



AdaBox 013

Created by John Park



<https://learn.adafruit.com/adabox013>

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Introduction

Hi there!

[If you're looking to subscribe to AdaBox, click here! \(https://adafru.it/tNC\)](https://adafru.it/tNC)

If you're here, it's because you were given the gift of electronics with an AdaBox! Perhaps you are a beginner who is getting started with your AdaBox. Or maybe you just want to relive what it's like being a beginner at electronics again. But most of all, you want to learn how to build and make creative, awesome stuff with electronics, graphics, and coding! ([If, rather than learn all that, you'd like to look at pictures of cats instead, please check https://www.adafruit.com/galleries/cats-of-engineering \(https://adafru.it/oAd\)](https://www.adafruit.com/galleries/cats-of-engineering))

And, you're in luck: there's never been a better time. Seriously. We're not just saying that. It's bonkers how great a time this is for you to learn electronics, graphics, coding, prop-making, and costume effects!

Gone are the days where you need thousands of dollars of equipment and lots physics/math background. Nowadays, if you want to learn to work with electronics, and code microcontrollers you can jump right in for \$100 or less, and any sort of computer. And we're talking about learning a lot of electronics, graphics, coding, prop-making, and costume effects - from the basics of setting up a dual-screen microcontroller, to customizing your eyeball graphics, and sound effects! From integrating interactive eyeballs into your costume, to making your own microphone reactive display! With a good pack of parts and materials, you can build a base of knowledge that will take you from your first set of spooky cat eyes to someone who can make the creative haunt props, costume accessories, and interactive projects of their dreams!

Who is this for?

Anyone who is interested in learning how to program and build interactive projects, and with access to a modern web browser. That's pretty much the minimum. Remember, this guide is specifically for people who have purchased or received an AdaBox subscription!

You don't need to know a lot of physics or math, and just like an Art Degree isn't required for making art and being creative, **you don't need to have a computer**

science or mechanical engineering degree. It helps if you're comfortable using computers but that's a skill most people pick up through life.

If you know how to program already - great! If not, don't worry, we'll teach you enough to be dangerous.

Who isn't this for?

While you can follow along without an AdaBox, it will not make as much sense unless you have all of the components and more which either came as a gift or purchased yourself - remember, the goal is helping beginners!

This guide is also not for crows. Corvids are awesome, [but they prefer analog tools \(https://adafru.it/CBc\)](https://adafru.it/CBc).

If you're an expert, please visit our hundreds other tutorials and jump right in at [learn.adafruit.com \(https://adafru.it/dlu\)](https://adafru.it/dlu)

Who are you?

Great question. This is me:

I'm Ladyada, and I love to teach people how to build stuff and how they can be creative with technology.

So, are you ready?

Let's do this thing!

Want to buy past AdaBoxes?



[AdaBox001 - Welcome to the Feather Ecosystem](#)

Please note! This is NOT the subscription version of AdaBox! This is ONLY AdaBox001 that shipped out to AdaBox subscribers in September of 2016. This...

<https://www.adafruit.com/product/3193>



[AdaBox002 – Making Things Move](#)

AdaBox002 - Making Things Move with our Feather Bluetooth LE Mini Robot Rover is the perfect gift for folks who are just getting started in the...

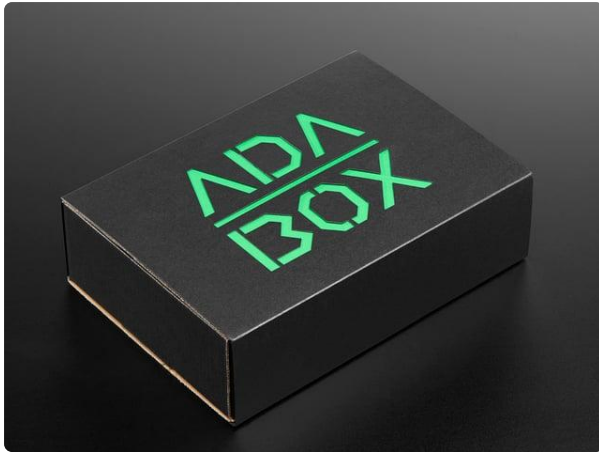
<https://www.adafruit.com/product/3235>



[AdaBox003 – The World of IoT – Curated by Digi-Key](#)

AdaBox003 – The World of IoT (Curated by Digi-Key) is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an...

