

A Control Primer for Halloween Props – Part 1

by SkeletalRemains

This primer covers the basics of control systems in haunt applications. The main purpose of Part 1 is to introduce some of the control system theories that I have worked with. All of this knowledge is based on what I have learned in my prop-building experiences. Thanks are in order to Deveds2 as he came up with a trigger diagram that inspired me to put this together!

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intro

This is a guide for anyone new to prop-building in haunt applications. This is just a first part that I have put together, which includes an introduction to the simpler types of control. I plan to follow this up with additional guides that go into detail on other aspects as well. I have spent considerable time learning all of this information. I hope that other prop-builders can shortcut this process by reviewing what I have put together here. Comments and questions are welcome!

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[why control?](#)

Let me set the stage:

It is Halloween, the kids are coming up the walk, and you are perched in the bushes out of sight. You have one finger on a button, and the other hand is ready to un-pause the radio where you currently have "Terrorized Screams" recorded. When their foot hits the third crack in the concrete, that is your queue! A horribly grotesque disfigured creature comes flying out of nowhere making all kinds of terrifying sounds. The kids FREAK OUT! Even the parents nearly hit the ground!

This is a common occurrence in every neighborhood in America on October 31st. The problem for me was simple: it wasn't enough. I wanted to do more, but I didn't have the space, plus my macabre obsession led me to a \$1000 budget for new stuff every year. This is a yard haunt! Why would we do this? Well, it doesn't really matter, we love it, and that's that – nobody's going to stop us. Plus, it easily makes your house the most popular house on the block on Halloween. This obsession led me to one of the largest haunted houses (anywhere) in North Texas, and it is here where I began learning a lot of the different control mechanisms for haunted applications. Having a couple haunting pros to bounce stuff off of for the past few years has been indispensable. I get to see firsthand how it used to be done, how it's done today, and how it's going to work tomorrow.

As long as animatronic haunted props have been around, there has been a desire to control them and make them run by themselves, with little or no intervention required by the operator. Think about it: you spend hours and hours (even days or weeks) building the perfect prop, then another perfect prop, then another. How do you control all of them? You obviously cannot be in the same place at the same time. While this is especially true for haunted houses, it is becoming more and more common to see yard haunts go to this level of automation to make for an incredible Halloween experience for the kids.

Control systems are designed to relieve the haunter of having to hide in the bushes all night. The last year that I did my yard haunt, I had 8 kids acting and running props in my yard haunt. That is a lot of wasted talent when someone has to sit there and push a button! You have better things to do than push a button.

By the way, if the term 'control system' sounds a little intimidating, don't worry! A control system is nothing more than your collection of controls that automates a specific prop. Look at my first example at the top of the next page, the control system was the haunter. How simple is that?

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[disclaimer](#)

That's right! DISCLAIMER!

By reading the material on the following pages, you are agreeing that I (the author) is not responsible for your safety in any way and cannot be held responsible for any damage to persons or property that may become injured, harmed, or destroyed, including, but not limited to, death. The articles contained within deal with electricity and compressed air pneumatics, as well as other dangers. Readers are hereby informed that all actions that they take is at their own risk!

Thank you!

-enjoy-

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[safety](#)

Halloween is easily my favorite time of year. I get to build stuff all year long, make things jump, design new stuff, meet new people, go to other haunted houses, etc. But I cannot do any of that if I am dead!

Use common sense in everything you do related to Halloween, from candy, to props, to haunted houses, to wall panels, to electricity, and everything else that could injure or kill you! Always use good judgment.

If you are not familiar with certain aspects of something such as electricity, don't try to be a hero! Ask someone on this forum! Buy a book on electricity! Hire an electrician if you absolutely have to. Your life is not worth risking over a Halloween prop!

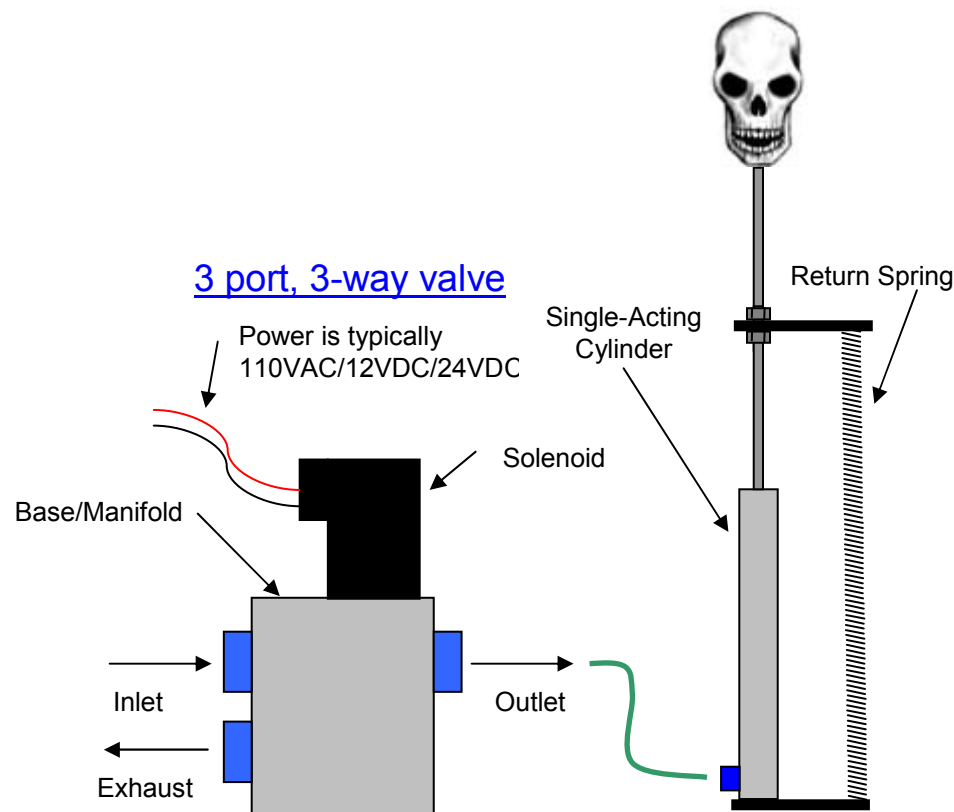
I'll say it one more time, I am not responsible for your actions by what you achieve or hope to achieve by reading this primer!

