

08 October 2020 – Kentucky 4-H Virtual Experience – Control the Flow

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00:00:11.940 --> 00:00:21.810

Torey Earle: Hi everybody, welcome to the Kentucky 4-H Virtual Experience. Today we're going to concentrate on SET, or Science, Engineering and Technology programs.

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00:00:22.620 --> 00:00:33.060

Torey Earle: My name is Torey Earle and I am an Extension Specialist for 4-H Youth Development with University of Kentucky College of Agriculture, Food and environment Cooperative Extension Service.

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00:00:39.210 --> 00:00:48.870

Torey Earle: The activity that we're going to do today is from the 4-H Electric Excitement curriculum book one the Magic of Electricity. The activity is called Control the Flow.

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00:00:49.890 --> 00:01:05.130

Torey Earle: And in this activity you're going to learn a little bit more about how a switch helps control the flow of electricity through a circuit, you're going to make your own switch and then we're going to talk a little bit about different switches that are used for different purposes.

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00:01:06.690 --> 00:01:22.230

Torey Earle: As we start our activity. I'll show you some of the things that you'll need to gather up and have on hand. In order to do this activity and then will we will make our own circuit with a switch in it. So, let's get started.

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00:01:23.850 --> 00:01:34.830

Torey Earle: As we start our activity, some things that you will need to have on hand are a D Cell battery holder a D Cell battery rated at 1.5 volts.

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00:01:36.690 --> 00:01:38.730

Torey Earle: A couple of paper brands.

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00:01:40.110 --> 00:01:41.160

Torey Earle: A paperclip.

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00:01:43.410 --> 00:01:47.070

Torey Earle: A lamp holder with a small 1.5 volt.

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00:01:48.210 --> 00:01:49.230

Torey Earle: Lamp in it.

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00:01:51.900 --> 00:01:53.040

Torey Earle: Index cards.

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00:01:54.420 --> 00:01:55.980

Torey Earle: A small Phillips screwdriver

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00:01:57.240 --> 00:02:00.840

Torey Earle: A pair of needle nose pliers and a hole punch.

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00:02:03.960 --> 00:02:17.850

Torey Earle: One of the first things we're going to do is we're going to put a couple of small loops with our needle nose pliers in the end of our solid copper

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00:02:18.960 --> 00:02:25.860

Torey Earle: Wire and this solid copper wire is actually doorbell wire that I've obtained from a local hardware store.

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00:02:27.300 --> 00:02:27.960

Torey Earle: And

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00:02:30.300 --> 00:02:39.360

Torey Earle: It's very small, low voltage wire that you can use for activities like this, using the D or C cell batteries.

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00:02:40.710 --> 00:02:45.870

Torey Earle: So, what we want to do is we want to put small loop in it like this.

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00:02:47.670 --> 00:02:54.300

Torey Earle: And then the other end, we want to put another small loop in it like this.

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00:02:56.370 --> 00:03:05.910

Torey Earle: Then we're going to take one of those small loops and attach it to one side of our lamp socket or around

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00:03:07.020 --> 00:03:11.070

Torey Earle: One of the screws and we may have to bring that screw out just a little bit.

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00:03:12.900 --> 00:03:14.460

Torey Earle: To get our wire underneath it.

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00:03:15.780 --> 00:03:31.410

Torey Earle: And you're going to notice that as I do this I looped the wire in the direction the screw is going to tighten that actually tightens the wire down underneath the screw and will not push it out.

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00:03:34.170 --> 00:03:39.240

Torey Earle: I want to take the black wire end of my battery holder.

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00:03:40.890 --> 00:03:43.260

Torey Earle: And I'm going to put it on the other side.

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00:03:44.340 --> 00:03:49.920

Torey Earle: Of the lamp socket with the bulb in it the same way as I did.

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00:03:52.860 --> 00:03:57.120

Torey Earle: The wire on the opposite side, I'm going to make a little loop in it.

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00:04:00.300 --> 00:04:07.020

Torey Earle: And I'm going to put it underneath the screw in the way that the screw would tighten down

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00:04:12.930 --> 00:04:13.650

Torey Earle: And then

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00:04:15.000 --> 00:04:16.800

Torey Earle: I'm going to tighten it.

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00:04:19.170 --> 00:04:34.950

Torey Earle: So it's not that way. I've got both of those wires attached. Now what our ideas to do here is to make a circuit we could actually hook these two together. Let me put the battery in and show you how that would work. We could touch the two red wires together.

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00:04:37.170 --> 00:04:38.760

Torey Earle: And you can see

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00:04:39.870 --> 00:04:40.920

Torey Earle: The light comes on.