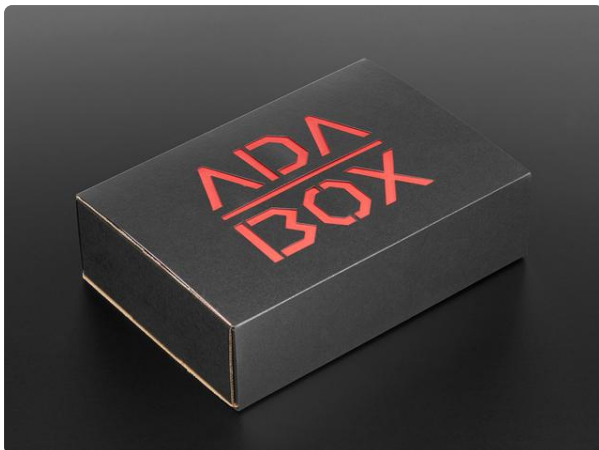
<https://www.adafruit.com/product/3268>



[AdaBox004 – Making Things Dance](#)

AdaBox004 – Making Things Dance is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent...

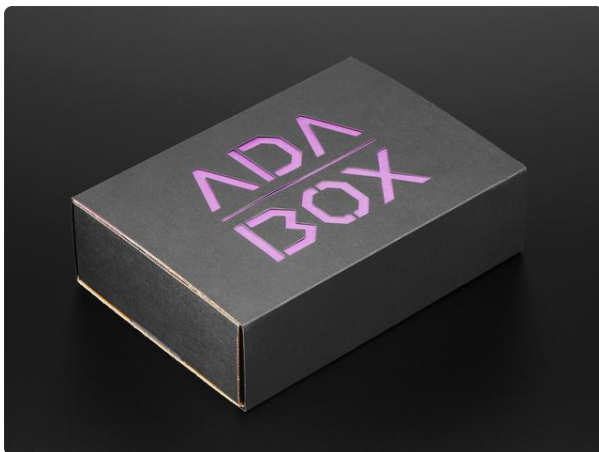
<https://www.adafruit.com/product/3370>



[AdaBox005 – Break for Pi](#)

AdaBox005 – Break for Pi is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent...

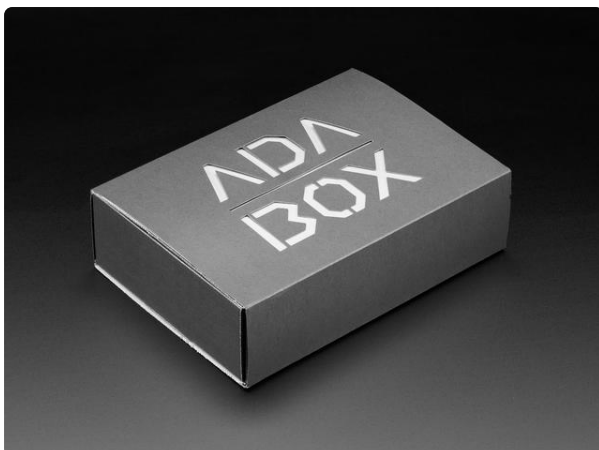
<https://www.adafruit.com/product/3644>



[AdaBox006 – CircuitPython](#)

AdaBox006 – CircuitPython is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent addition to our...

<https://www.adafruit.com/product/3697>



[AdaBox007 - SPY](#)

Discontinued - you can grab AdaBox...

