ARDUINO MODEL ROCKET LAUNCHER FOR 3D PRINTED ROCKETS

By chall2009 (/member/chall2009/) in Technology (/technology/) > Arduino (/technology/arduino/) 43,688 308 14 Featured

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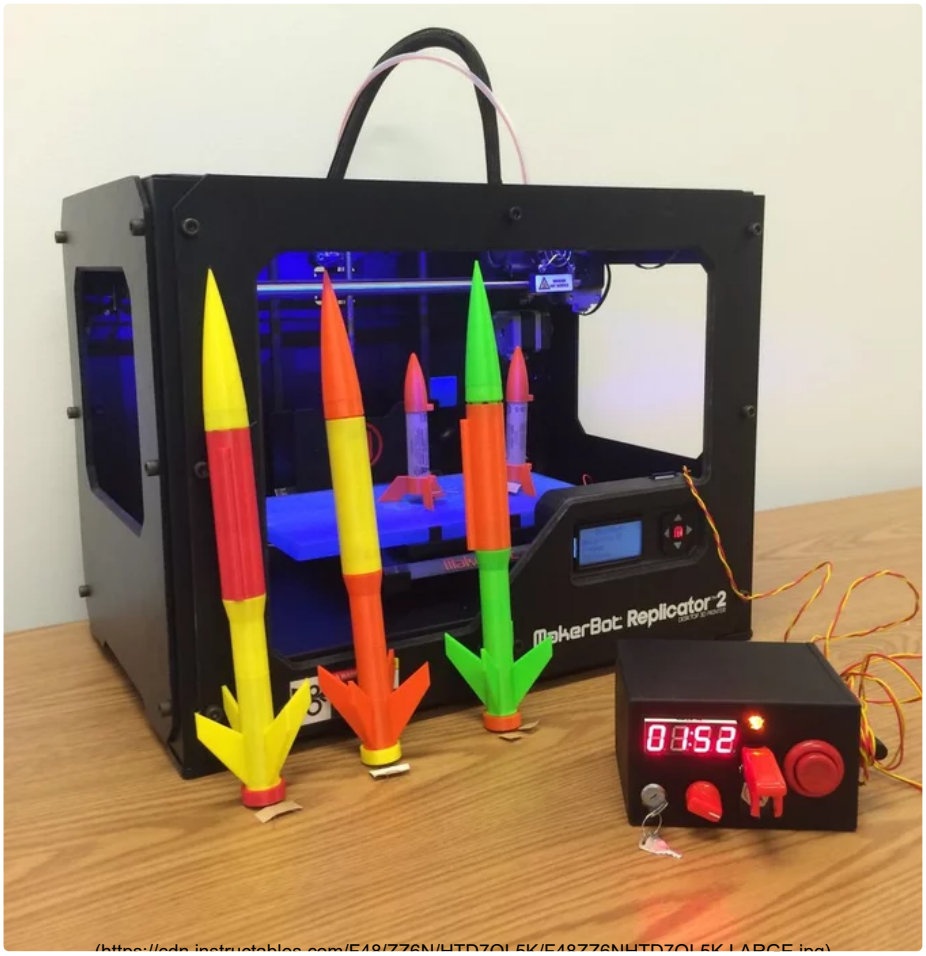
3D Printed Rocket Launch



(/member/chall2009/)
By **chall2009 (/member/chall2009/)**
ChallTech (http://www.challtech.com)
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About: Studying Technical Entrepreneurship at Lehigh University. Owner of ChallTech, LLC. I'm a bioengineer that hates biology. http://www.challtech.com More About chall2009 » (/member/chall2009/)

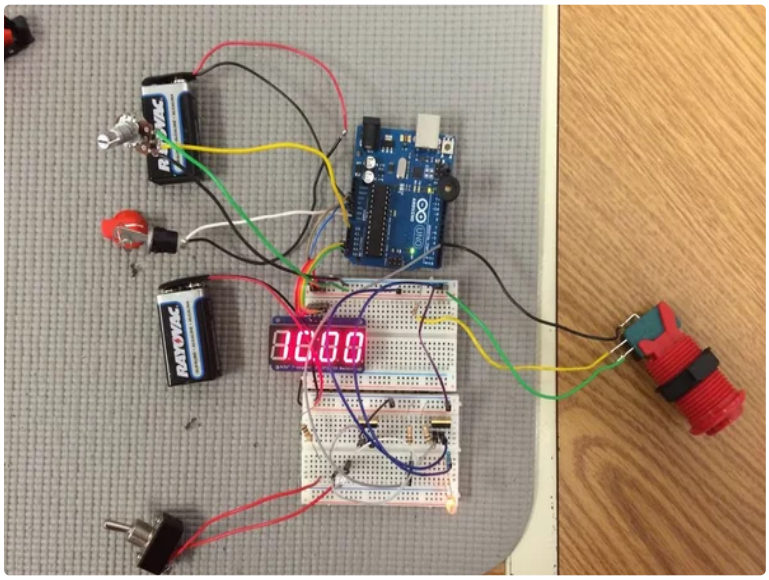
Intro: Arduino Model Rocket Launcher for 3D Printed Rockets

When I was a kid, I loved playing with Estes Rockets, so I decided to get back into the hobby but using all of my maker skizzls. So here's a really cool Arduino Rocket Launcher launching 3D Printed rockets from my MakerBot Rep2! Enjoy! Fully Open Source for anyone to make!

Arduino Code on GitHub (https://github.com/chall2009/Arduino-Rocket-Launcher/blob/master/LICENSE)

Thing Files for 3D Printing on Thingiverse (http://www.thingiverse.com/thing:284198)

Step 1: Acquire All the Components



Things you are going to need to complete the Instructable and Launch your own 3D Printed Rocket are put together in a comprehensive list in an Excel Spreadsheet with links to the components I used - You can always use your own if they are laying around!

