

USB MOTION DETECTOR



Turn your PC into an ambush multimedia presenter. By Ken Delahoussaye

Gone are the days when people's interest could be held by simple radio or television. Today we're bombarded with information and we crave interactive experiences that don't waste a single second of our time. Advertisers recognize the difficulty of presenting messages that cut through the clutter, and they've come up with creative ways to capture our attention.

One example: the multimedia kiosk, now common in shopping malls, movie theaters, and airports. Complete with an internal computer, sound card, and video graphics monitor, these dazzle stations can be a powerful advertising tool — especially when they have motion detection circuitry that triggers a video presentation at the precise moment an unsuspecting patron comes near.

This article explains how to construct a USB motion detector that will give your computer this

hey-you ability, using a free Windows presentation applet I wrote, USB Multimedia Presenter, so that you can start your own kiosk advertising campaign. You can also use the setup for practical jokes, or just to amaze or amuse your friends.

To interface between the detector and computer, I used an off-the-shelf USB device which requires no drivers to install, since it uses existing Windows drivers. The detector draws all the power it needs from the computer, which further simplifies things. All the parts for the project are easy to find, and if you have basic soldering and mechanical skills, you can put it together in a single evening.

Connect the Detector to the USB Interface

Drill a $\frac{3}{16}$ " hole in the top of the motion detector enclosure, to accommodate the USB cable. Center

MATERIALS

Passive infrared motion detector DSC's Digital Bravo BV-300DP has room enough to fit the other components inside its case. Available from the Home Security Store, homesecuritystore.com.



USB interface with cable USBmicro part #U421, usbmicro.com

DC/DC converter, 5V to 12V I used the Cincon EC1SA02N, Mouser Electronics part #418-EC1SA02N, mouser.com.

1kΩ resistor Mouser #291-1K-RC

22-gauge signal wire aka hookup wire, various colors
Double-sided mounting tape

Windows PC running free USB Media Presenter software Download it at kadtronix.com/downloads/usbmediapres10setup.zip.

Audio and video files for presentation

TOOLS

Soldering iron and solder

Antistatic wrist strap aka ESD wrist strap or ground bracelet

Wire strippers

Small cable tie

Screwdrivers: Small flat-blade and Phillips

Drill and 3/16" drill bit

Multimeter

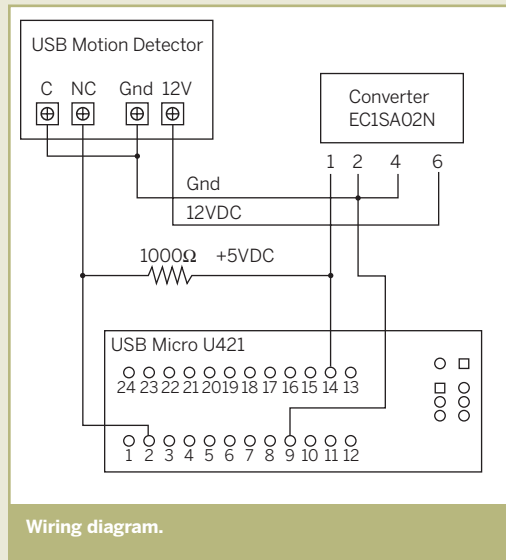
the hole on the seam where the 2 halves of the enclosure meet. Do not let the drill bit penetrate more than 1/2" inside the unit, as this can damage internal components (Figure A).

To open up the detector, first unscrew the retaining screw, if the unit has one. Then firmly grasp the unit in your left hand and use your right hand to pull the halves apart while gently pushing down on the retaining tab with a small flat-blade screwdriver. Set both halves aside.

At this point you'll start handling static-sensitive electronic components, so you are strongly advised to wear an antistatic wrist strap clipped to a suitable electrical ground. This will protect the components from damage from electrostatic discharge.

Use a Phillips screwdriver to remove the screw that holds the detector's printed circuit board. Carefully remove the PCB and set it aside.

Solder short (2") lengths of signal wire following the project wiring diagram (above) to pre-wire the USB interface, DC voltage converter, and 1kΩ



Wiring diagram.

resistor. Note that the 4 pins of the SIP package version of the DC converter are numbered 1, 2, 4, and 6, to match the pin numbering on other versions of the component. Leads run from terminals 9 and 14 of the USB interface PCB to pins 2 and 1 of the converter, respectively. Pin 1 of the converter connects to the resistor, and pins 2 and 4 connect together. Solder leads to converter pins 2 and 6, and connect another lead from USB PCB terminal 2 to the unconnected end of the resistor, but leave them loose for now (Figure B); we'll attach them when reinstalling the detector PCB.