Thanks!

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[automating a simple prop](#)



The prop to the left is our simple prop. While it appears unrealistic, or you might wonder “Where would you put this thing?”, just realize that it is NOT to scale and only represents whatever a simple prop might be. The skull simply indicates the ‘business end’ of the cylinder rod. This might be a pop-up, a grave jumper, a casket jumper, or any number of other similar props. The whole idea here is that the simple prop is actuated by a SINGLE action. That is the common thread.

A simple prop might also be a dual-cylinder design where both cylinders are setup to ‘pop’ at the same time. Cases where you may encounter this is on props that need additional force but a big enough cylinder wasn’t readily available. Another instance might be a prop that pops up out of a barrel and the head spins at the same time. The key here, to further refine my definition of a simple prop, is that everything is actuated at the SAME TIME. Essentially, you can test this theory by asking yourself a simple question. Does this prop produce the expected result by turning everything on and off at the same time? If the answer is yes, then it is a simple prop.

OK, so now we know we want to upgrade this prop by adding control. I’m going to go through this in somewhat reverse order, one at a time, which will help you understand what each piece is comprised of. (I’ll explain more about that later)

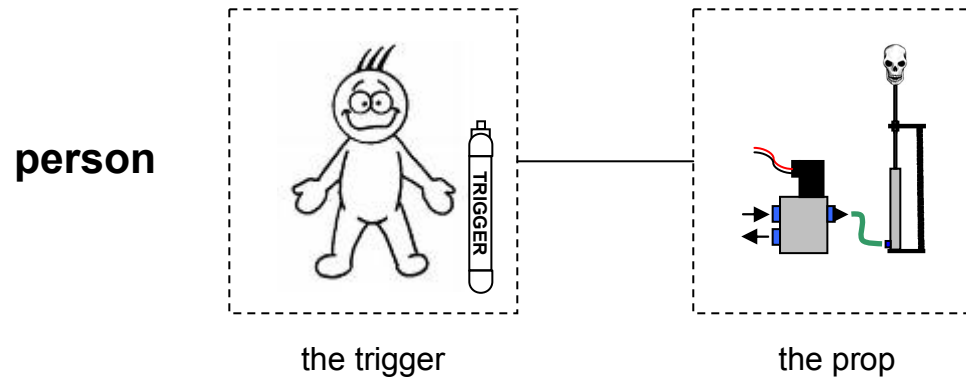
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triggering

Before we can automate, we need to look at how modularization of props can be done. This is actually a very simple process, and it can all be laid out into a nice template. There are so many different ways a scare can be engineered. Obviously, there is a prop of some sort that might come popping up out of nowhere, so we'll start there. In fact, we'll make it the centerpiece of our template.

Next, we'll add a trigger. For our first trigger, we are going to assume it is being run by a person. Every prop goes through this stage at some point or another, as we know that all props will be tested (as they're built) to verify functionality.



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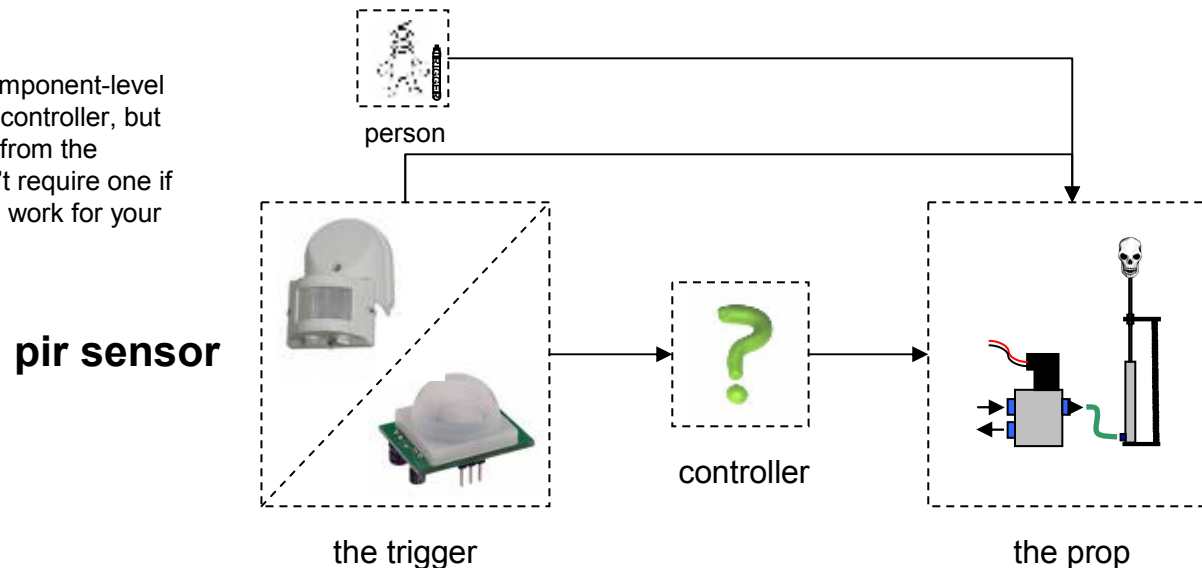
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triggering

Now, let's look at some other triggers. A very popular trigger is the PIR trigger, which stands for Passive Infrared. Be careful when buying PIR sensors, as surplus sites on the Internet often sell just the sensor without the control board. These are so popular because you can pick one of the motion-sensing floodlight kits at Wal-Mart for about \$9-\$10, and hack it by removing the PIR sensor. These sensors from Wal-Mart come with a 5-8 second 'test' feature that will often satisfy the requirement for a timed activation. That keeps the prop extended for 5-8 seconds, unless a bunch of people keep streaming by, in which case it will stay extended.

Any other type of PIR sensor is going to provide some unique results in this configuration. A raw, component level, unpackaged PIR is going to trigger without the built-in delay. The delay is a function of the circuit that interprets the behavior of the PIR and turns it into a nice 5-8 second delay that serves the 'TEST' feature of the motion-sensing floodlight. In order to use the component-level sensor in the same capacity, an external controller will have to be used.

Note that the component-level PIR must use a controller, but the hacked PIR from the floodlight doesn't require one if 5-8 seconds will work for your prop.

