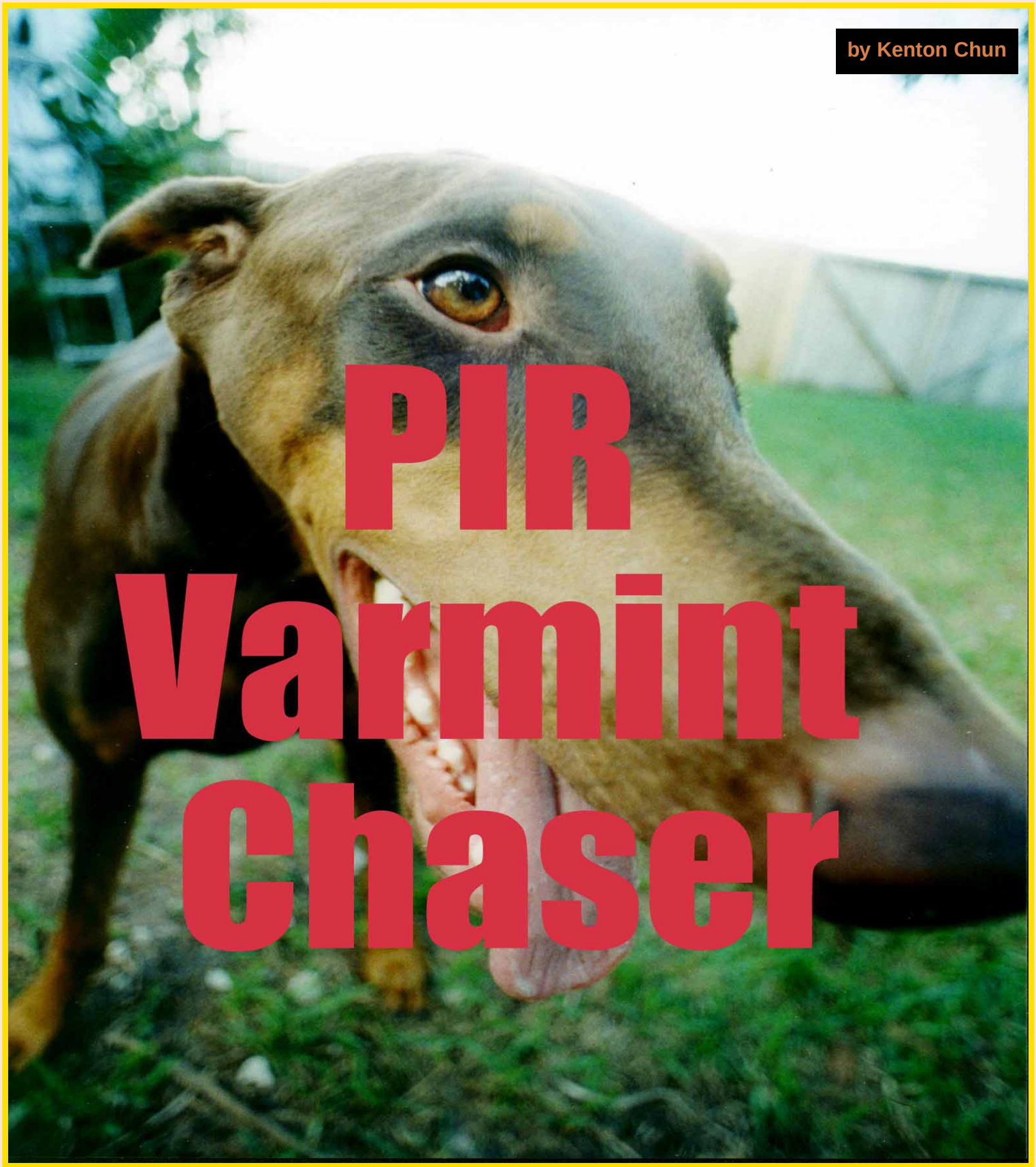

PIR Varmint Chaser

by Kenton Chun

Unless you live in a condo, you probably have had problems with varmints in your yard at one time or another. It may be stray cats or dogs, or even the occasional unwelcome solicitor! In addition to rabies, varmints are known to carry and transmit infectious diseases and are a transport vector for blood sucking parasites and hitch hiker weeds.

Of course, it is unlawful and inhumane to resort to violent measures, and trapping and relocating varmints will not work in the long run because the varmint population is actually dependent upon the available food supply in the neighborhood.