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00:04:42.180 --> 00:04:44.670

Torey Earle: But to make it a little more convenient or

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00:04:45.750 --> 00:04:50.820

Torey Earle: Functional we would like to have a switch inside of this circuit.

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00:04:52.440 --> 00:04:56.940

Torey Earle: So, I'm going to make a small loop in the red wire coming off the end of my battery holder.

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00:04:59.010 --> 00:05:00.750

Torey Earle: And I'm going to take one of my paper brads

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00:05:02.130 --> 00:05:09.060

Torey Earle: This is going to be the index card will be the holder for our switch and I'm just going to punch.

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00:05:10.380 --> 00:05:14.280

Torey Earle: A hole in the index card with my hole punch.

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00:05:17.070 --> 00:05:20.370

Torey Earle: Then, I'm going to take my paperclip X. I'm gonna take my

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00:05:21.510 --> 00:05:24.180

Torey Earle: red wire coming off my battery holder first

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00:05:25.500 --> 00:05:28.830

Torey Earle: Rapid around the paper brad, like so.

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00:05:31.050 --> 00:05:36.060

Torey Earle: I'm gonna put the paper brad through one of the loops on my paper clip.

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00:05:37.440 --> 00:05:38.400

Torey Earle: And then

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00:05:39.540 --> 00:05:54.270

Torey Earle: Put that assembly for the index card and spread the tabs out on the paper brad, so, that way I have a wire that is touching my paper clip that is secured by the paper brad.

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00:05:57.300 --> 00:06:03.360

Torey Earle: Then the other thing to do is take my whole bunch, go to the other end of the loop on my paper clip.

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00:06:05.790 --> 00:06:07.410

Torey Earle: And I'm going to

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00:06:08.430 --> 00:06:09.450

Torey Earle: Punch another hole.

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00:06:12.900 --> 00:06:13.950

Torey Earle: Through this hole

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00:06:15.630 --> 00:06:16.770

Torey Earle: I'm going to

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00:06:19.290 --> 00:06:20.550

Torey Earle: Secure the wire.

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00:06:22.200 --> 00:06:29.790

Torey Earle: And you can do this with your needle nose pliers secure the wire that is going to my bulb or to my lamp socket.

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00:06:31.350 --> 00:06:32.670

Torey Earle: On the other paper brand.

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00:06:34.170 --> 00:06:38.790

Torey Earle: Then spread the paper Brad tabs out

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00:06:39.990 --> 00:06:41.160

Torey Earle: Like I did on my other one

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00:06:43.560 --> 00:06:51.750

Torey Earle: And if you would like to with this you can secure these tabs underneath with a piece of tape with that's what its gonna look like on the back side.

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00:06:53.400 --> 00:06:53.970

Torey Earle: And now.

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00:06:55.530 --> 00:07:04.830

Torey Earle: Since our paperclip is metal our paper brands are metal and our wires are metal. All of these are conductors of electricity.

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00:07:05.910 --> 00:07:17.190

Torey Earle: Our index card is not a conductor. It is an insulator. And you notice that the wires have a rubber coating around them. Those are insulators, too. And we'll let let electricity flow through

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00:07:18.750 --> 00:07:31.050

Torey Earle: So, now what we do we put our D cell battery inside our battery holder and the wires are not touching, so the circuit is not complete, but to make that circuit complete will move our paperclip down

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00:07:32.190 --> 00:07:40.140

Torey Earle: Touch the paper brad. And you notice the light comes on. So, we have created our own circuit.

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00:07:41.490 --> 00:07:58.260

Torey Earle: And put a switch in it using a paperclip as our contact point for the Switch paperclip is down circuit is closed light burns paperclip is up circuit is open the light does not far

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00:08:00.240 --> 00:08:11.910

Torey Earle: If you'd like to make the process a little easier and not have to worry about using tools as much, you can actually do this same activity using

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00:08:12.810 --> 00:08:22.260

Torey Earle: alligator clip wires. If you have them available, you can usually find these at a hobby shop or something like that. Maybe a

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00:08:22.860 --> 00:08:34.410

Torey Earle: An electronic store, but you can use these to clip to your wires and to your paper brads and to your lamp socket. So, you don't have to worry as much about using tools.

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00:08:36.330 --> 00:08:55.080

Torey Earle: Either process is very acceptable to us, just as a learning process because this in particular would not be considered a state fair project. This is one of the tools that you would use to develop your state fair project in learning a little bit more about electricity.

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00:08:57.390 --> 00:09:03.600

Torey Earle: There are several different types of switches that can be used for different applications, the switches on this side.

