How to build a Digital Trail Camera using the PixController DigitalEye™ Trail Camera Kit

Getting Started

This tutorial will cover the building of a digital trail camera from start to finish. In this example we will construct a digital trail camera using the PixController DigitalEye™ Trail camera kit you can purchase from http://www.pixcontroller.com. This kit will include all you need to build this project less the digital camera and a few small consumable items as glue. In this kit will use a modified Sony DSC-S600 digital camera, however, this kit will work with the other Sony cameras such as the DSC-P32, DSC-P41, and DSC-S40.

You will need to modify your digital camera for remote shutter control. For a list of PDF instruction files on how to modify these please visit the www.pixcontroller.com web site and look under the "Technical Information" -> "Camera Modification PDF's" link.

Building this kit will require basic hardware skills such as laying out the case for drilling & drilling the holes, and basic soldering skills. Note: modifying the digital camera for remote shutter requires more advanced skills. If you do not feel you have the skills to accomplish these tasks you should find a skilled person to help you. ***PixController, Inc. is not responsible for any damage made in building this kit or modifying the digital camera.***

We will take you through this tutorial in 5 easy steps (listed below). Let's get started!

Tools Used:

- Soldering Iron
- Wire Cutters and Wire Strippers
- Electric Drill or Drill Press
- Drill Bits and Counter Sink Bit
- Sharp Knife such as an Xato knife
- Plumb Bob or Digital Caliper
- Awl or Center Punch
- Marking Pen (Fine tipped Sharpie type marking pen)
- Hole punch set (suggested)
- Dremel or high speed small grinding drill

Materials Used:

- PixController DigitalEye™ Digital Trail Camera Kit and Digital Camera
- Marine Goop *(purchase from you local hardware store)*
- Heat Shrink Tubing or Electrical Tape
- Velcro with adhesive backing

Step 1 – Cut O-Ring seal from 1040 case rubber bladder

The first step in your digital trail camera project is to prep you 1040 case and cut the O-Ring seal from the rubber tray bladder. To start you will need to remove the rubber bladder in the case bottom tray as shown in Figure 1.

Figure 1 – Remove bladder

Next using a sharp knife such as and Xato knife you want to cut the O-Ring portion of the rubber bladder out as shown in Figures 2 and 3.

Figure 2 – Cut O-Ring seal

Figure 3 – O-Ring Seal removed

The last step is to replace the O-Ring into the bottom case tray into the grove shown in Figure 4. *Note, you may want to use a few drops of Marine GOOP to glue the O-Ring into the grove.*

Figure 5 – Insert O-Ring into case tray grove

Step 2 – Drilling the Eye-Bolt holes

The next step in building your digital trail camera project is to drill the eye-bolt holes which hold in the Universal board mounting/shelf metal work.

Figure 5 – Purge Valve Location

To start you will need to remove the purge valve on the 1040 case shown in Figure 5. Using a small screw driver push it into one of the purge valve slots and lift up as shown in Figure 6.

Figure 6 – Remove Purge Valve

Using an electric drill or drill press drill out a ¼” hole using the purge valve center hole as your pilot hole as shown in Figure 7.

Figure 7 – Drill a ¼” hole

Next, place your Universal controller board into your Universal Board metal shelf/holder as shown in Figure 8. Put your 4 nylon spacers on the 4 #6-32 screws, place the Universal Board on next, and secure with the 4 #6-32 machine nuts.

Figure 8 – Mount Universal Board in metal shelf/holder

Place the Universal Board with metal fixture into your 1040 case and insert one of your eye-bolts into the hold you drilled out of the purge valve as shown in Figure 9.

Figure 9 – Secure with eye-bolt in 1040 case

Next, mark the location of the second eye-bolt with a fine tipped marking pen such as a Sharpie pen. Draw a circle around the hole location as shown in Figure 10.

Figure 10 – Mark location of second eye-bolt

Remove the eye-bolt and remove the Universal board with metal fixture as shown in Figure 11. From the circle drawn in Figure 10 mark the center of the hole with your fine tipped marking pen.