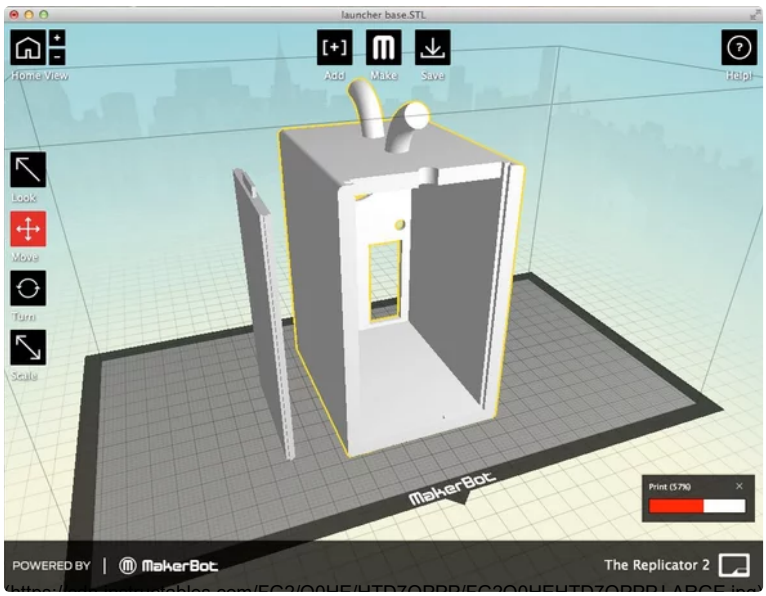
For the actual rockets - I highly recommend designing your own or finding one on Thingiverse.com. Also having a 3D printer, experience with Arduino, and knowing how to solder will be incredibly useful in making the launcher and launching your own 3D printed Rockets!

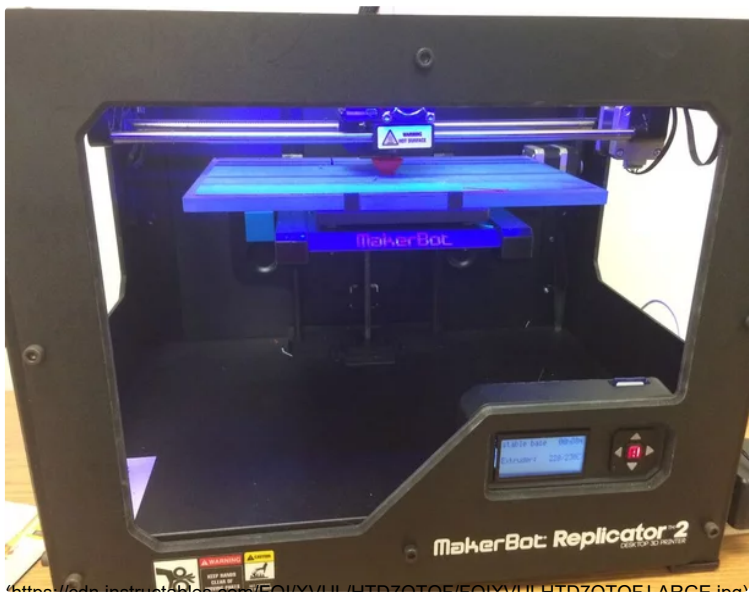
Also if you are under 18, please acquire an adult for supervision! You will be using (controlled) explosives later on!

Components and Sour... Download (https://cdn.instructables.com/ORIG/F1W/KN7I/HTD7QNYP/F1WKN7IHTD7QNYP.xlsx)

(https://cdn.instructables.com/ORIG/F1W/KN7I/HTD7QNYP/F1WKN7IHTD7QNYP.xlsx)

Step 2: Start 3D Printing Rockets and Enclosure for the Arduino Rocket Launcher





I've hosted all of my 3D printing (.STL) files for the Launcher on Thingiverse and even the SolidWorks files if you want to tweak them:

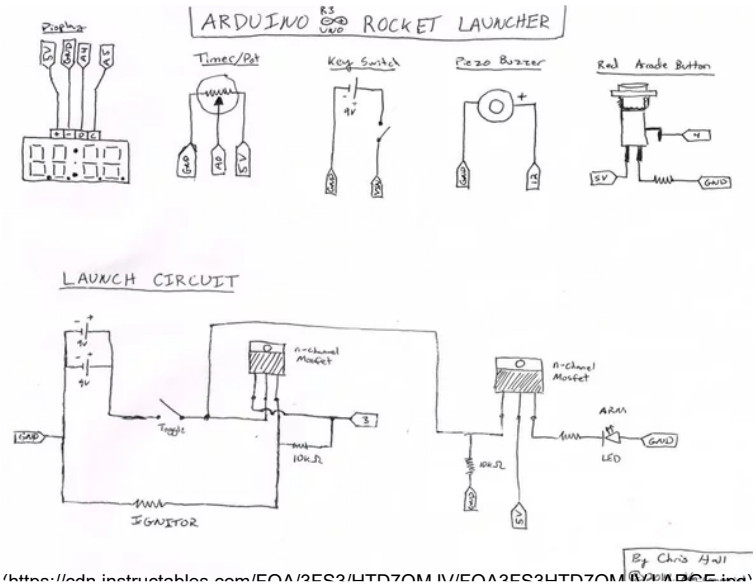
http://www.thingiverse.com/thing:284198 (http://www.thingiverse.com/thing:284198)

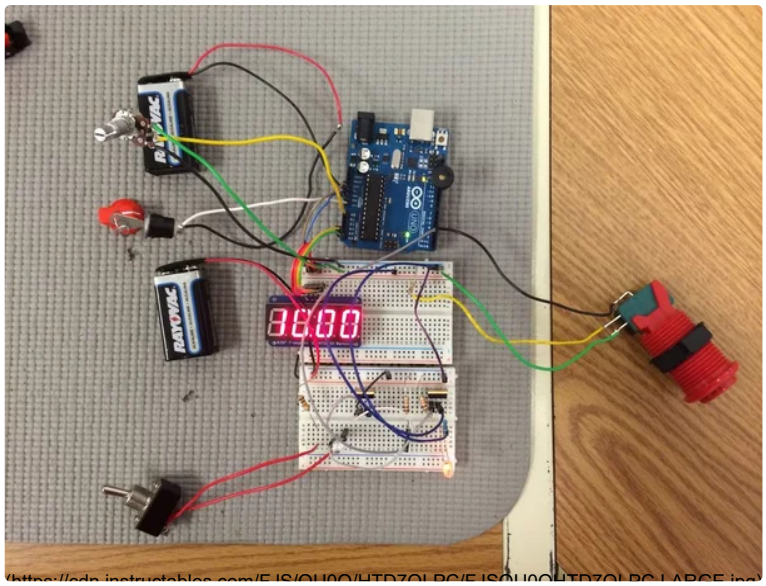
I've found the best way to orient the print for the launcher case is shown in the screenshot of MakerWare. I printed it with .2mm height and with a raft. Using no supports works just fine, despite the overhangs.