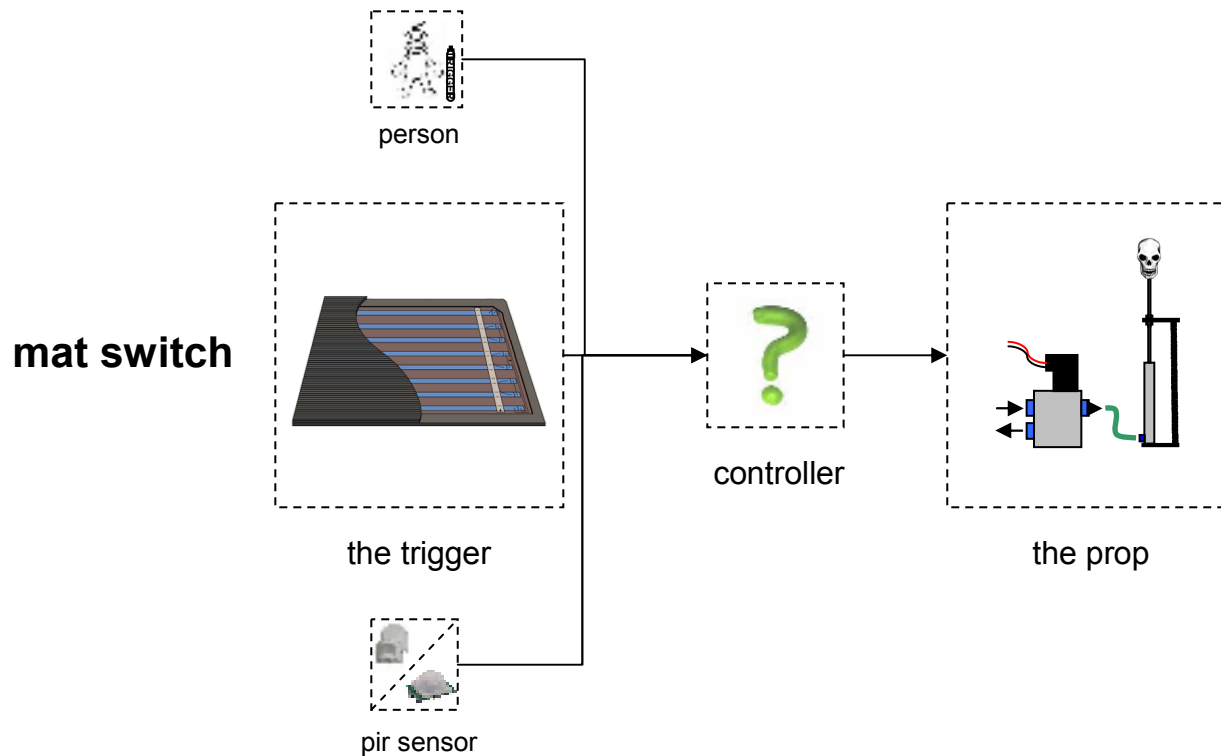


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triggering

Another trigger is the mat switch, which detects when someone walks onto it. This mat will act as a sensor by closing an electrical loop which triggers the prop. One downfall of this trigger is that it is often easily visible by the patrons so they step on it already expecting the scare, or sometimes avoid it altogether. The key here is to keep it too dark to see what you are walking on, or enough distraction to keep the patrons eyes off the floor. Again, you will most likely need a controller if you want to use a mat switch. If you don't use a controller, your result may not be what you expect. Never run 110VAC through a mat switch unless it is a commercially-made pressure-mat and was specifically designed and built for line voltage.