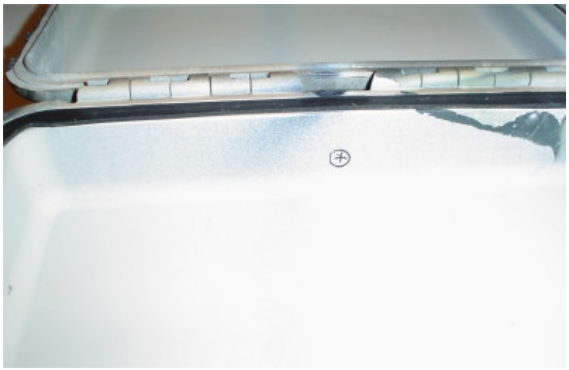

Figure 11 – Draw center mark on hole

Using a small high speed grinding tool such as a Dermel tool with a small bit drill a small pilot hole in the center of the eye-bolt hole just located.

Figure 12 – Drill a small pilot hole

With the small pilot hole now drilled use your electric drill or drill press to drill the eye-bolt hole out to a ¼" hole as shown in Figure 13.

Figure 13 – Drill ¼" hole for second eye-bolt

Lastly, re-install the Universal Board in metal fixture back into the 1040 case and secure the fixture with the 2 eye-bolts from both sides of the case as shown in Figure 14.

Figure 14 – Install both eye-bolts with Universal Board and metal fixture

Step 3 – Locate/Drill the Camera Lens & Flash holes, and the PIR sensor hole

In step 3 you will locate and drill the 3 holes in the 1040 case lid – the camera flash and lens holes and the PIR sensor hole. This is one of the most critical parts of your digital trail camera project. Locating these holes and drilling them in accurate centers is a must. The hole positions you will be locating are shown in Figure 15.

Note: This example uses the Sony DSC-S600 digital camera, which fits snug into the width of the Pelican 1040 case. However, digital cameras such as the Sony DSC-P32, DSC-P41, and DSC-S40 will require some small grinding of the Pelican 1040 case with a tool such as a Dremel tool on the sides of the case sides.

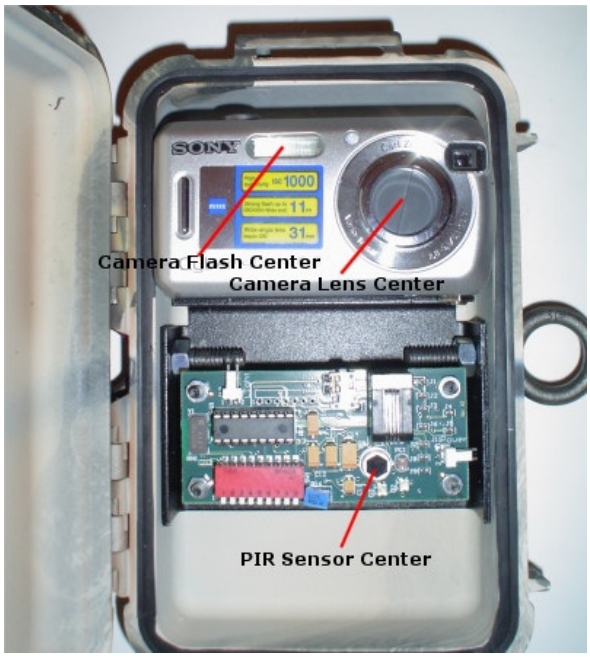

Figure 15 – Location of holes to drill

There are many methods to locate these 3 hole locations on to the lid of the 1040 case for drilling such as measuring and transferring these measurement with a digital caliper, but one of the easier methods is using a plumb bob as shown in Figure 16. You can also use a laser level to mark these locations similar to the plumb bob method. Here we will cover the plumb bob method in locating these holes.

To start out secure your digital trail camera in 1040 case in a way it won't move, but in a way you can make slight adjustments moving it around. A drill press vice is a good way to hold the 1040 case in doing this. Next, hang/attach your plumb above your 1040 case over the camera lens as shown in Figure 16.

Figure 16 – Hang plumb bob above camera lens

Keeping the 1040 case from moving close the lid and mark the location of the plumb bob on the outside of the 1040 case as shown in Figure 17. The will be the location to drill the hole for the camera lens.

Figure 17 – Mark the location of the camera lens

To mark the location use a fine tipped marking pen shown in Figure 18.

Figure 18 – Use fine tipped marking pen to mark location

Next, you need to use an awl or center punch to make a location for the drill to follow the center of the hole. See Figure 19.