<https://www.adafruit.com/product/3778>

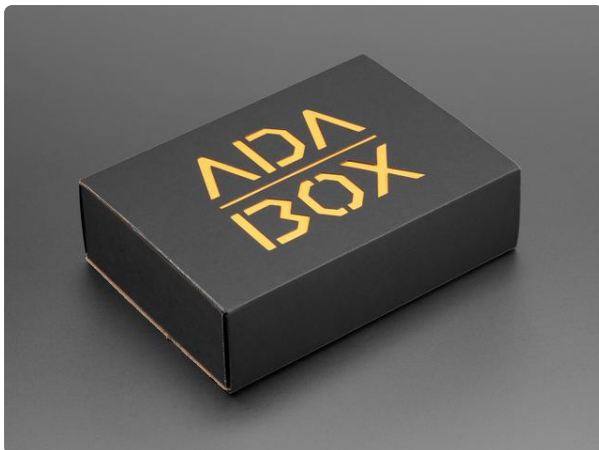


AdaBox008 - Octo Crickit

#MakeRobotFriend

Sometimes we wonder if robotics engineers ever watch movies. If they did, they'd know that making robots into servants always ends up in a robot rebellion. Why even go down that...

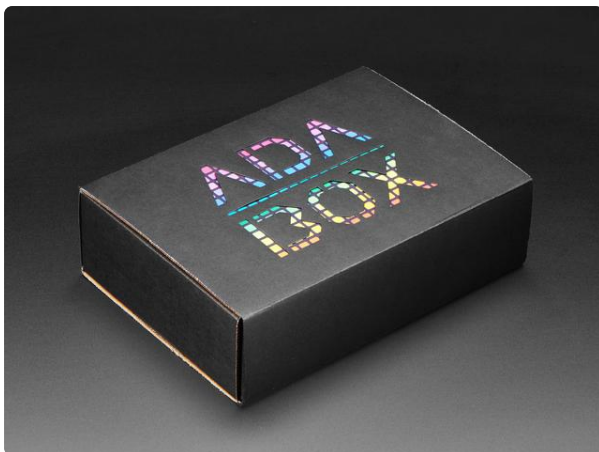
<https://www.adafruit.com/product/3906>



AdaBox009 - HalloWing

Are you the kind of person who doesn't like taking down the skeletons and spiders until after January? Well, we've got the ADABOX for you. This is electronics at...

<https://www.adafruit.com/product/3863>



AdaBox010 - Rainbow Trellis

This ADABOX is a multi-sensory feast - Lights! Sound! Squishy buttons! This box comes with a NeoTrellis M4. It's a grid of 4x8 silicone buttons, with a...

<https://www.adafruit.com/product/4018>



AdaBox011 - PyPortal

Reach out beyond your desk - to the stars and beyond - with PyPortal! This ADABOX features a new, easy-to-use IoT device that allows you to customize and create your...

<https://www.adafruit.com/product/4061>



[AdaBox012 - PyGamer](#)

Oh! Hello! If you're here, (and we suspect you are) it's because you want to reward yourself with the gift of handheld gaming development and coding with an AdaBox!...

<https://www.adafruit.com/product/4185>

Unboxing AdaBox 013

I was hacking in the lab quite late one night - soldering pins and debugging the bytes
- When suddenly a bang exploded with sparks, and a figure emerged from the hazy dark!

(It wore a mask) It wore a monster mask!

(The monster mask) Its eyes were LCD glass

(It wore a mask) It had some chips on the back

(The monster mask) And a sweet solder mask

This Halloween, you will be the spookiest in town thanks to ADABOX 13! Cat eyes, or monster peepers...The MONSTER M4SK board included in this BOX can be customized with different eyeball and sound effects to bring your costume or cosplay to life. You can wear the M4SK as a set of goggles, or break it apart to have two independent eyes. Pair it with one of the blank masks included for you to decorate, or perhaps outfit a ghost, skeleton or pumpkin decoration!

