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Overview

DIY Electric Igniters

In this project we're making electric ignitors! This DIY electronic igniter is perfect for setting off fireworks from a safe distance. It's a great way to launch explosives without having to use lighters or matches. All of the components fit inside the chipboard enclosure. You can cut out the design with scissors or a cutting machine!

We think this is a safe way to light off fireworks. It's a great way to get young kids involved. They can light off fireworks at a safe and distance without the danger of burning their fingers. It’s also great for assistive tech so folk who might not have the dexterity in their hands can still set off fireworks.

This project is intended for adults, young children should be under parental supervision at all times. Explosives are be dangerous and should be taken with caution.
Circuit Playground Button Input

Our button was constructed out of chipboard and was inspired by the Nintendo Labo. It features a spring mechanism that allows the button to be held momentarily.

We made this into a downloadable template that you can print and cut out yourself. We think this works great with other projects like the Circuit Playground Express.

Inside the box are two 9V batteries, cooper tape and sets of wire. When the button is actuated, it closes a circuit and allows current to flow through the kanthal wire.
From Wikipedia, Kanthal is the trademark for a family of iron-chromium-aluminium (FeCrAl) alloys used in a wide range of resistance and high-temperature applications. The alloys are known for their ability to withstand high temperatures and having intermediate electric resistance. As such, it is frequently used in heating elements.

Reusable Igniter

We hand coiled a piece of Kanthal wire, a ferritic metal, to heat up our fuses and ignite our fireworks. The wire is powered by two 9V batteries, which will provide enough power to brightly heat up our coil!

Parts

We'll need just a couple of parts to build our own ignition box. Check out the list below!
1 x Kanthal Wire
http://a.co/41Mv7qC

2 x Chipboard
Medium Weight Sheets - 25 Per Pack. (12 x 12)
http://a.co/94Tg56C

1 x Cricut Vinyl Cutter
Smart Cutting Machine
https://home.cricut.com/

Alkaline 9V Battery
Battery power for your portable project! These batteries are high quality at a good price and work fantastic with any of the kits or projects in the shop that use 9V. These...
https://www.adafruit.com/product/1321
9V battery clip with 5.5mm/2.1mm plug
I found these high-quality battery clips. They're molded plastic so they won't tear like cheap clips, and they cover the battery terminals to prevent shorts. Comes with a...
https://www.adafruit.com/product/80

JST PH 2-Pin Cable - Female Connector 100mm
Red and black tinned wires with a 2-pin JST PH connector on the end. 4" / 100mm long. Matches up nicely with our Lipoly chargers!
https://www.adafruit.com/product/261

Copper Foil Tape with Conductive Adhesive - 6mm x 15 meter roll
Copper tape can be an interesting addition to your toolbox. The tape itself is made of thin pure copper so it's extremely flexible and can take on nearly any shape. You can easily...
https://www.adafruit.com/product/1128

Small Alligator Clip to Male Jumper Wire Bundle - 6 Pieces
When working with unusual non-header-friendly surfaces, these handy cables will be your best friends! No longer will you have long, cumbersome strands of alligator clips. These...
https://www.adafruit.com/product/3448
Short Wire Alligator Clip Test Lead (set of 12)
Connect this to that without soldering using these handy mini alligator clip test leads. Approximately 4.5" overall cables with alligator clip on each end, color coded. You get 12...
https://www.adafruit.com/product/1592

Circuit Diagram

Two 9V batteries are wired in parallel, with both the negative and positive wires tied together respectively. We can use 9V battery clips to make solid connections.

Wires from the battery clips are spliced together into a 2-pin JST cable. A momentary button is wired inline with the negative connection to allow the circuit to be opened and closed with the press of the button. In this project, we'll construct our own push button out of chipboard and copper tape.
A coil of kanthal wire is connected to alligator clips and wired to the positive and negative connections respectively. It should take about 3 seconds to fully heat up the coil.

## Button + Box Assemble

### Box Parts

Download, print and cut out the design temples for all of the button and box parts. You can use thick card stock, but we recommend use medium weight chipboard (30pt). Cut the outlines with scissors, laser cutter or a simple vinyl cutter.

### Score Fold Lines

You can assign the included score fold lines to the dashed lines on the template. Cutting machines can use a score tool while cutting out the design, but we'll need to add a slight cut to the score lines. This will help keep the wall more ridged when assembling our components.

Project on Cricut Design Space

labo_button.svg

boxfold-ignite.svg

sparky-label.svg
Remove slots

We'll need to clean up the slot areas with a sharp hobby knife.

Use flush cutters to remove any hanging pieces. Don't tear them off as they will take a whole layer of cardboard with it!
Stem

Score

We used a ruler with a grippy bottom and a hobby knife to add a slight cut to the score lines. This helps to keep the walls ridged when assembling.

