

Smart 12 volt light dimmer

John Hooper describes his entry into the Trace C40 load controller competition. While a light dimmer may seem a bit passé, this one has an interesting feature designed to save energy

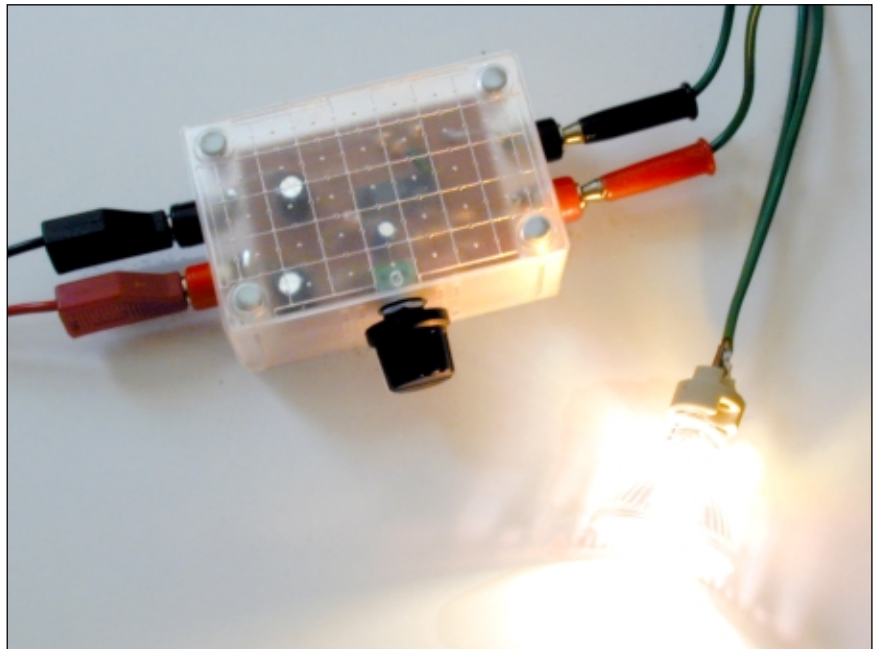
Many lighting circuits use light dimmers, but they rely on the light level being set manually by the operator. A far more efficient system is to have the dimming circuit measure the ambient light level and adjust the brightness of the lights accordingly. This helps to maintain an even light level in the room, and save energy in the process by not running the lights unnecessarily.

The circuit I designed to accomplish this task is described here. It has the following features:

- saves energy when sun the comes out
- compensates for supply voltage variations
- can control up to a 50 watt load
- high efficiency
- light output is variable between 0 and 100 per cent
- it operates from a safe 12 volt supply
- it uses less than 20 components, costing around \$15.

How it works

The circuit uses pulse width modulation to control the power going to the lamp. It does this by switching it on and



The automatic dimmer will control up to 50 watts worth of halogen lamps in order to maintain a consistent light level in a room.

off at a rate too fast to be perceived by the human eye.

The switching is done by a power MOSFET, Q1. The switching frequency is set to around 200Hz by the oscillator circuit, based around U1a. The output waveform of this oscillator is almost sawtooth in shape.

Light intensity is measured by the light dependent resistor (LDR1), and the dimming level is set by the control potentiometer, VR1. The desired light level and the measured light level are compared and the comparator, based around U1b, adjusts the power in the lamp until they are equal via the MOSFET driver, U1c.

