stay on for a certain length of time. The time delay can be up to 90 seconds – increase R1 to 4.7M Ω and/or increase C1 to 100 μ F if desired.

Decide which form of output you want (buzzer only, buzzer with one LED, one LED or two LEDs). See the pictures of the versions below. Then collect the following parts (Available as a Rapid Electronics kit, order code 70-1055 plus buzzer and/or LEDs):

CMOS 4049 DIL CMOS Chip, PP3 battery snap, PCB, D1: 1N4148, C1: 1 μ F 50V capacitor, R1: 470k Ω resistor (yellow-purple-yellow-gold), R2 and R3, 10M Ω resistor (brown-black-blue-gold) and R4 (if using one LED), 47 Ω resistor (yellow-purple-black-gold). If you are using 2 LEDs or the buzzer you can leave out R4. If using the buzzer you can include a single LED, otherwise insert a short wire link (like a resistor lead off-cut) across the LED1 holes.

You will also need: a soldering iron with a stand and a wet sponge, a PCB holder of some sort, some solder and a pair of side cutters. Remember soldering irons can burn you. You should wash your hands after handling solder.

Take great care to fit the components exactly where they are supposed to go, otherwise your circuit may not work as expected. Use the photograph below to help you place the components correctly.



Put a tick in each box as you solder in each part or if you prefer, get someone to check your placement before you solder it. **CHECK TWICE – SOLDER ONCE!**

Resistor R1 Resistor R2 Resistor R3 Diode D1(+) Capacitor C1(+/-)

Microchip 4049 – make sure the indent at one end matches the outline on the PCB

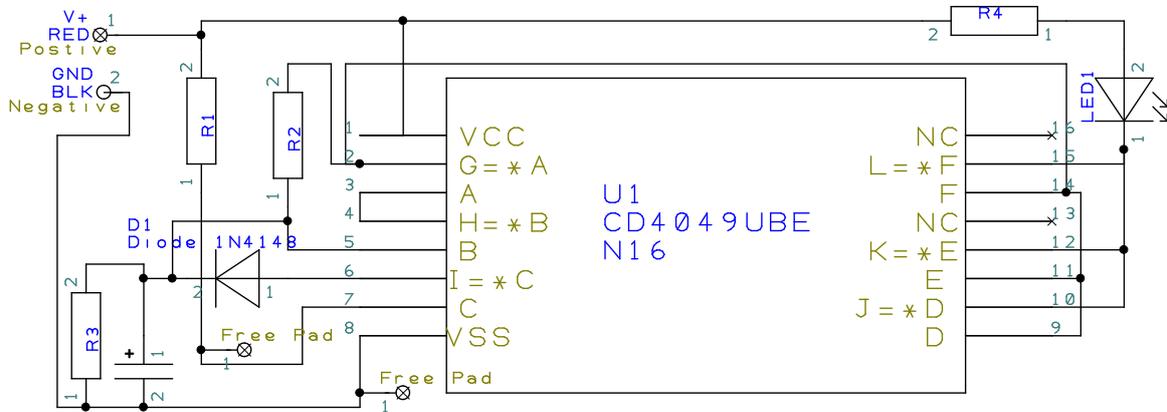
Decide on your output device – buzzer, buzzer and LED or LED(s). You may also need to fit a single wire link

Next fit two flexible wires to each TW1 and TW2 – these wires go to the two touch pads that you intend to use – brass drawing pins work well and are easy to solder the wires to.

Finally fit the RED and BLACK wires up through the stress relief holes then down into the PCB and solder

Now carefully check your soldering for errors (missed joints or solder splashes). If it looks OK, connect up to a PP3/MN1604 (9 volt) battery. 4x AA batteries (6 volts) in a suitable holder (e.g. Rapid order code 18-0115) will also work well. The buzzer and / or the LED(s) should light when you touch between the two pads with a finger, or between hand and hand in the case of the steady hand game.

TIP! Remember you can bend the legs on the LEDs to change the spacing of them if you want. Bend **then** solder. Or fit them into the holes in your design first to check, and solder them in place.



The circuit diagram shows the most basic version of this circuit – driving a single LED via a current limiting resistor. As you will see by looking at the three different build options, the PCB is set up for driving a transistorised buzzer, a single LED or two LEDs.

When used with the buzzer, a short wire link (use a resistor lead off-cut) needs fitting where LED1 is marked.

When Free Pad 1 and Free Pad 2 are linked by your fingers, the first logic gate changes state and charges the capacitor via D1. This logic 'high' is taken as a drive signal for the simple bi-stable formed by the next two gates. The output of these two gates drives the remaining 3 gates in parallel, so providing sufficient drive to power the buzzer or LEDs. Depending on the power supply used (6V: 4x AA cells, or 9V: a single PP3 battery) this handy little circuit has a multitude of applications. Longer time delays can be achieved by raising the value of R3 and/or the value of C1. The time delay is very approximately $0.7 \times R \times C$, but larger values of C (which will usually be electrolytic) tend to leak more charge. 'Select on test' if it's not quite what you need.