Once you have marked the location of the camera lens you need to follow the above steps to mark the locations of the camera flash and PIR sensor. After all holes are marked and prepped for drilling you will need to remove the eye-bolts and metal fixture holding the Universal Board and drill out the holes.

Figure 19 – Use an awl or center punch to prep hole for drilling

Next, you want to drill out these 3 holes using your electric drill or drill press. We recommend using forstner bits for this process. If you do not have any forstner bits we suggest purchasing the bit sizes needed from your local hardware store, or online at http://www.harborfreight.com/.

You will need to drill a 1” hole for the PIR sensor and 7/8” holes for the camera flash and camera lens holes. These are the hole sizes we recommend when using the Sony DSC-P32, DSC-P41, DSC-S40, and DSC-S600 digital cameras. Other cameras may require different hole sizes for the camera lens and camera flash holes.

Drill holes for all 3 locations marked as shown in Figure 20.

Figure 20 – Drill holes

Once all 3 holes have been drilled re-install the Universal Board with metal fixture and attach with the two eye-bolts. Place your digital camera into the case and close the case. All of your holes should be centered over the PIR sensor, camera lens, and camera flash as shown in Figure 21.

Figure 21 – Drilling complet

Step 4 – Prep the foam insert and glue in the glass for camera lens/flash, and PIR lens

First place the foam liner into the inside lid, but do not remove the white paper. Place the foam liner in with white paper facing towards the lid as shown in Figure 22.

Figure 22 – Place foam insert into lid, do not stick into place

Next, hold the foam with your fingers to the inside of the case and close the lid ½ way. Then draw the hole locations on to the white paper backing of the lid foam liner with a fine tipped marking pen as shown in Figure 23.

Figure 23 – Close lid ½ way and mark locations with fine tipped pen.

Remove the lid foam liner from the case and cut out the holes you've marked. Place the lid foam on a surface you can cut the holes out with by placing the lid foam liner with the white paper backing facing up as shown in Figure 24. For this process you can use either a sharp knife such as an Xato knife or a hole punch set.

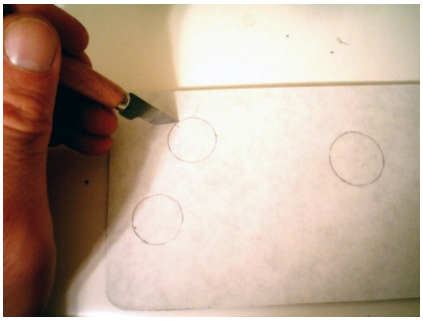

Figure 24 – Cut holes for locations drawn

For this process we really recommend using a hole punch set. You can purchase an inexpensive hole punch set from http://www.harborfreight.com/ - part number **ITEM 6770-9VGA** for only $9.95. When using a hole punch set such as this you want mark the center of each hole with a sharp tool such as an awl. This will allow you to place the center of the hole punch tool into this marked location and ensure your holes will be centered as shown in Figure 25.

Figure 25 – Using a hole punch

Next, cut the holes out with your Xato knife or your hole punch as shown in Figure 26. If using a hole punch you want to use your 1" punch for the PIR lens hole, and 7/8" punch for the camera lens and flash holes.

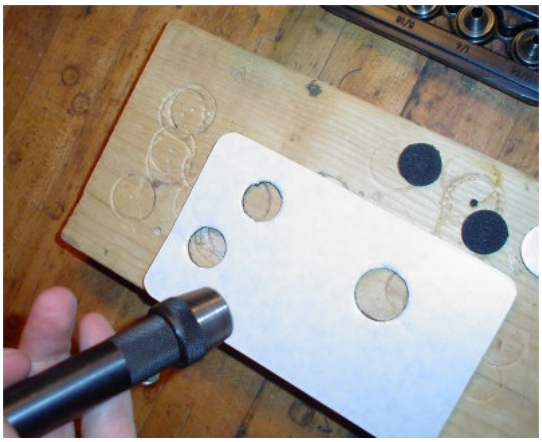

Figure 26 – Cut the holes out

Next, we want to enlarge the flash gasket center hole to either about 7/8" or 1" using a hole punch or a grinding tool with a high speed grinder such as a Dremel as shown in Figure 27.

Figure 27 – Enlarge hole in flash masking gasket

The flash gasket enlarged as shown in Figure 28. This is needed especially for zoom lens cameras such as the Sony DSC-S40 and DSC-S600 to make enough room for the lens to zoom in/out without getting stuck or rubbing on any surfaces.