Well-intentioned, but misguided "feeders" will tend to support a permanent population of stray animals. Removing the varmints will only leave a vacancy for others to take their place.

No varmint likes to get wet. Survival depends on retaining body

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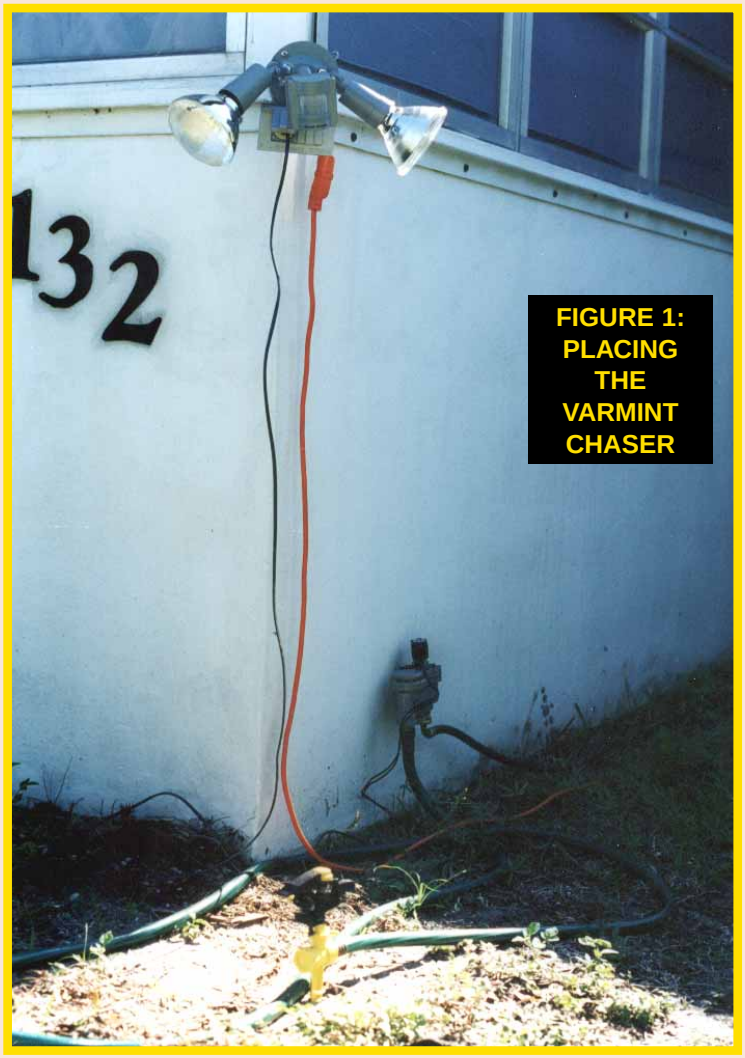

FIGURE 1: PLACING THE VARMINT CHASER

heat so dogs, cats, and other wild animals have an instinct to avoid being soaked.

This month's project will use a Passive Infrared (PIR) sensor to trigger open a solenoid valve which, in turn, is connected to a common yard sprinkler. When aimed at the area you wish to protect, varmints will steer clear!

The local chapter of the ASPCA confirms that this is an acceptable and humane method of deterring trespassing strays. Stray animals usually possess enough intelligence to realize when they are not welcome. The PIR varmint chaser will drive the point home without hurting them and may result in a greener lawn as well!

Passive Infrared (PIR) detectors have recently become cheap and plentiful. Advances in logic circuitry and infrared lensing systems have made them remarkably reliable and immune to false alarms. Most PIR sensor technology has been applied in automatic home lighting and commercial alarm systems.

These are sensing systems that sense the presence of a warm-blooded entity and turn lights or alarms on in response. PIR detectors actually sense changes in far infrared, at frequencies associated with heat.

A typical PIR sensor consists of a comparator amplifier that is looking at the outputs of a reference voltage source and an infrared detector diode. After a settling period, the voltages are static and the detector is armed. When something warm like a raccoon, a person, or even a warm car hood passes in front of the detector, the voltage fluctuates.

A plastic Fresnel lens designed to focus the infrared on the detector will modulate the signal as the target moves. If the sensing circuitry decides this is a valid event, a relay is triggered into an "on" state.

Usually the relay is connected to lighting which turns on as the intruder is detected. In the case of potential burglars, the lights coming on is usually enough of a deterrent to stop the advance. In the case of varmints, more convincing may be necessary.

Most varmints are nocturnal. They tend to patrol their perceived territorial boundaries (your yard) at night. This makes the PIR detector ideally suited for detecting and deterring nighttime prowlers.