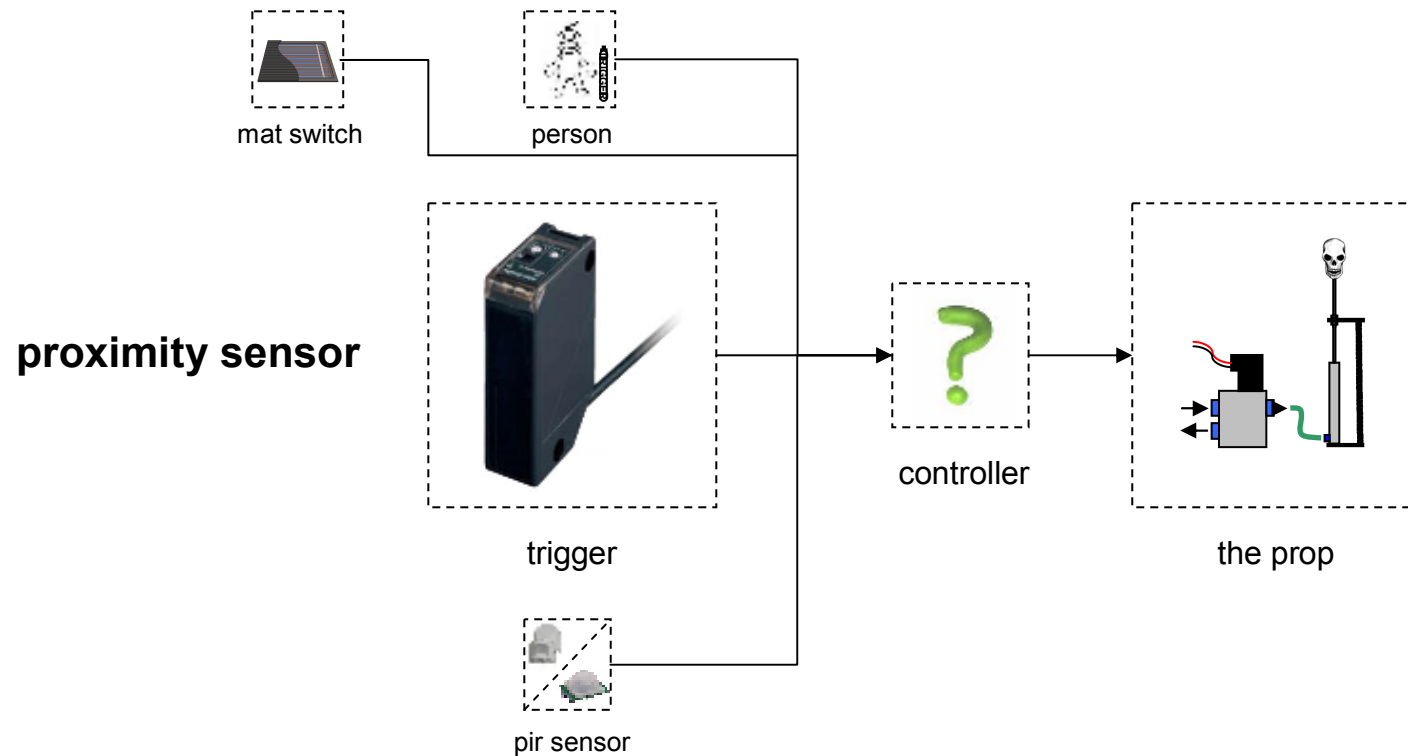


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The proximity sensor gets my vote for best trigger. While not always the most appropriate sensor for EVERY prop, it nearly always achieves the best scores with the most precision. The proximity sensor is actually a type of photoelectric sensor. There are several different types of photoelectric sensor, but only the following 3 are typically used in haunt applications: through-beam, retroreflective, and proximity/diffuse (any which may be used to trigger a prop). The through-beam sensor has two pieces (emitter and detector) that are mounted at a distance from each other (usually about 2 meters). The beam is emitted from the emitter, and you trigger off of the detector whenever someone breaks the beam. With a retroreflective sensor, the emitter and detector are in the same housing, and a reflector is mounted on the adjacent location to reflect the beam back to itself. The proximity sensor is best because it is a single housing which requires no adjacent detector or reflector. This makes setup much easier.

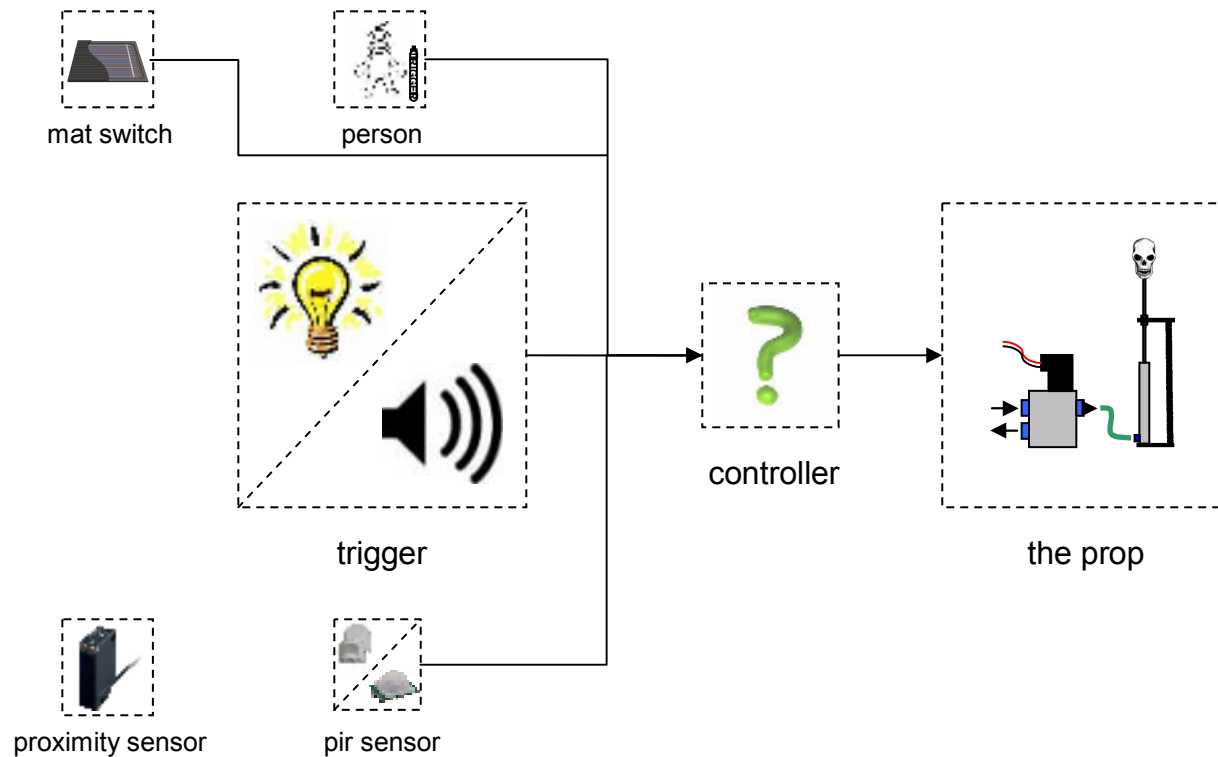


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triggering

There are some specialty triggers we can also consider such as audio and light. These are typically reserved for specific things such as thunder and lightning, or other special effects. A special controller will take an audio source and convert it into pulses of light so that it appears the lighting is synched with the thunder. However, these aren't typically used as a standard trigger for props in my experience.