Fold

Apply pressure to create a straight clean fold on each fold line. Make sure the fold is clean or the part will unfold itself.

Connect Tab

Fold the middle tab into the slot opening to complete the stem part assembly!
Spring

Add clean folds to each vertical line on the part.

Use a flat tool like a spudger to fold the spring sections in a zig zag pattern as shown in the pictures.

Don't fold any of the larger tabs. The two ends will connect to form the spring holder for the stem.
Steam and Spring

Insert the stem part into the center part of the spring part with all of the small tabs pointing in the same direction as shown.
Button Top Cover

Carefully add clean straight folds to the score lines.

This section is really close to the parts framing, so be careful not to bend outside of the score lines.
Button Cover

Carefully fold the score lines, these are close to the edges as well.

The small tabs all press fit into each slot around the part. Gently press the tabs at an angle to prevent the slots from tearing.
Top Cover Insert

Take the stem and spring assembly and fit the top button cover from the spring side. Careful not to bend the spring tabs.

Bottom Cover Insert

Insert the bottom cover from the opposite side of the springs. Gently fit each corner at an angle to tightly fit over the stem and spring assembly.

Tabs

Press fit the small tabs on the bottom cover part into the top cover slots. Insert at an angle to prevent the slots from tearing.
Spring Connect

With the top and bottom button cover attached we can complete the assembly by connecting the small tabs on the spring into the slots on the stem.

Button Cover Connect

Next we'll press fit the small tabs on the stem into the four slots on the button cover.

Spring Test

Finally, we can test the springiness of our button!
Box Fold

The box requires the same slight cut on the score lines. Use a ruler to help cut the long sections of the folds. Use a spudger to really help add sharp folds. If the box doesn't stay ridged, make sure all of the score folds have had enough pressure applied to each score line.
Circuit Assemble

Copper Tape Stem

The copper tape is placed on the bottom of the stem.

Wrap the copper tape around the fold tab as shown on the picture. Leave more than enough copper tape to form a long tab as shown in the picture. The tab will allow the alligator clip to connect to button stem.

When the button cover is pressed, the bottom of the stem will make contact with the copper traces on the rest of the box.
Circuit Layout

Follow the copper trace pattern as shown in the picture. Form the "F" shape in the center of the box enclosure. Start above the box tab slots and place until you get to the middle part of the second section of the box.

Use a spudger to press the copper tape on the box enclosure.

Tape Tabs

We'll need long wires to connect the wire coils. We cut two pieces of 4 foot (1.2 meter) long wires. Fold pieces of copper tape into tabs to connect the wires to the rest of the circuit in the box.
9v battery connector

Now we'll need to connect the two 9v battery connectors together by soldering them to a female JST connector.

First fit heat shrink around each wire before soldering the wires together.

We’ll connect the the two red wires to the red wire on the JST connector. Do the same with the three black wires.

Fit the heat shrink over the soldered connections and use the side of the iron to heat.

Jumper Aligator Clips

The batteries will connect to the circuit on box enclosure via alligator clips.

We'll carefully plug in the jumper to alligator clips into each JST port.
Twist Wires

You can twist the wires to help keep them organized. You can do it by hand or use this 3d printed drill bit ()!

Button Insert

Insert the button assembly into the center slot on the box enclosure. Carefully press fit each corner at an angle to prevent the tabs from tearing.

Thread Wires

Pass the twisted wire pair through the smaller opening on the box enclosure.
Place Parts

Place the two 9v batteries to one side of the enclosure. You can use foam tape to secure them to the wall.

Connect Clips

Now we can carefully connect an alligator clip to the copper tab on the button stem and the other to the tab on the box enclosure.

Close Box

Arrange the smaller tabs over the large walls of the enclosure to carefully close the box.

Test push the button to make sure the stem is not obstructed and can reach the copper tape inside the enclosure.
Coil Wires

The heating coil is available pre coiled but we picked up a spool and use a small screw driver to coil around and made our own.

Now we can connect the heating coil to the extension wires. To make swapping coils easier, we used short alligator clips to hold them. This works when placing the heating coil close the the fireworks fuse.

We can also use a third helping hand to easily hold the alligator clips at an angle.

Test Heat Coil

Finally we can test heat the coil. Press the button on the box enclosure. Fresh batteries should heat the coil bright yellow in about three seconds!
Graphics

To add detail to ignitor, we printed these Minecraft graphics and used a glue stick to adhere to the three wall of the enclosure.
Fuse extension

Most fountain type fireworks have their fuses above the ground. We added a fuse extension to reach the floor, were it will be close to the heating coil.
Light it up!

Set the box enclosure on the flat level surface. Make sure the wire is long enough to light from a safe distance.

Carefully set the firework fuse close to the heating coil and push the button to ignite the fuse!