Getting Started

The heart of the project is a commercially-available PIR lighting assembly. You can also use a PIR detector available from parts suppliers in this publication. Check the advertiser section for sources. PIR light assemblies can also be obtained from your local mega-hardware store. They come in various configurations, but the one we're looking for does not have to be an expensive model.

Higher cost models have light sensors built in so that they absolutely will not come on during the day. Bear this in mind if you want the unit to chase varmints all day, as well as all night.

Look for one that is rated for outdoor use — it should come complete with a weatherproof fixture and junction box suitable for use in damp locations.

You will also need a automatic sprinkler solenoid-operated valve. These normally closed valves are used to control branches of underground sprinkler systems. They typically come in one of two voltages, 24 VAC and 117 VAC models. If you decide to use the 24-VAC version, you will also need a 24 VAC transformer or wall wart.

Wire the passive infrared detector according to the manufacturer's instructions. AC wiring conventions are different than DC conventions! In home AC circuits, the black wire is hot, the white wire is neutral, and the ground wire is green. Remember, "Black Is Dead."

In order to make the unit portable, I wired the PIR assembly to a standard grounded outlet box attached directly to the lamp assembly. If you are using correctly polarized plugs, the narrow plug slot is the hot one.

Make sure to cut the power at the breaker box before opening any junction boxes, or working on house circuitry. House current can be lethal. Do not cheat – connect all grounds.

It is suggested that you go ahead and wire in the outdoor lamp assemblies according to the manufacturer's instructions. The switched hot lead from the detector will be red (Figure 3). Wire the outlet to the red (switched hot) and white (neutral) wires.

You may decide not to use the lamps, but we have discovered that stray animals will begin to associate getting soaked with the light coming on and eventually will flee in response to only the light!

Wire the solenoid valve with five or 10 feet of 14-18 gauge outdoor wire, or extension, if you are using an outlet box. This will give you some latitude for locating the water supply away from the lamp assemblies. When the assembly is complete, it should look something like (Figure 2).

Mount the PIR assembly on a "C" clamp so that it can be attached to any stable object in the