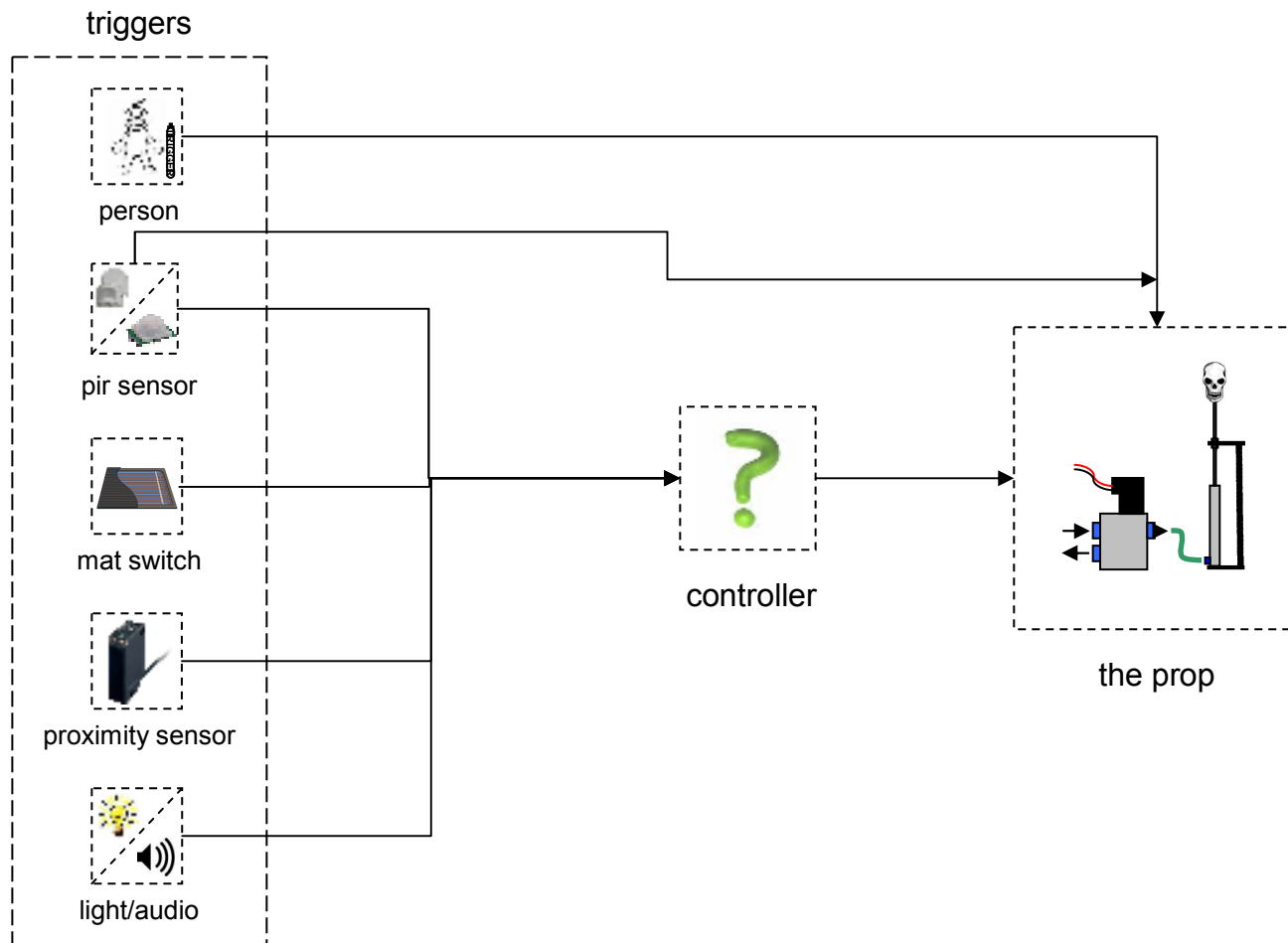


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controllers

Now that we've discussed triggers, let's talk about controllers. Controllers are great because they literally replace you, in fact they do an even better job than you! A controller is going to be able to determine any number of items, and respond with a predetermined course of action. The diagram below shows that which triggers use a controller and which don't require one. Even though the person and hacked PIR do not require a controller, it is still easy to use both of those options **with** a controller.