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00:09:04.470 --> 00:09:20.970

Torey Earle: Are used for direct current applications or with batteries, the switches on this side are used primarily with alternating current situations like wiring a house or a farm or some other type of structure or building

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00:09:22.380 --> 00:09:33.990

Torey Earle: The two types of switches that we have here just to give you some information. This is a push button switch. It is a momentary called a momentary switch you push it and hold it.

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00:09:34.920 --> 00:09:39.360

Torey Earle: It allows current to flow through you let go of it, it stops the flow of current

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00:09:39.780 --> 00:09:53.790

Torey Earle: So, that's kind of handy if you're needing something to be on for just a second, or you're needing to flash a light or something like that. You can push it and it'll provide a momentary current flow until you release the switch.

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00:09:55.350 --> 00:10:10.920

Torey Earle: This particular switch is used a lot and lab type activities for low current electricity. It's called a knife switch and you see it has two terminals on it, one to hook your

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00:10:11.760 --> 00:10:22.200

Torey Earle: Inlet wire or your positive wire from and one to your negative wire from. So, if the switch is open like this there is

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00:10:22.770 --> 00:10:37.800

Torey Earle: No connection between this side for positive and this side for negative. But if you close the switch. Both of these sides are now connected because you can see underneath everything is tied together.

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00:10:39.120 --> 00:10:46.560

Torey Earle: So, simple knife switch all it does is open and close a circuit to allow electricity flow.

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00:10:50.100 --> 00:10:56.940

Torey Earle: These two types of switches, you will probably see either in your house or in your office or something like that.

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00:10:58.110 --> 00:11:04.050

Torey Earle: This particular one is called a single pole single throw switch

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00:11:05.910 --> 00:11:08.340

Torey Earle: Just in looking at one in

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00:11:09.390 --> 00:11:21.000

Torey Earle: A box on the wall, you will be able to almost immediately tell it because it does on the switch itself have to words on and off.

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00:11:22.050 --> 00:11:38.640

Torey Earle: Nine times out of ten when you see a switch like this, it is a single pole single throw switch and it is designed to turn a light or an outlet or some mechanism, off and on, from a single location.

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00:11:41.130 --> 00:11:52.440

Torey Earle: You look on the side. It's got to brass screws on it. These brass screws are for the hot wire. So, as you would hook up a circuit.

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00:11:53.100 --> 00:12:08.640

Torey Earle: Wire comes in here wire goes out here and if the circuit is off. No electricity will flow between the two. If a circuit is on that closes it and electricity will flow.

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00:12:11.640 --> 00:12:31.140

Torey Earle: Of this one is just a little different. This is called a three-way switch and if you'll notice, hold it up, it does not have off and on, on it. It is just designed to interrupt the current flow from two locations within a house or an office.

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00:12:32.280 --> 00:12:48.120

Torey Earle: So, if you wanted to have a light or a switch that you are able to turn on from one interest store and then turn off from another entrance door. This is the kind of switch you would use those on one side, there are two screws.

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00:12:49.410 --> 00:12:53.760

Torey Earle: On the other side, there is only one screw and then a ground skirt.

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00:12:55.320 --> 00:12:58.920

Torey Earle: This is designed to have electricity come in through this

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00:13:00.180 --> 00:13:13.800

Torey Earle: And then two lines go out to another one of these switches and that will allow the circuit to be broken from two different locations. So, if you come in one door and turn your light on

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00:13:14.400 --> 00:13:19.230

Torey Earle: You go out another door. There's another one. These types of switches there you can turn your light on

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00:13:20.460 --> 00:13:26.460

Torey Earle: Control light or a circuit from two different locations coming into or out of a room.

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00:13:28.650 --> 00:13:31.890

Torey Earle: As we ramp up our control the flow activity today.

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00:13:33.120 --> 00:13:37.200

Torey Earle: review a little bit. What did you learn about switches? What is a switch?

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00:13:38.490 --> 00:13:49.290

Torey Earle: What does it do what, how does it stop or start current flow within a circuit. What are the different types of switches? How are they used?

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00:13:50.250 --> 00:14:02.100

Torey Earle: And hopefully some of these things will help you as you start to develop your 4-H electric project or maybe even a 4-H electric project state fair project.

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00:14:03.300 --> 00:14:13.800

Torey Earle: Now, each one of these individually is not a state fair project but again they are going to give you the skills that you would need to help you develop a state fair project.

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00:14:15.570 --> 00:14:33.870

Torey Earle: Thank you for joining me today for the Kentucky 4-H virtual experience focused on Science, Engineering and Technology. For more information about the 4-H program, please check out your local University of Kentucky Cooperative Extension Service.