For the Rockets, I suggest either the following (I will add more as I test them):

3D Printed Rocket with Forward Swept Fins by QwykSylver (http://www.thingiverse.com/thing:123586)Disposable Rocket by kebes22 (http://www.thingiverse.com/thing:127354)

Step 3: Follow the Schematic and Build It on a BreadBoard First





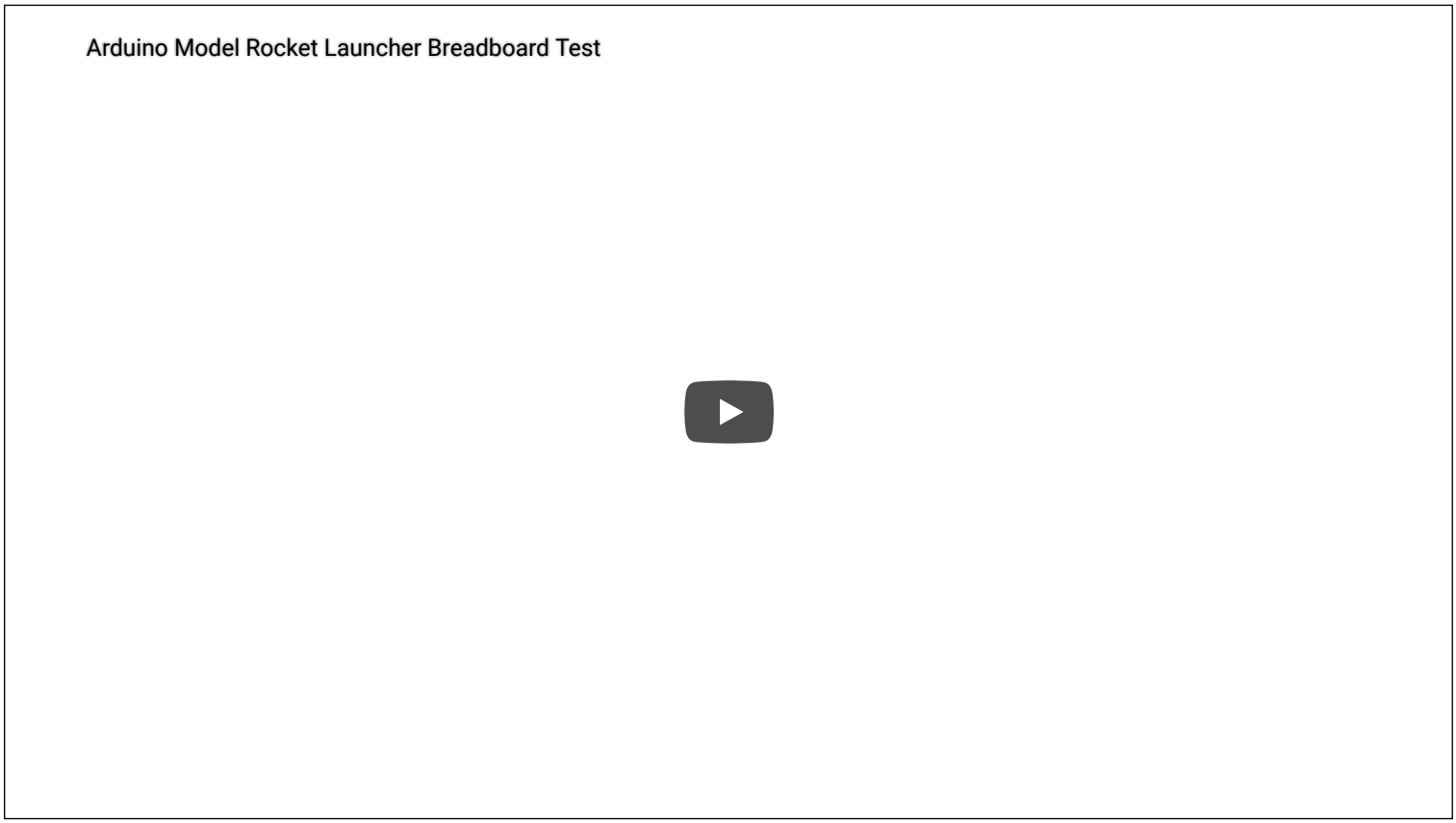
Once you have the components, build the circuit on a breadboard and connect it to the Arduino. This is advanced for someone getting started in electronics/wiring/Arduino, but if you have some experience with electronics this step won't be too bad.

The Arduino code can be found on my GitHub: https://github.com/chall2009/Arduino-Rocket-Launch... (https://github.com/chall2009/Arduino-Rocket-Launcher)

Note: You will also need Adafruit's Arduino Libraries to run the red 7 segment display.

Adafruit_LEDBackpack - https://github.com/adafruit/Adafruit-LED-Backpack... (https://github.com/adafruit/Adafruit-LED-Backpack-Library)Adafruit_GFX - https://github.com/adafruit/Adafruit-GFX-Library (https://github.com/adafruit/Adafruit-GFX-Library)

Step 4: Test the BreadBoard



To test to see if you wired the breadboard correctly, your launcher should function just as it does in the video. If something doesn't work, go back and double check your wiring and connections.

The potentiometer is used to set a time between 1second - 2 minutes and the red arcade button begins the countdown. The toggle switch closes the "launch" circuit and acts as a safety mechanism. Only when it is closed will power be sent to the rocket to ignite the engine. The amber/yellow LED acts as our "Armed" indicator.

Note: You can use an LED with a resistor instead of an ignitor to test if current is going to the Launch Circuit. Current only flows for the duration of the buzzer after the timer counts down.