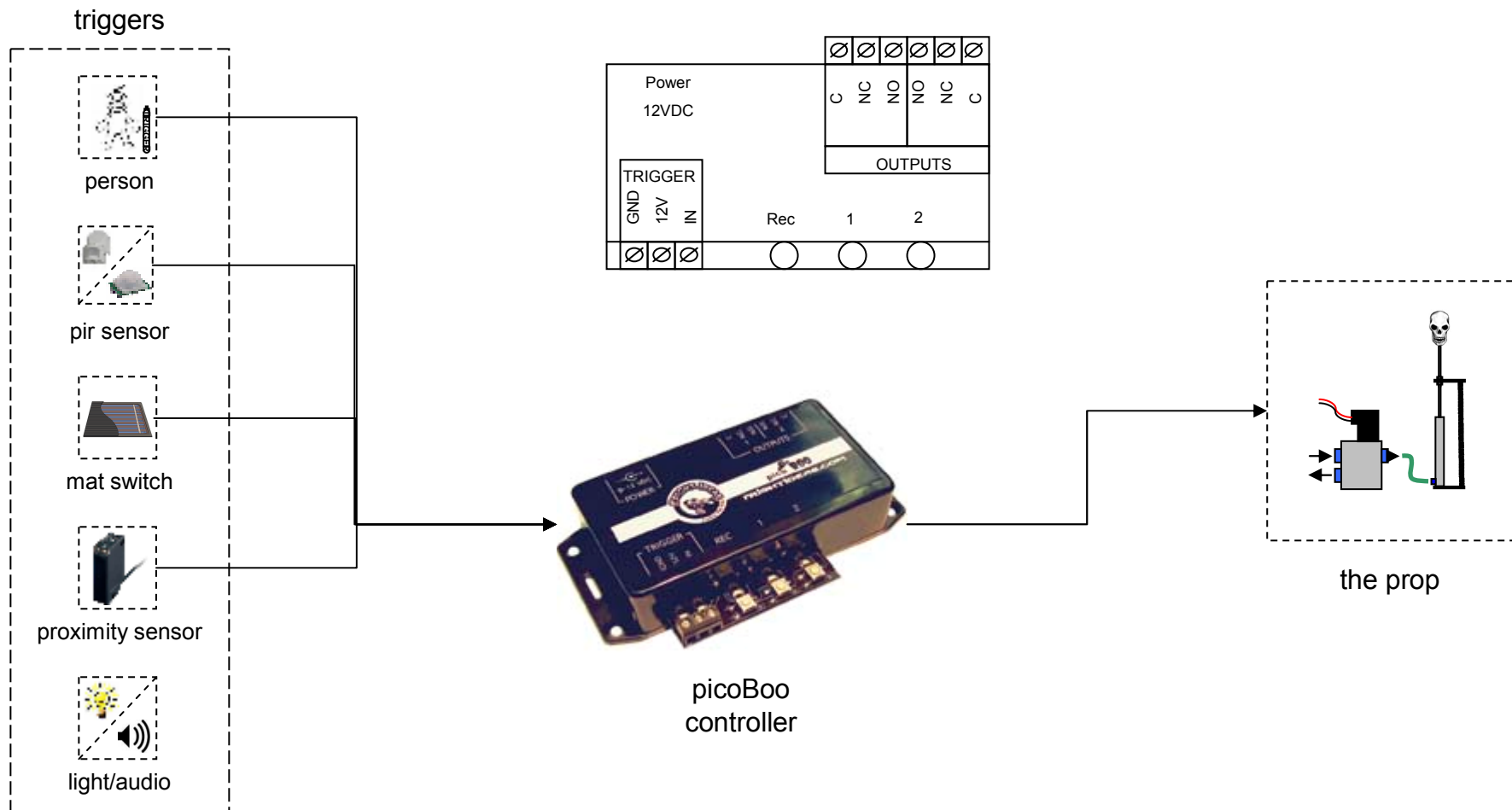


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A haunt controller basically does what **you** do. That is, it waits for it's queue, and acts just as you would when the proper event occurs. As you can see below, there is an illustration of a picoBoo controller's connections. Aside from power to run the controller, there are connection points for the trigger and your prop mechanics. There are literally dozens of controller manufacturers out there to choose from, but I chose this picoBoo from FrightIdeas because it is simple and essentially represents the majority of the controllers on the market, plus it's a great controller!



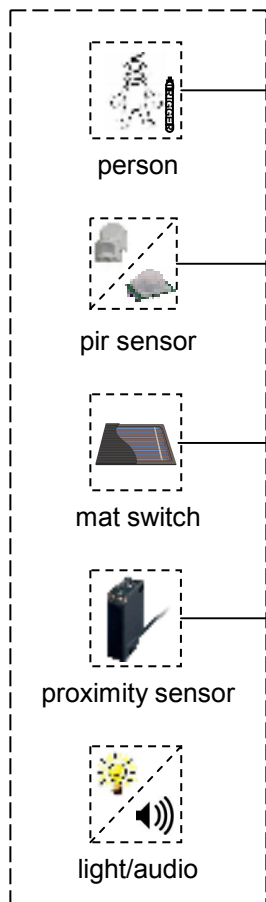
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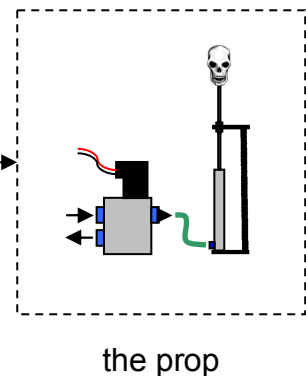
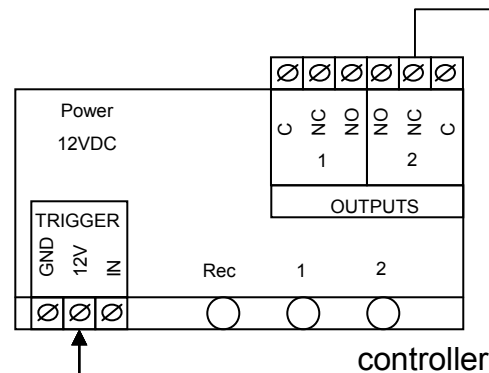
controllers

Let's go around the controller starting with the power in the upper left corner. This, and many other controllers, work off of 12VDC, and the adapter comes with the controller in most cases. Keep a keen eye toward that when purchasing, this may not always be the case. Moving counter-clockwise, we find the trigger connections in the lower-left corner. As you can see, there are 3 connections, and if you were to short **GND** directly to **IN**, the controller will activate. There is a 12V connection there, and it serves as a convenience for powered triggers, such as PIR sensors or photo eyes. You must also pay attention that the triggered **IN** will be receiving a connection to **GND**, because if it gets connected to 12VDC instead, it won't activate the controller. There are also concerns about whether your specific trigger is a normally-open or normally-closed trigger. Most controllers are configurable both ways. If it isn't, you may have to use a relay instead. There is usually a very simple fix for little issues like that.

triggers



In the lower-right corner, you will find buttons that are used to program the controller. The operators manual will have all the details for each specific controller, but the process usually entails pushing the **Record** button, then manually pushing buttons 1 & 2 in whatever pattern you want, just like how you would push the buttons for the real scare (the buttons refer to each output which we'll go over next). This makes it very easy to have your controller up and running in very little time. Lastly, in the upper-right corner, we have outputs for the prop. In a simple prop, you need only one output to energize your prop's circuit, but you can use the 2nd output to energize a light on the prop in an erratic pattern, or whatever else you choose to do with it. In this scenario below, if your prop's solenoid runs off of 12VDC, you are all set, and you can usually connect the valve straight up to the controller. If your prop's valve runs off of 24VDC or 110VAC, you will need to use a relay. This particular controller, however, does offer the same package with 110VAC plugs right on top of the controller, making it much easier to connect.

