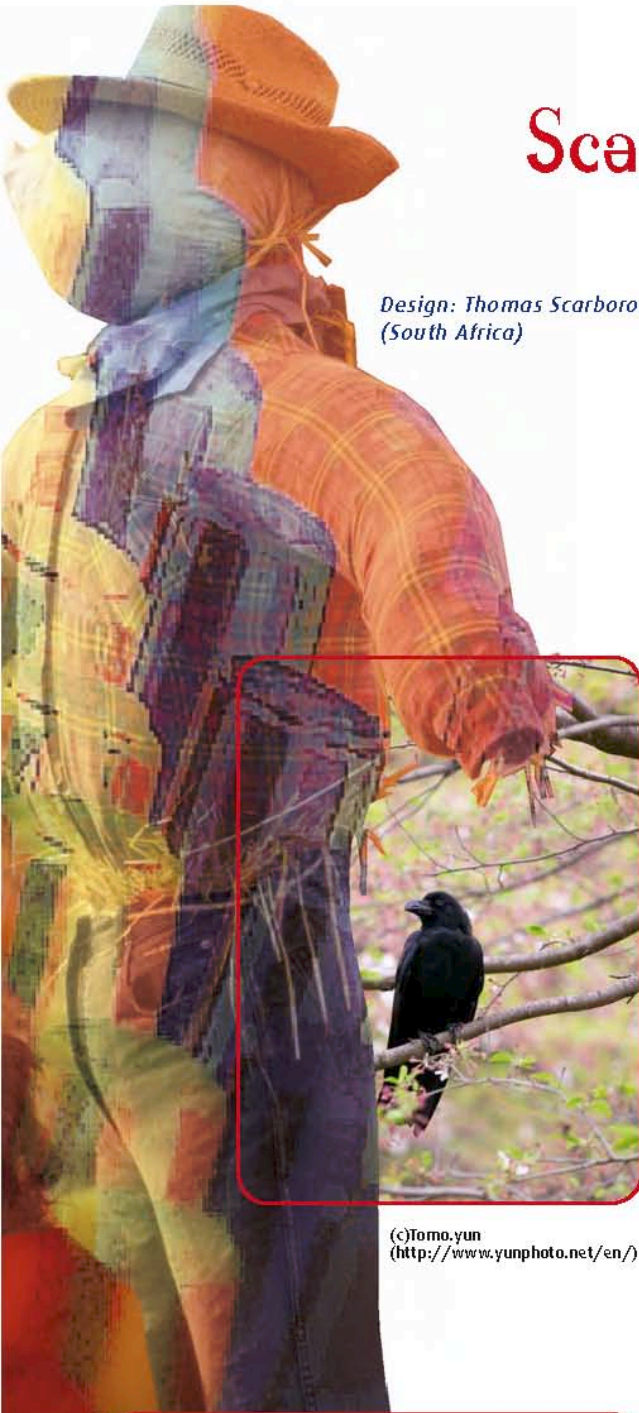


Scarecrow

Design: Thomas Scarborough
(South Africa)



(c)Tomo.yun
(<http://www.yunphoto.net/en/>)

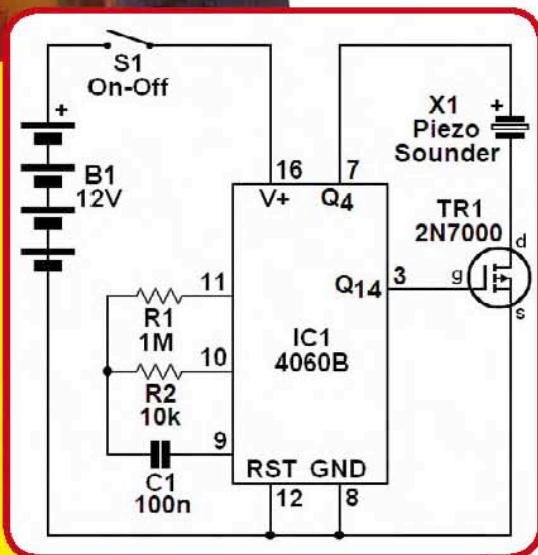
Take a look in any back garden and you are likely to see evidence of the affection we hold for garden birds. Bird feeders and bird baths draw them into the garden in the depths of winter when their usual foodstuffs have long since fallen from the trees and lie frozen in the soil. Even in the summer months bird tables are scattered with old crusts and sunflower seeds to provide a snack for the summer visitors and some people (probably falsely) interpret birdsong as some sort of a thank you from our feathered friends. Anyone who tends a fruit and vegetable garden may have a slightly less welcoming attitude toward them; in the sowing season they eat seeds and nip off the tips of new shoots. At harvest time they take fruit that we were hoping to eat ourselves.

As any hobby gardener will tell you, some form of scarecrow can be useful at certain times of the year to protect the crops. You sometimes see a traditional scarecrow stuffed with straw and wearing last years cast-offs standing in the middle of a farmer's field. You will probably also have noticed that after a few days the crows find that this new structure makes a useful lookout post where they can perch and contemplate the breakfast laid out before them. No matter how closely the scarecrow may resemble Ozzy Osbourne, birds quickly learn that static structures pose no threat. A much more effective strategy is to use sound energy. The sudden sound of a shotgun will set all birds in earshot up into the air, and many commercial bird scarers use this effect.

The author has suggested this very simple circuit which periodically produces a loud sound to scare birds. The design consumes very little power and uses a common integrated circuit and a piezo sounder. Despite its simplicity, field trials have shown that the device is effective: birds simply flew away when the unit was switched on. After some time the birds did however return, it seems like they eventually become accustomed to almost any disturbance. Anyone living close to a vineyard will know that the farmer only sets out bird scarers as the grapes begin to ripen so that by the time the birds have become tolerant of the noise most of the crop will already have been harvested.

The heart of the circuit is a CMOS counter type 4060B (IC1). This chip contains a clock generator circuit which only requires two external components R1 and C1 to set the frequency of oscillation. The clock is connected internally to a 14-stage binary counter with each stage dividing the frequency of the previous stage by two. This circuit uses outputs Q4 and Q14 giving division ratios of $2^4 (= 16)$ and $2^{14} (= 16,384)$. With the values given the output signal from Q14 is around 1 Hz. This frequency is not audible but is used here to turn TR1 and with it the piezo sounder on and off. The circuit periodically produces a loud screech. If necessary the piezo sounder X1 (the type without any internal electronics) can be replaced by a small piezo tweeter unit to increase the sound level.

The whole circuit can be powered by primary cells but if the unit is going to be used for longer than about one week it is better to use a high capacity rechargeable battery. The circuit can also be expanded by adding a Light Dependent Resistor (LDR) so that it turns off at night. Remove the connection to ground on pin 12 and connect instead an LDR between pin 12 and ground. Connect a 10 kΩ (or thereabouts) trimmer between +12 V and pin 12, now adjust the trimmer so that the circuit shuts down as evening approaches.



2N7000



4060B