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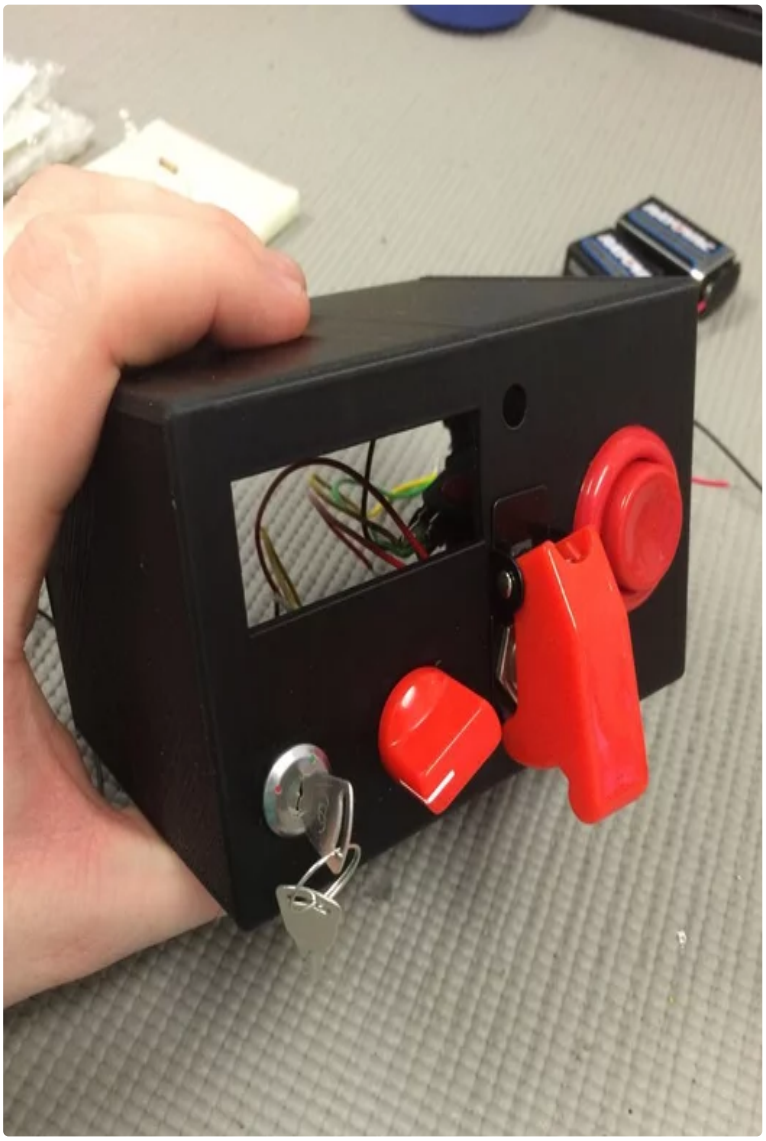
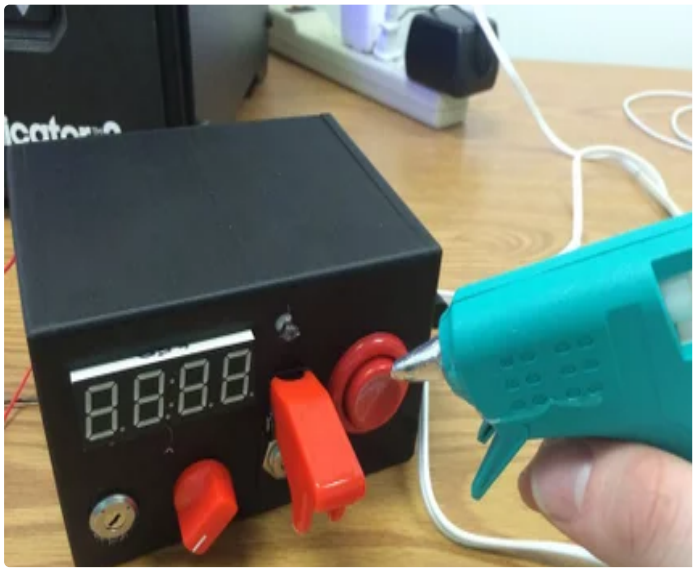
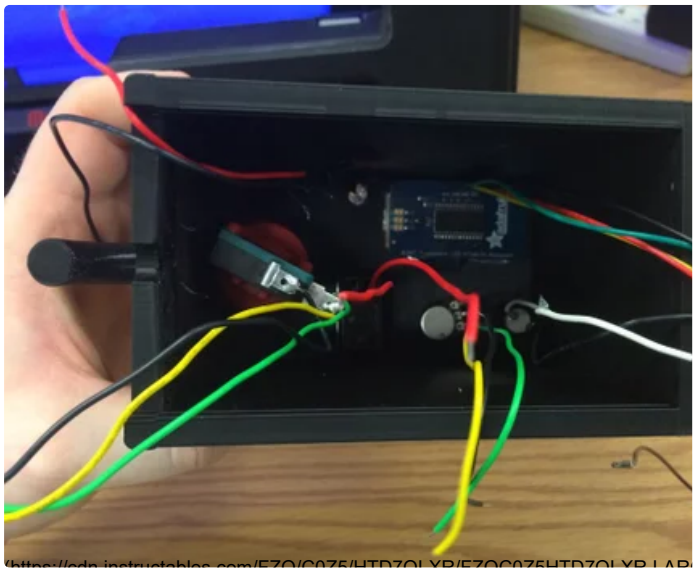
Step 5: Take the 3D Printed Case and Mount the Electronics

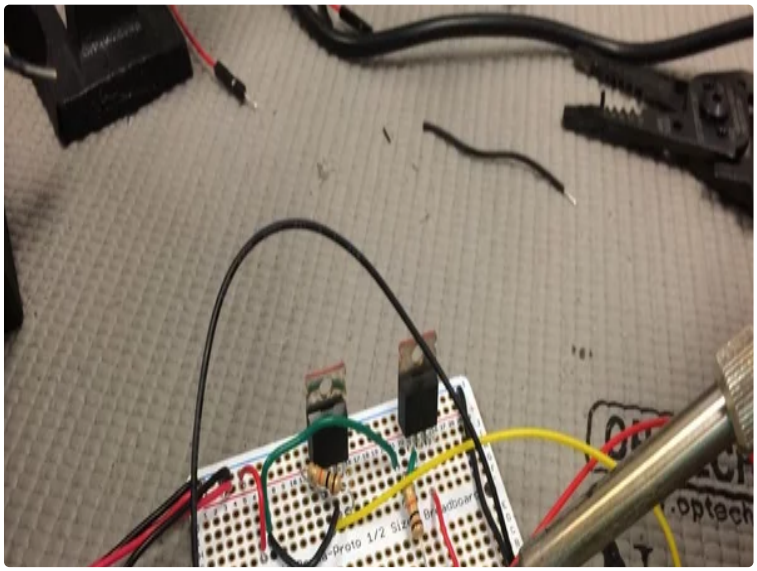


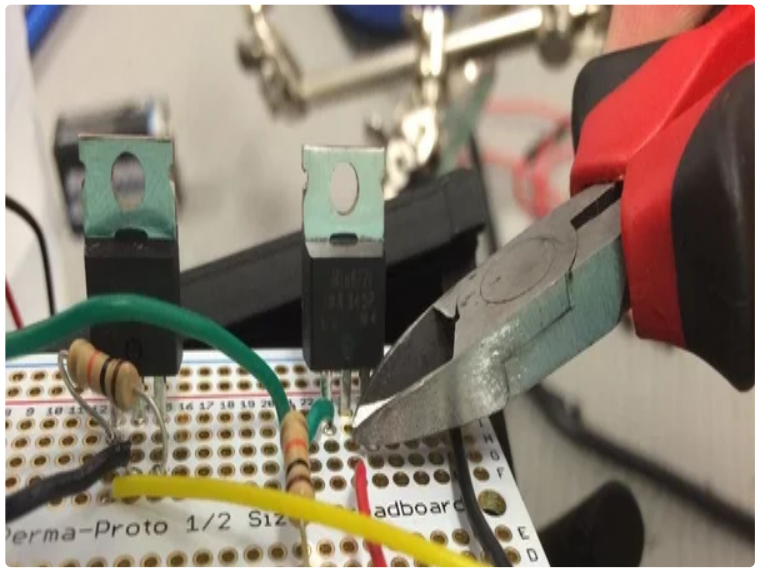




I used a glue gun to mount some the electronics. The holes have a high tolerance, so adding in some extra glue tightens everything up nicely. Since most of the parts are panel mounted, you don't need much glue. Make sure you give yourself plenty of extra wire to connect to the Arduino board.