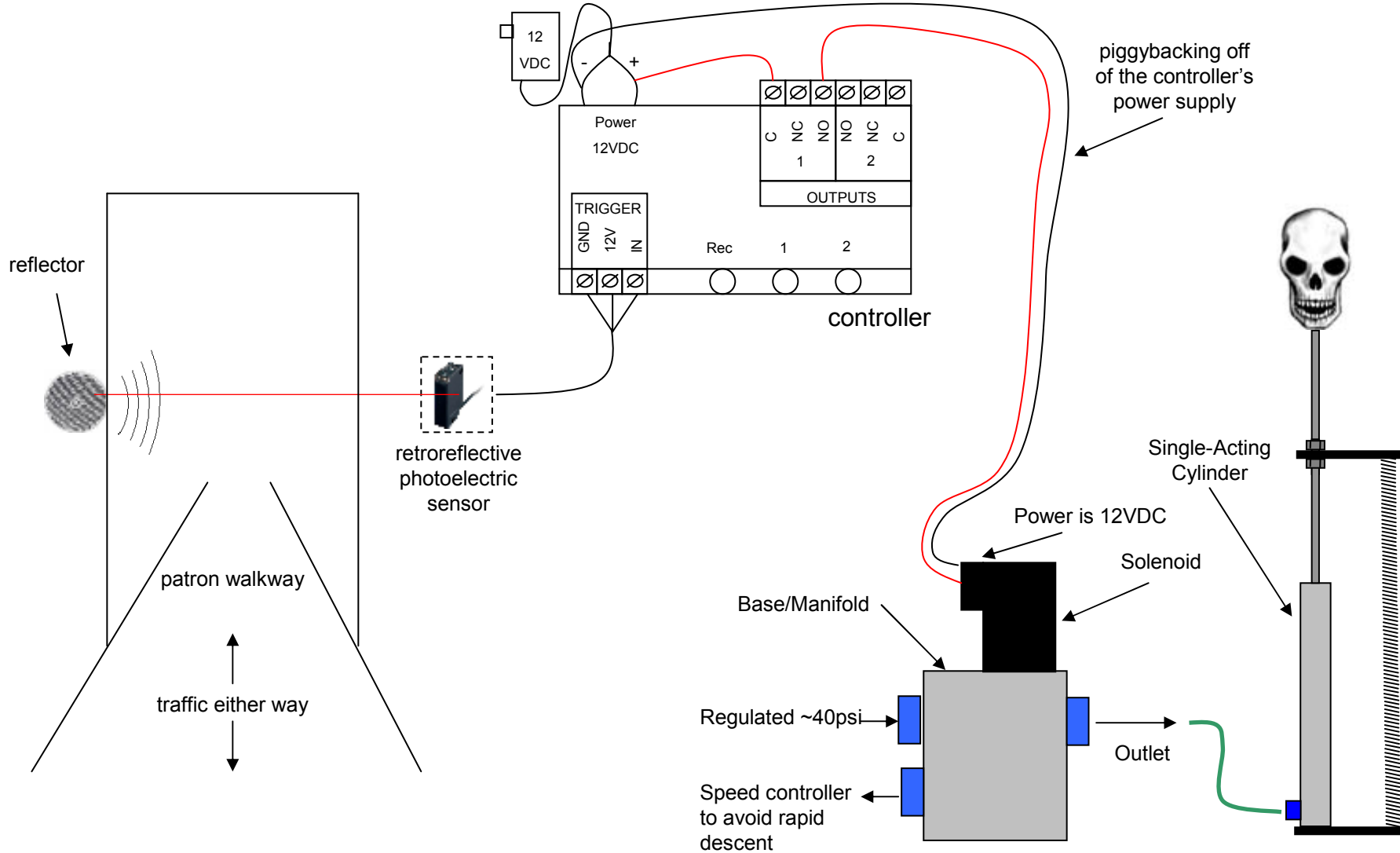


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putting it all together

Now that I have gone over most of the components that comprise a simple prop, let's start putting it together! We already have our prop built and ready to go (working backwards again!) We are going to use the picoBoo controller below as our controller. And finally, let's use a retroreflective photoelectric eye as our trigger (the one with the reflector). First, let's lay all of this out and start hooking it up!



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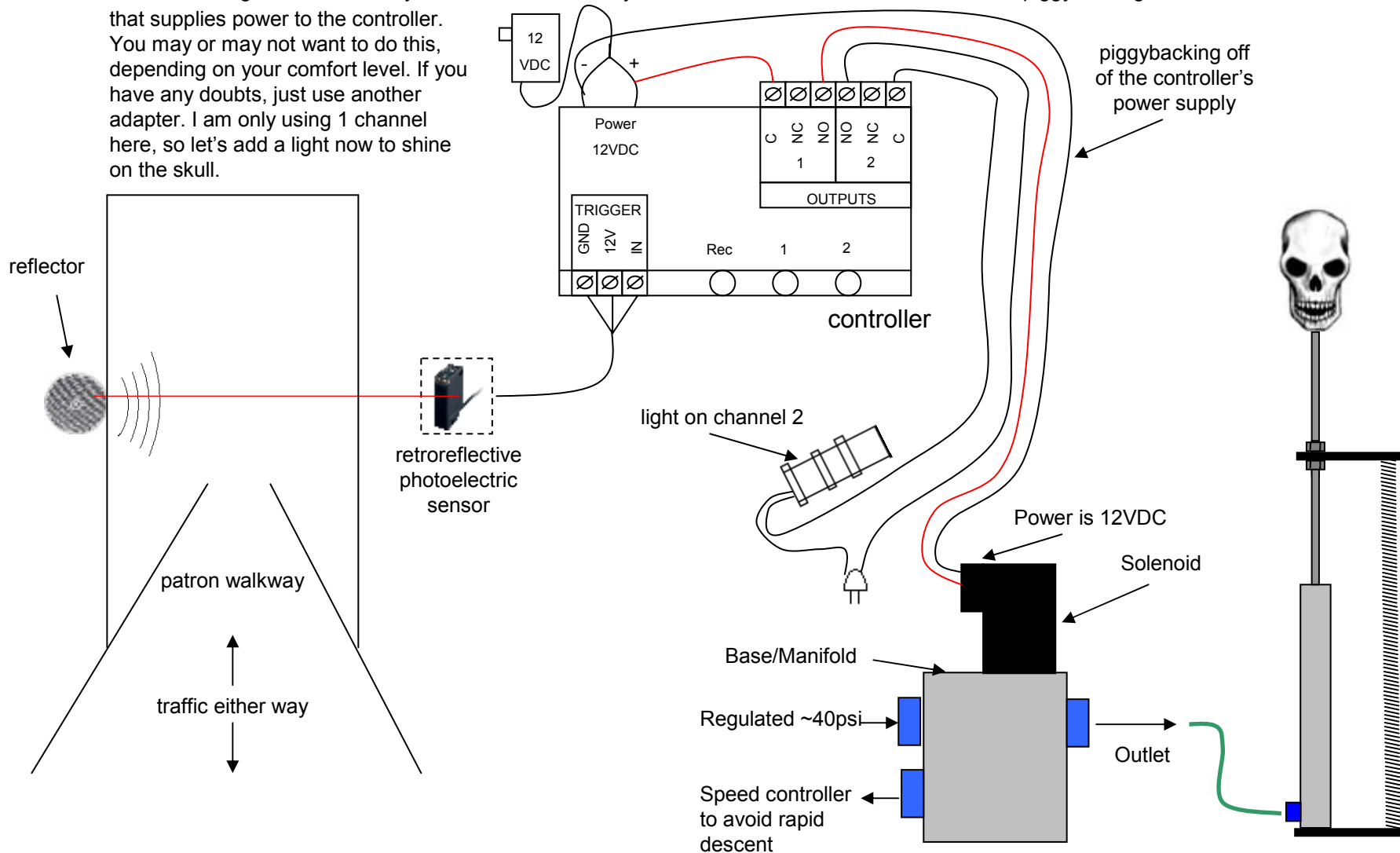
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putting it all together

A few things before we program it. First, the photoelectric sensor has three wires coming out of it that connect directly to the trigger inputs. These are 12V, GND, and OUTPUT that goes to IN on the controller. The output must go low (GND) to trigger. If it doesn't, see if the sensor can be reconfigured. Otherwise you'll have to use a relay to send GND to the IN. Next, here I show piggybacking from the 12VDC controller that supplies power to the controller.