Figure 28 – Flash gasket hole enlarged

Using Marine GOOP place enough glue around all 3 holes. You can purchase Marine GOOP from your local hardware store and is the best waterproof glue for this type of application. The best way to apply the glue is the lay the Marine GOOP tube opening flat against the 1040 case lid as shown in Figure 29, press the glue from the tube and move around the hole location. Do this for all 3 holes. Don't be afraid to get glue inside the holes as you will cut/remove this glue after your lenses are in place and the glue had dried. The idea here is to get the a waterproof hole.

Figure 29 – Place Marine GOOP around the holes

Once the glue has been applied around all 3 hole surfaces you want to place the lenses into the holes. Using the 1.25" circle glass place them into the Camera flash and Camera lens holes as shown in Figure 30.

Next, place the PIR lens into the PIR hole as shown in Figure 30. You must place this lens into the hole with the groves facing in towards the Universal Board and the smooth surface out. <u>If this hole was drilled slightly off center then note the direction of the PIR sensor center and make the appropriate adjustments to placing the PIR lens. The PIR lens needs to be centered over the PIR lens to ensure proper motion detection distance.</u>

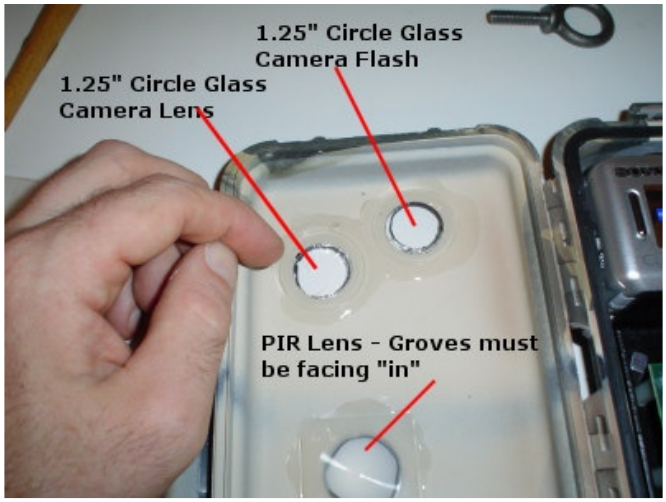

Figure 30 – Place lenses into glue

Let the lenses dry for about 1 hour facing flat down as shown in Figure 30. After this time has expired close the case and cut/remove any excess Marine GOOP glue with a sharp knife and tweezers as shown in Figure 31.

Figure 31 – Remove Marine GOOP after drying

Next, remove the white paper backing from the 1040 lid foam as shown in Figure 32.

Figure 32 – Remove white paper backing from foam lid insert

Carefully place the lid foam on to the 1040 lid as shown in Figure 33. Be sure to center each hole before adhering the lid foam to the 1040 lid.

Figure 33 – Place lid foam insert into 1040 lid

Next, place some Marine GOOP around the Flash Gasket as shown in Figure 34.

Figure 34 – Apply Marine GOOP to Flash Gasket

Once the glue has been applied place the Flash Gasket over the Camera Lens hole (glue surface down) as shown in Figure 35.

Figure 35 – Place gasket over Camera Lens hole

Step 5 – Build the battery holder assembly

Locate the 9V battery holder with switch and Universal Board power cable as shown Figure 36.

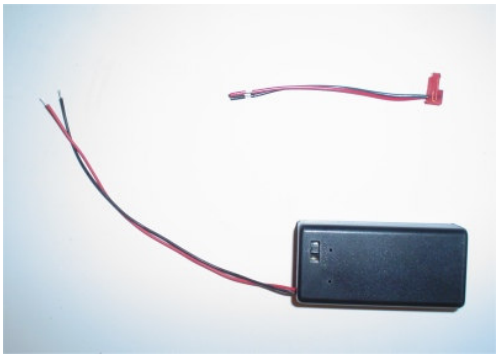

Figure 36 – 9V Battery Holder & Universal Board power cable

Next, using your wire cutters cut the length of the 9V battery holder 6” wires in half as shown in Figure 37.