Step 6: Move the Circuit to a Protoboard or Arduino ProtoShield





In order to get the launcher ready for the field, transfer the circuit from a breadboard to a Protoboard or Arduino Protoshield. This will make your launcher much more reliable so you aren't left fiddling with it in the field and can spend more time launching rockets. It will also allow you to quickly remove your Arduino Uno for other projects.

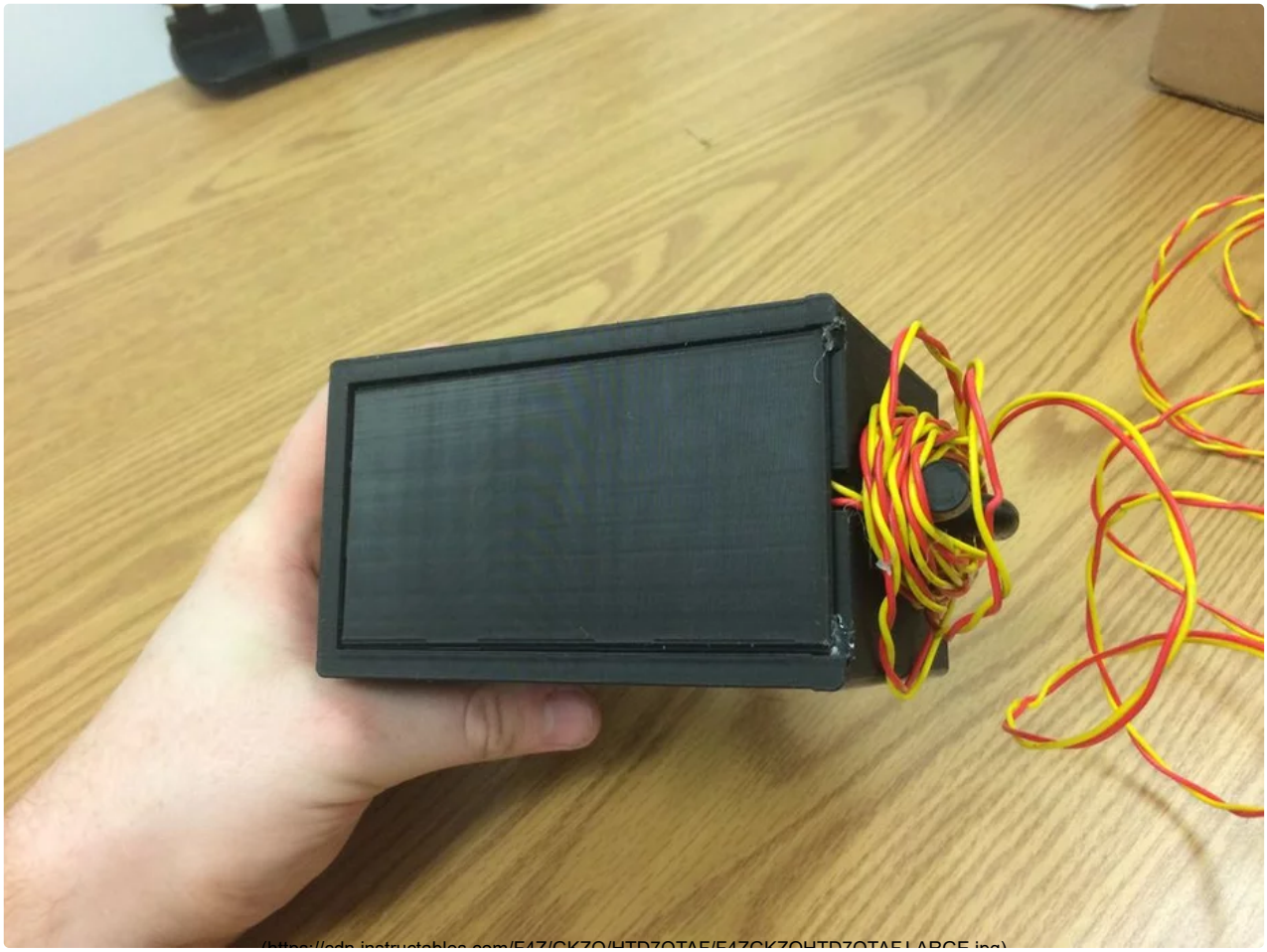
Note: Soldering is required for this step. If you don't know how, I highly suggest using Adafruits Learning System: http://learn.adafruit.com/adafruit-guide-excellent... (http://learn.adafruit.com/adafruit-guide-excellent-soldering/tools)

For Protoboard, I suggest Adafruit's (Can you tell we love Adafruit?) Arduino Protoshield: https://www.adafruit.com/products/51 (https://www.adafruit.com/products/51)

Make sure you cut any extra wire in order to minimize the possibility of short circuits.

For the two leads that go to the launch pad, use about 20 ft of wire in the colors of your choosing. I chose red and yellow. Put gator clips on the end so you can clip it to the ignitor for the rocket engine. You can then wrap the wire around the cleat on the side of the case.