Arrange the pre-wired components inside the detector case, and secure them to the back shell with double-stick mounting tape. Be careful not to obstruct the area where the detector PCB will be reinserted. The components should fit just under the detector PCB without making contact (Figure C).

Now, reinstall the detector PCB and secure it with the small original screw. Complete the wiring as shown in the wiring diagram: USB PCB terminal 2 and resistor to terminal NC, DC converter pins 6 and 4 to 12V and Gnd, and terminal C bridged to Gnd (Figures D and E). The PCB has screw terminal blocks, so you don't need to solder. The NC (normally closed) and C (common) terminals serve as a switch that turns things on and off, and the USB interface routes this signal to the computer.

Close the detector case back up; that's it for the hardware!

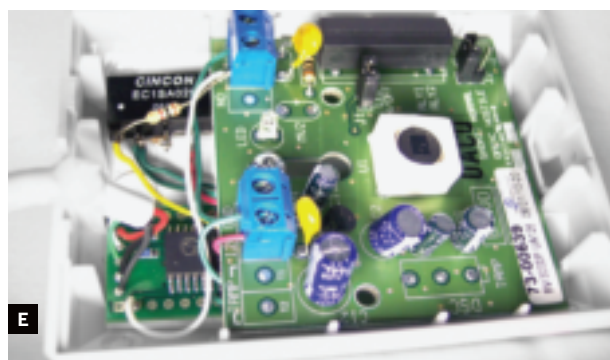
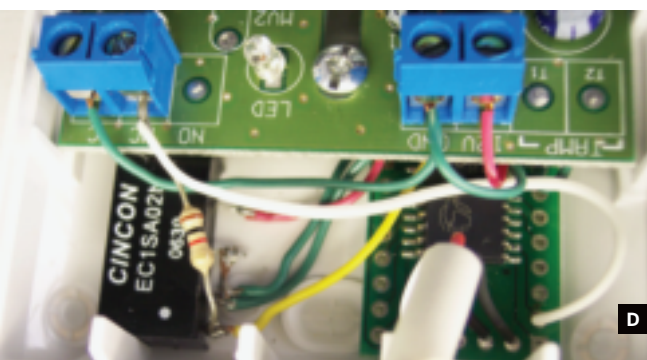
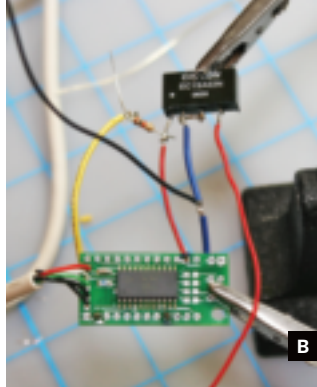


Fig. A: Drill the cover for the USB cable. Fig. B: Wires and resistor connecting the USB interface and voltage converter. Fig. C: Position the components under the detector PCB, without making contact.

Fig. D: The wire connections to motion detector PCB terminal blocks. Fig. E: The finished circuit with the motion detector PCB back in place.

Configure the Software, and Run with It

The software, USB Multimedia Presenter, builds a playlist with all the audio and video files in a specified folder. Then, each time someone comes near the detector, it randomly selects and plays one of them. To get started, download the application from kadtronix.com/downloads/usbmediapres10setup.zip onto your PC, then unzip it, install, and launch.

In the Configure box, choose a folder on your system containing the media files you want to trigger; this defaults to the C:\WINDOWS\MEDIA folder, which is ideal for testing purposes if you don't have a specific playlist already.

Test the software by clicking Start, with the Use Trigger Device box unchecked below. This will shuffle-play the files in "demo mode," with a set delay between each.

Now let's put the system together. Plug the motion detector into the computer and position it in a direction that will detect movement. To eliminate false-positive triggerings, you might strategically limit its field of view. My detector picked up on adults moving up to 15 feet away.

In USB Multimedia Presenter, check Use Trigger Device at the bottom of the pane, then click Start.

You're up and running. The Device Activity Indicator should flash from green to red when motion is detected. Approaching visitors will be amazed as your presentation magically begins for them.

Create a Presentation

For the presentation itself, you can do anything you want. Brightly colored graphics, flashy animations, and special effects are always effective eye-catchers, and once you've got an audience, the content must hold their interest long enough to convey the message.

There are many other possible uses for the system. Once, I set the detector up just outside my front door, so that the computer would alert me when a visitor approached. Another time, I set it up to play a .wav audio of a shattering window. For added effect, I turned up the volume on my computer speakers. Whenever the trigger occurred, it had everyone in the house running around looking for broken glass.

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