AdaBox 013 Contents



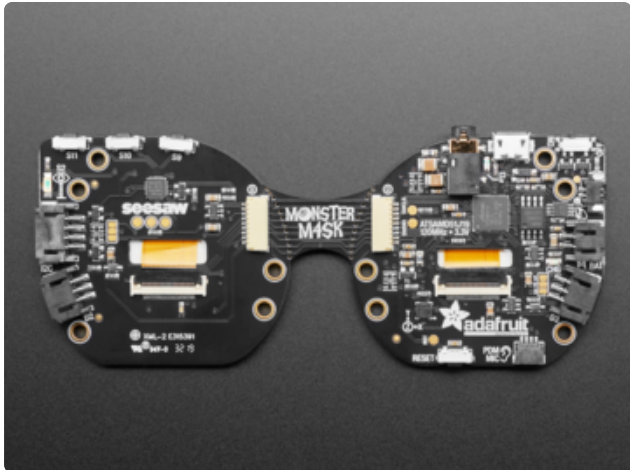
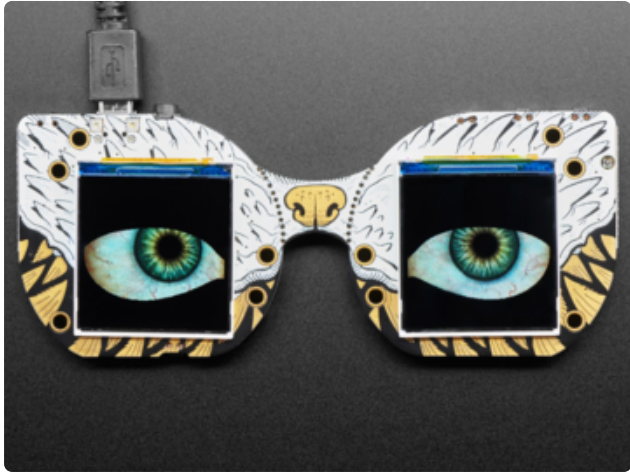
Adafruit MONSTER M4SK

Peep dis! Have you always wanted to have another pair of eyes on the back of your head? Or outfit your costume with big beautiful orbs? The MONSTER M4SK is like the Hallowing (<http://adafru.it/3900>) but twice as good, with two gorgeous 240x240 pixel IPS TFT displays, driven by a 120MHZ Cortex M4 processor that can pump out those pixels super fast.

This unique design has the eyes at the same pupil-distance as a human (~63mm) but is designed so that the nose section can be broken apart with pliers/cutters and then wired together with a 9-pin JST SH cable up to 100mm long (<http://adafru.it/4350>) so the eyes can be re-positioned or freely attached.

We wanted to make audio-effects easier so in addition to a class D audio amp, there's also a stereo headphone jack that is connected to the two DACs on the chip. Use it when you want an externally sound amplifier box for big effects. For small portable effects, the built-in amp can drive 8 ohm speakers up to 1 Watt.

On each side are JST-PH plugs for connecting external devices. The 3-pin JSTs connect to analog/timer pins on the SAMD51, so you can use them for sensors or GPIO devices. The 4-pin JST connector connects to the I2C port and you can fit Grove connectors in it for additional hardware support. For the PDM mic port, you can use this cable (<http://adafru.it/4209>) to wire to a PDM mic (<http://adafru.it/3492>).



There's also plenty of sensors built in - light sensor, 3 tactile buttons, and a capacitive touch pad on the nose.

This is by far the cutest, creepiest and most incredible development board we've made so far! Gaze upon these features:

ATSAMD51G19 Cortex M4 microcontroller running at 120MHz with 512KB Flash, 192KB RAM

8 MB QSPI flash for storing graphics and sound effects

Two 240x240 IPS TFT displays each on their own SPI bus

Beautiful silkscreen with a boop-able nose that is a capacitive touch pad

Lipoly battery charge circuit for portable use

Stereo headphone jack out, for sound effects via an amplifier

Mono speaker driver for smaller 8 ohm 1W speakers

One 4 pin STEMMA JST connector for I2C connection (also Grove compatible)