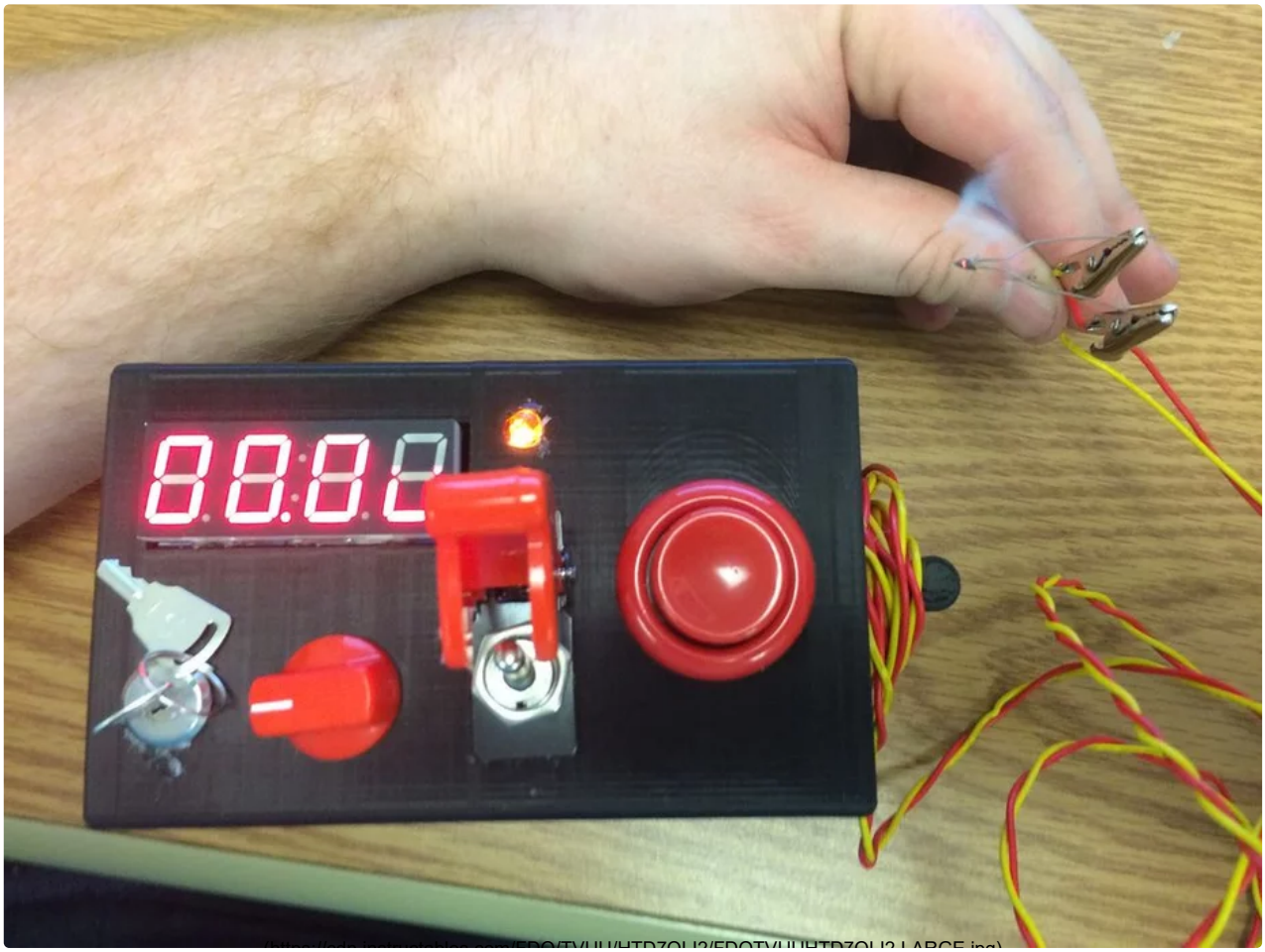
Step 7: Package Electronics in the 3D Printed Case



Package all the electronics and Arduino in the case carefully. Make sure you don't have exposed wires that aren't insulated. Everything will fit nice and snug, don't be afraid to add a little pressure. To keep the back cover on you can use some tape or glue. I love using a glue gun because I can re-heat the glue to undo what I did.

Step 8: Test Fully Assembled Unit

Arduino Rocket Launcher Full Assembly Test

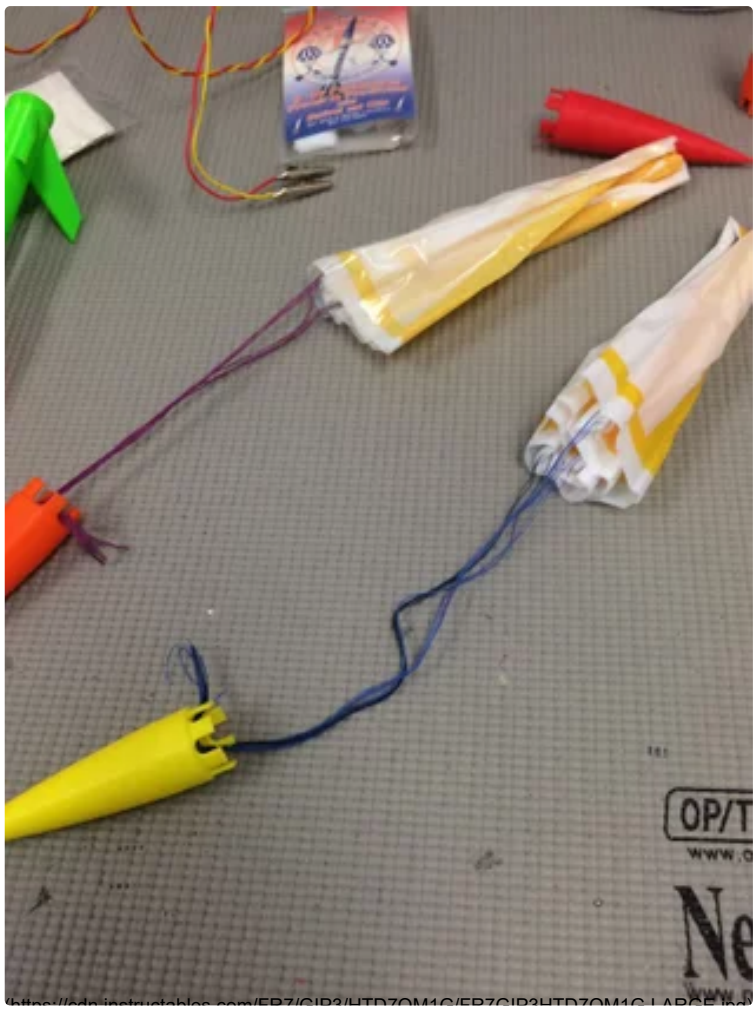


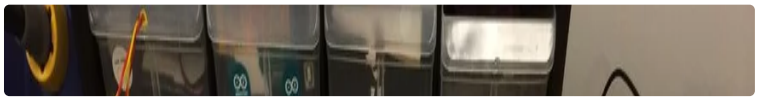
Your unit should work just as it does in my video. I used an ignitor to make sure it performs as expected. If it does not work as expected, go back and double check your connections and the schematics.

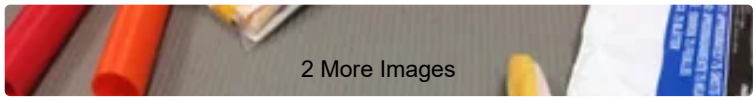
DO NOT LAUNCH ROCKET ENGINES INSIDE!