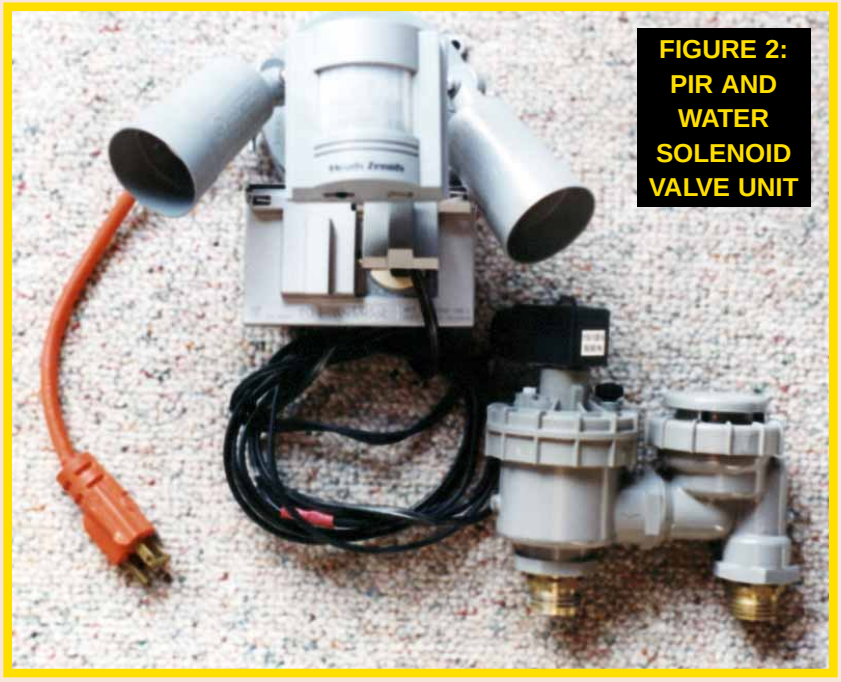

FIGURE 2: PIR AND WATER SOLENOID VALVE UNIT

Passive Infrared Varmint Chaser

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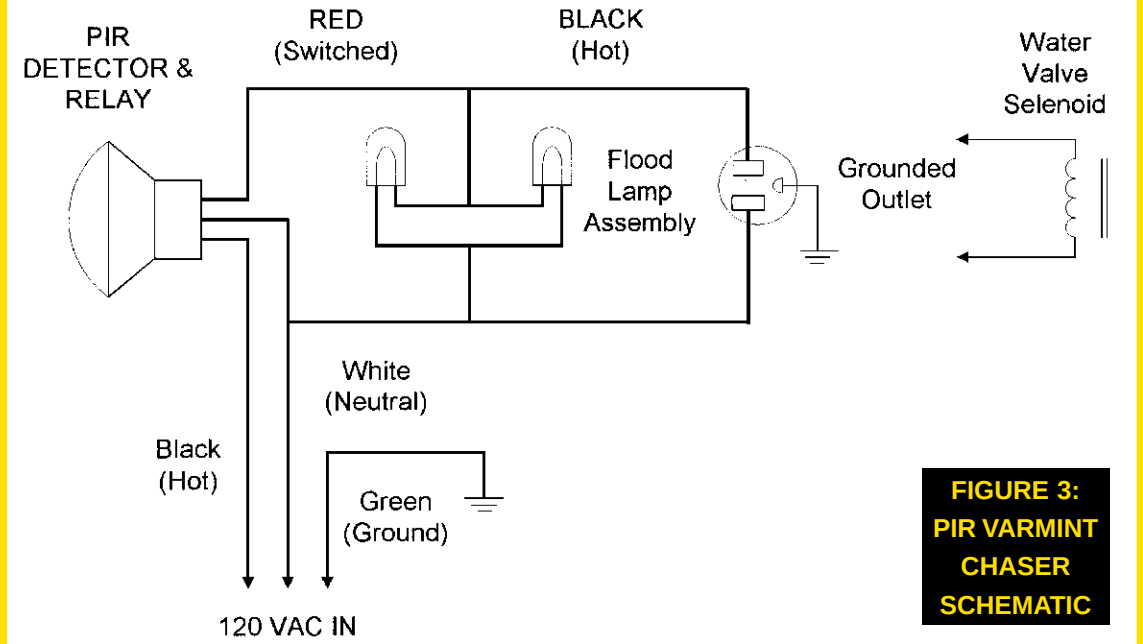

FIGURE 3: PIR VARMINT CHASER SCHEMATIC

vicinity to be protected. The solenoid valve does not have to be attached to anything. Finally, using double-female washing machine supply hoses, connect the input of the solenoid valve to your hose bib, and the output to a garden sprinkler.

We have found that the most effective sprinklers are the spring-loaded impulse clapper type, or the whirling turbine type. These have quick start-up and are fairly noisy, which helps to startle the intruders.

It would be a good idea to power the project with a GFCI-protected outlet or branch circuit breaker since water is involved. If you are using the 24-VAC version of the solenoid and have the transformer located well away from the PIR and water supply, the arrangement is pretty safe as it is.

Placing the Unit

Place the unit in an area that varmints are known to frequent. Study your varmints — they will usually enter and exit your property through a consistent path of least resistance. The best arrangement is pointing down a long pathway that is typically used by varmints to enter your yard.

Next, position the sprinkler 20 feet or so ahead of the PIR sensor. Impulse-type sprinklers usually have a stake attached so that they can be conveniently placed at different locations on the lawn. You will have to adjust the position of the stake and the pattern of the sprinkler to cover the area you wish to protect (Figure 1).

Finally, power up the PIR light assembly and turn on the water. The sprinkler may start up if the PIR model you have selected goes through an initialization cycle. Set the sensitivity so that the unit is not triggered by passing cars, or neighbors hanging out laundry.

Usually the duration can be set to anything under one minute. It would take a fairly stubborn varmint to wait around any longer than that. Even if that is the case, the unit will catch them when they advance again.

Conclusion/Alternate Applications

The PIR Varmint chaser is a humane method of deterring strays from using your yard as their personal litter box. The yard will look a lot better as well. If you do not have a varmint problem, the project is easily adapted to trigger on a video camera for video surveillance, a scary music tape for trick-or-treating Halloween goblins, or even a camera for nighttime photography of wild animals. I have used the PIR varmint chaser for all of these purposes with great success.

Use your imagination to think up new uses for the PIR varmint chaser, and remember to have fun, whatever you do! **NV**

Parts List:

- **PIR Sensor & Lamp Assembly (See Text)**
- **120 VAC Solenoid Normally Closed Sprinkler Valve**
- **F-F Washing machine Supply Hose**
- **Impulse Sprinkler (See Text)**
- **20' Outdoor Extension Cord**
- **C-Clamp**
- **Assorted crimp connectors, hardware as needed**

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