Two 3 pin STEMMA JST connectors with digital/analog/PWM for servos, sensors, etc

One 4 pin JST SH port for connecting an optional PDM microphone

Backlight controls

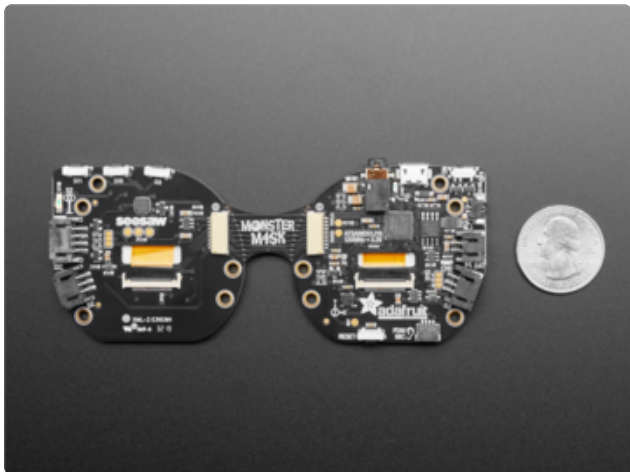
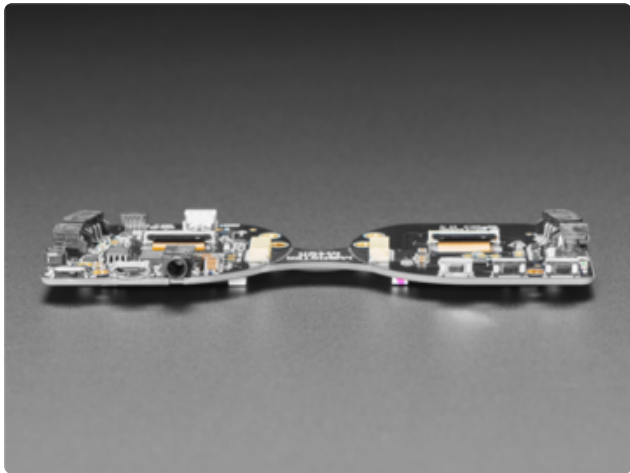
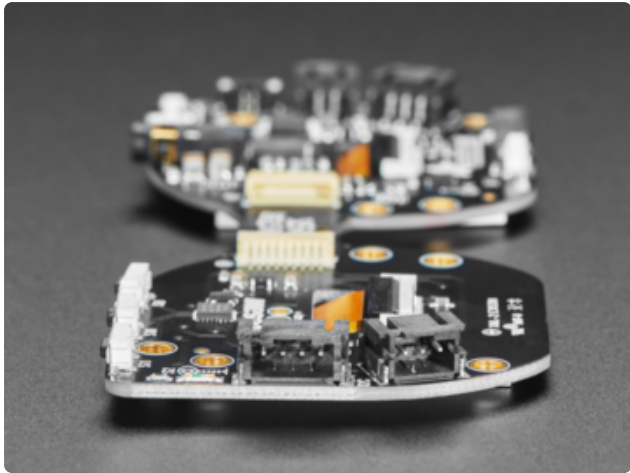
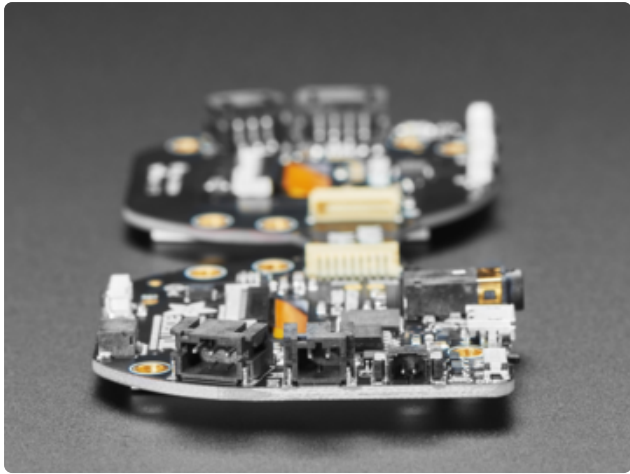
Three tactile buttons

Light sensor

On/Off Switch and reset button

And as you can expect, we've got some great new eyeball code, which does 2 eyes with user-configurable graphics.