Step 9: Assemble 3D Printed Rockets for Launch

How to prepare a model rocket for flight







I love the 3D Printed Rocket with Forward Swept Fins by QwykSylver (http://www.thingiverse.com/thing:123586) so I'm going to use them to show you how to prepare for a launch.

Attach the parachutes with a simple knot to the capsule. The parachute is made by Estes, but I'm sure you can make your own out of a grocery bag and some string.

The embedded video shows how to prepare a rocket for launch - it uses different components but the process is the same.

Estes Model rockets have been around a long time so there is a lot of resources on line to help with you with this process. Here's a great guide to their ignitors and motors. (http://www2.estesrockets.com/pdf/Model%20Rocket%20Engines%20&%20Igniters.pdf)

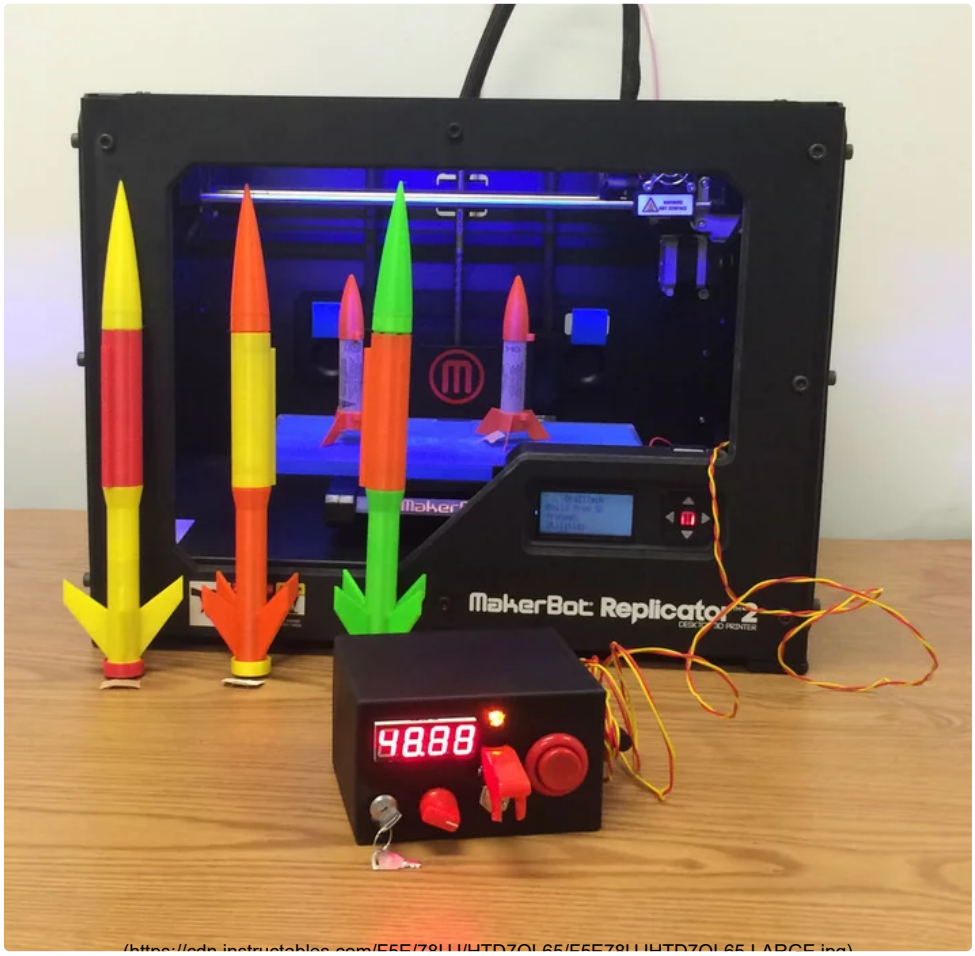
The Process is simple - ignitor end goes into the whole of the motor first, then the plug to keep it in. Attach the two gator clips of the leads to the ignitor when your on the launch pad.

Step 10: Assemble the Launch Pad

The launch pad is pretty basic. The things you need are:

1. A long thin 1/16" rod. You can find these at your local hardware store or hobby shop.
2. Some type of ceramic plate or aluminum plast reflector (I actually used a old pizza tray.)
3. Some way to anchor it to the ground, a weight or the quick 3D printed base I made.
4. I also 3D printed a red ball to prevent people from poking their eye out when I'm transporting the long thin stainless steel rod.

Step 11: Launch Your Rockets!



Go to a nice big field that's away from a lot of dry brush and away from the population. Find a place that has:

Open Area - It is very important you launch your model rockets in open areas, away from homes and businesses. It is recommended to use an open field, like a farm or athletic field. Make sure to ask for permission first.

Even Ground - Launch your rockets from a level platform and always straight up. If the launch pad is tilted just a few degrees your rocket could end up several hundred feet away. Flying your rocket at a 90 degree, perpendicular angle will offer the maximum height out of your rocket engines.

Launching Procedure:

Follow all general safety tips here: http://www.wikihow.com/Launch-a-Model-Rocket-Safel... (http://www.wikihow.com/Launch-a-Model-Rocket-Safely)

1. When the coast is clear, and your ready to launch, insert the key into the launcher and turn it to the right, the Arduino will boot up and play a sound.
2. Use the knob to set the countdown - 1second - 2 minutes.
3. Flip the toggle switch on, the Amber/Yellow should shine indicating the system is armed.
4. Hit the RED arcade button to start the launch.
5. When the countdown hits 0, current is sent to the ignitor while the buzzer is on and the rocket will blast off! If it doesn't blast off during those 8 seconds. Wait about 5 minutes

before approaching the launch pad (you probably have a dead engine or the ignitor broke - they are fragile!).

PLEASE EXERCISE SAFETY AND EXTREME CAUTION AND HAVE SUPERVISION IF UNDER 18 - I AM NOT LIABLE FOR ANYTHING YOU DO.

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I Made It!