You may or may not want to do this, depending on your comfort level. If you have any doubts, just use another adapter. I am only using 1 channel here, so let's add a light now to shine on the skull.

The diagram shows a 12VDC power source with terminals labeled '+', '-', and 'C'. The '+' terminal is connected to the 'C' terminal of the first channel (labeled '1'). The '-' terminal is connected to the 'NC' terminal of the second channel (labeled '2'). The 'C' terminal of the second channel is also connected to the '-' terminal. A label 'piggybacking off of the controller's power supply' points to the connection at the second channel.

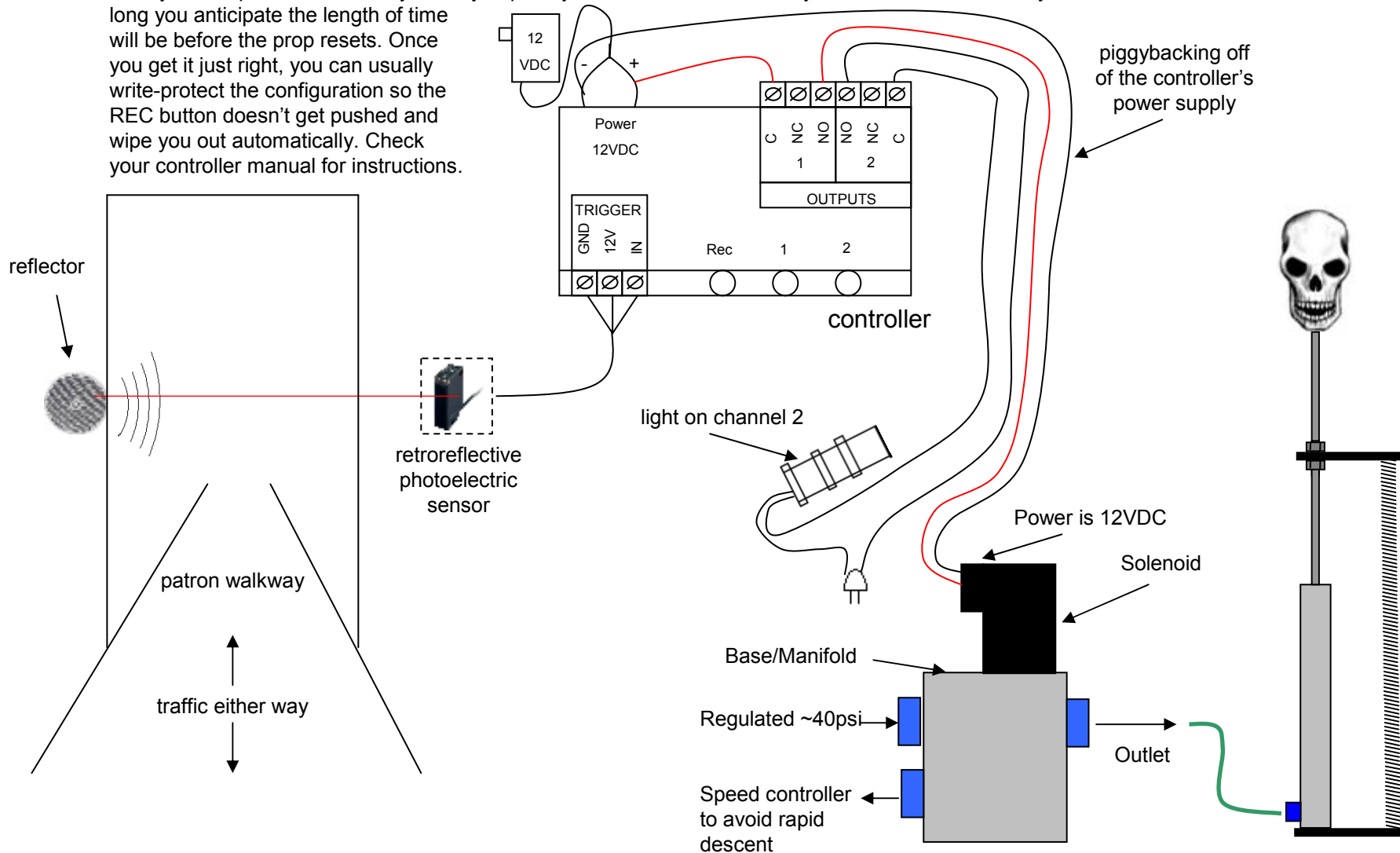


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So now, we want to follow the directions for the controller, and push the record button. Immediately after pushing REC, we will push in our combination of prop and light activations. This will be occurring in real time, so it'll be easier to make it look real, and make it easier to achieve what you had planned on initially. After you push your buttons for the scare you want, let the REC stay on for about 15 seconds, or however long you anticipate the length of time will be before the prop resets. Once you get it just right, you can usually write-protect the configuration so the REC button doesn't get pushed and wipe you out automatically. Check your controller manual for instructions.



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[thank you](#)

Thank you for taking the time to check out my various instructional primers. I can only hope that you get as much enjoyment out of your Halloween experience as I have. The information I have presented here is based entirely on my own personal experiences with haunt-oriented projects, and I am glad to pass it on to the next generation of haunters.

Please challenge my ideas as presented if you feel I have made any errors in my presentation. Like everyone else, I am in a constant state of learning and educating myself on all things haunted.

Send feedback! Please let me know what you want to see, and if I have the experience I will be happy to put together a similar primer or point to another primer where the information already exists...

Coming Soon:

Air cannons (as promised 2 years ago, sorry it took so long!)

Thanks!