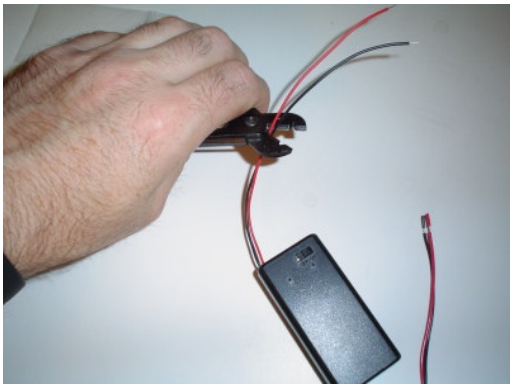

Figure 37 – Cut 9V battery holder wires in half

Next, you want to use your wire strippers and strip about ¼” of the wire insulation from the 2 red/black wires from the battery holder, and cut ½” pieces of heat shrink tubing as shown in Figure 38. You can purchase heat shrink tubing from your local hardware store or use electrical tape.

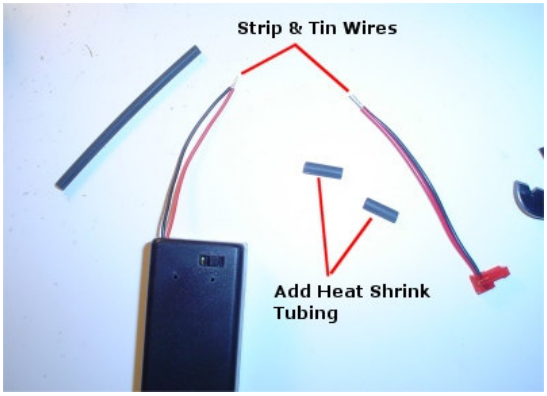

Figure 38 – Strip/Tin wires and add heat shrink tubing

Next, place the heat shrink tubing on to the battery holder wires and solder the red to red, and black to black wires from the battery holder wires to the Universal Board power cable as shown in Figure 39.

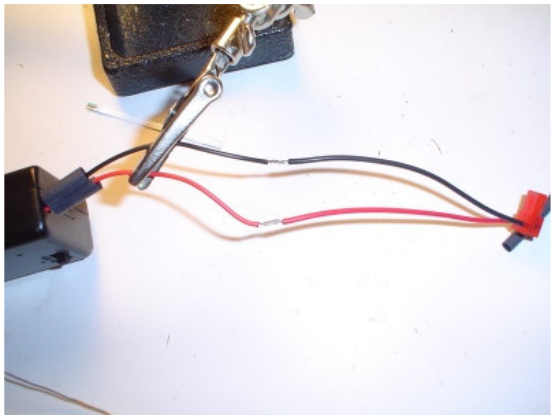

Figure 39 – Solder wires

Heat the shrink tubing into place over the solder connections or place electrical tape over the solder connections as shown in Figure 40. The battery assembly is now complete.

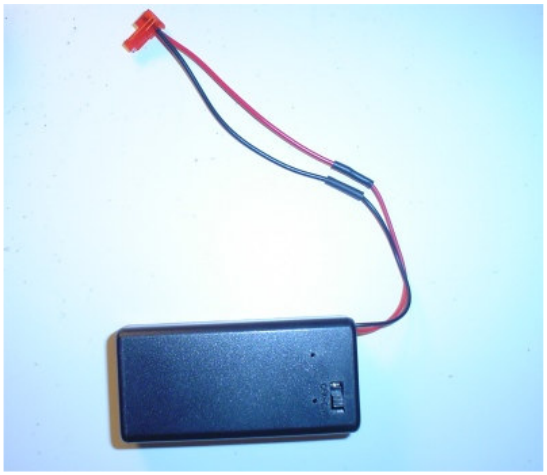

Figure 40 – Completed battery assembly

Lastly, you want to affix some Velcro to the bottom of the battery holder case as shown in Figure 41. You want to use Velcro with adhesive backing you can purchase from your local hardware store.

Figure 41 – Affix Velcro with adhesive backing to the back side of the battery holder case

To complete your system simply place the 9V battery holder w/ switch at the bottom of the case and plug the power cable into the power connector on your Universal Board as shown in Figure 42. Note, you want to run the wires under the board as shown.

In this example we wired a Sony DSC-S600 to the PixController board with a removable 3.5mm 4-position cable. You can use other cables like our 3-wire and 4-wire servo cables to accomplish the same task that can be purchased from our “Camera Accessories” section on the www.pixcontroller.com web site.

Figure 42 – Complete trail camera!

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