Recommendations

(/id/Dovetailed-Arduino-Humidity-Sensor/)

Dovetailed Arduino Humidity Sensor (/id/Dovetailed-Arduino-Humidity-Sensor/)
by WickedMakers (/member/WickedMakers/) in Technology (/technology/)

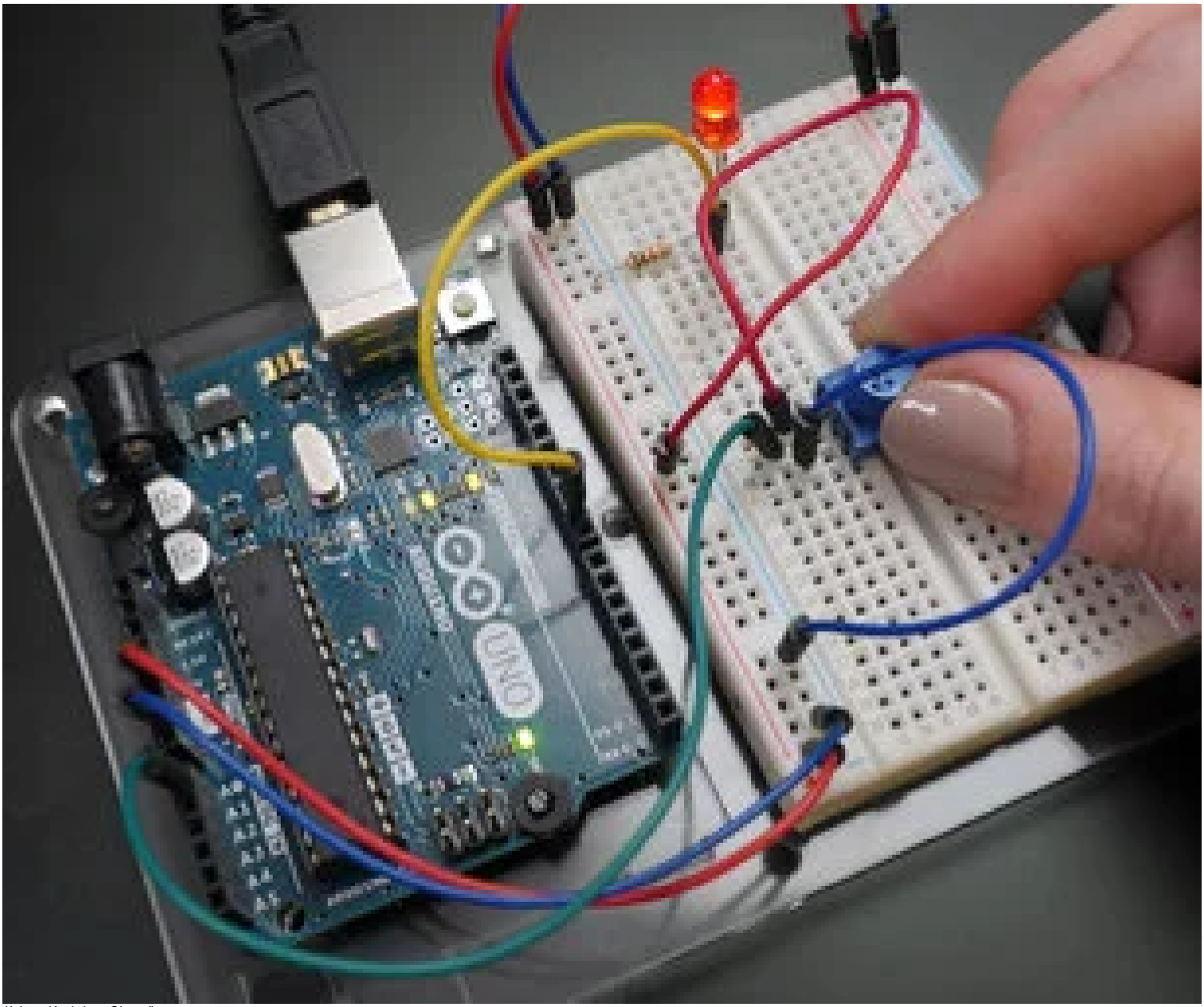
(/id/Spooky-Teddy-Arduino-Powered-Self-rocking-Chair-Ro/)

Spooky Teddy - Arduino Powered Self-rocking Chair & Rotating Head (/id/Spooky-Teddy-Arduino-Powered-Self-rocking-Chair-Ro/)
by gocivici (/member/gocivici/) in Arduino (/technology/arduino/)

(/id/Bucky-Touch-Light-up-Dodecahedron-Instrument/)

Bucky Touch: Light-up Dodecahedron Instrument (/id/Bucky-Touch-Light-up-Dodecahedron-Instrument/)

by jbumstead (/member/jbumstead/) in Arduino (/technology/arduino/)



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Please be positive and constructive.

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14 Discussions

(/member/TonyaL/) TonyaL (/member/TonyaL/) a year ago

Reply | Upvote

Do the two batteries run the Arduino and clock? How many launches do you get out of the two 9 volt batteries? I find my 6 volt launcher only does about a dozen launches before I have to change batteries.

(/member/JulianA12/) JulianA12 (/member/JulianA12/) 3 years ago

Reply | Upvote

Can you put a schematic for the conections?

(/member/WarriorStudio/) WarriorStudio (/member/WarriorStudio/) 5 years ago on Intro

Reply Upvote

Someone should make an instructables on how to build the launch controller. like the one you made, but with simple ICs instead of a whole Arduino. Would be cheaper and more available. Thanks for the guide.

(/member/wilgubeast/) wilgubeast (/member/wilgubeast/) 5 years ago on Intro

Reply Upvote

Sounds like Estes rockets might be into sponsoring a contest on Instructables this summer. Stay tuned.

2 replies

(/member/Lee73/) Lee73 (/member/Lee73/) 5 years ago on Intro

Reply Upvote

Very cool, great work... I just built one with a trio of 555's, not as fancy with the countdown display, that's for sure...
By the way - that is one big mosfet to drive an LED!

1 reply

(/member/Doctroid/) Doctroid (/member/Doctroid/) 5 years ago on Intro

Reply Upvote

Interesting project... though I'm not sure I'd want to use a microcontroller as the basis for a single station launcher; a bit of overkill. But on the other hand, looks like more fun than your standard Estes controller (a button and an LED). Out of curiosity, how much do the rockets come out weighing (excluding motor)?

(/member/conduit-project/) conduit-project (/member/conduit-project/) 5 years ago on Intro

Reply Upvote

Let's get ready for war!

(/member/xxxxxxxxxxxxxxxxxxx/) xxxxxxxxxxxxxxxxxxx (/member/xxxxxxxxxxxxxxxxxxx/) 5 years ago on Intro

Reply Upvote

Nice big red button to launch the rocket!

(/member/hahmed11/) hahmed11 (/member/hahmed11/) 5 years ago

Reply Upvote

Greatttt

(/member/Patrick S/) Patrick S (/member/Patrick S/) 5 years ago on Intro

Reply Upvote

Insane yo! Not often do I see an Arduino project that's this fun (and explosive). Killer work.

(/member/Danger is my middle name/) Danger is my middle name (/member/Danger is my middle name/) 5 years ago on Intro

Reply Upvote

Awesome!

Post Comment