

A Modified Motion Detector



Figure 1: Image of a modified infrared motion detector.

The infrared motion detector used to assess occupancy patterns within a space is a simple, off-the-shelf, battery-operated device typically used as a door chime/alarm similar to the sensor one might trigger when walking into a store. The PEC has modified the motion detector for use with a HOBO logger or ACR Smartreader 7. This is a simple procedure that enables an inexpensive occupancy sensor to send a voltage signal to a datalogger.

How the Motion Detector Works

The motion detector model has two operating modes: *chime* and *alarm*. In chime mode, the device sends a short voltage signal to the speaker when it senses motion. In alarm mode, a voltage signal is sent to the speaker for 30 seconds when it senses motion. For this application, the chime mode is set. The circuit has a capacitor that is charged by the voltage signal from the motion detector. The capacitor is instantaneously charged to about 7 volts and then leaks current over a ten minute period. This takes a voltage reading across the capacitor and deduces if a motion "hit" occurred since the last voltage reading.

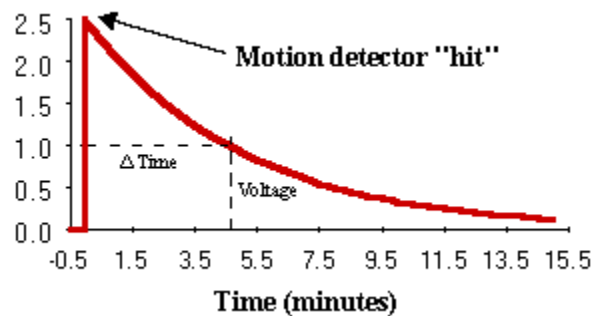
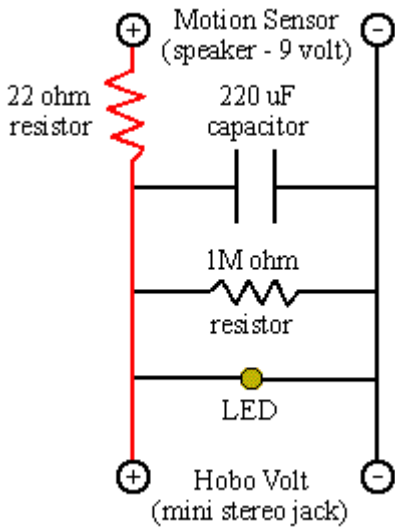


Figure 2: Graph of voltage discharge of occupancy sensor capacitor

Figure 2 shows the voltage as measured by the HOBO logger after a motion "hit" at time=0. The voltage drops logarithmically and the voltage at any particular moment is a function of time since the last "hit." For example, a reading of 1 volt indicates that the space was occupied 4.5 minutes prior to the time of the reading.



Use this diagram to make similar 9-volt motion detectors output a 2.5 volt signal instead of sounding an alarm.

The circuit in **Figure 3** is placed between the motion detector output (formerly connected to the speaker) and the HOBO logger (via a 1/8" phono jack). Proper operation is indicated by an LED mounted on the face of the sensor. The resistor and capacitor produce a 2.5 volt signal.

Figure 3 Wiring diagram for modifying an occupancy sensor