Right now our code support is only for Arduino - CircuitPython isn't quite fast enough to do the 3D animation techniques we use to draw the eyeballs.





2 x Plastic Lenses

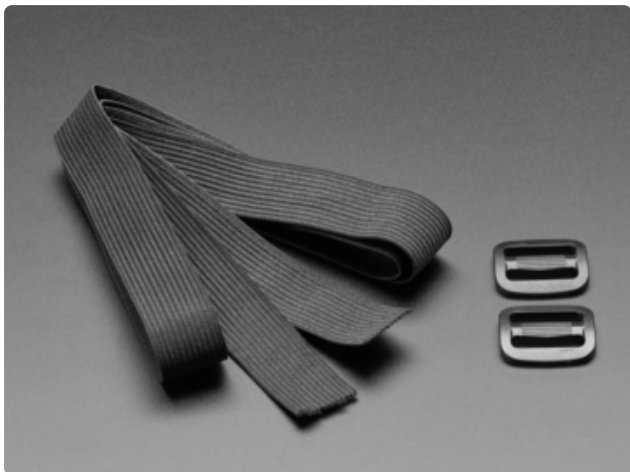
When placed over the displays, these will both protect the TFT and enhance the eye effect. These are plastic lenses, with brilliant clarity and a nice convexity (is that a word?)



Acrylic Cut Lens Holders + Hardware Kit

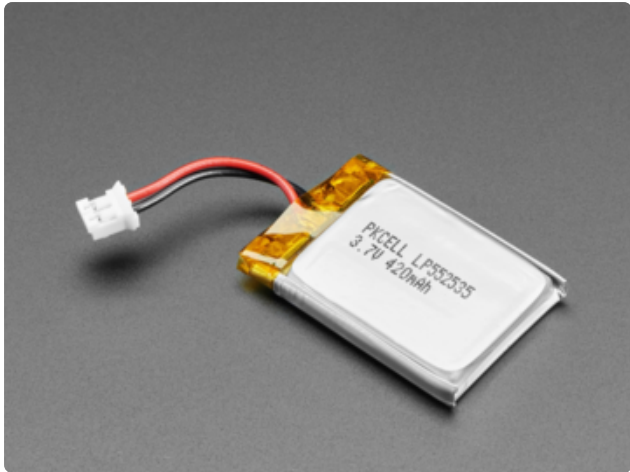
These cut pieces, when attached with the included nylon screws, hold the plastic lenses in place.

See the “Lens Holders” page in the “Introducing MONSTER M4SK” section for guidance on getting these to fit.



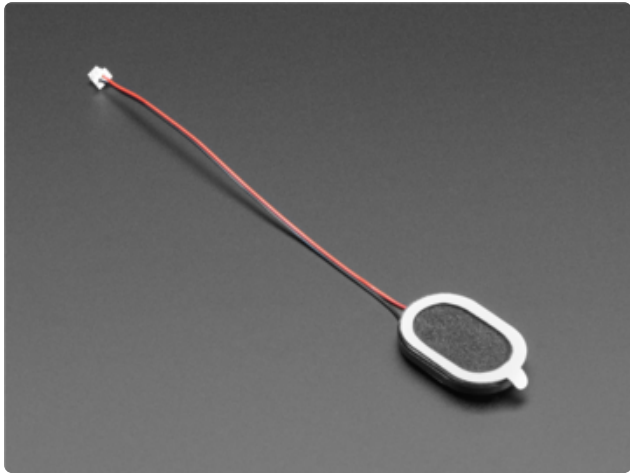
Elastic Band + Tri-glides

The elastic goes through the M4SK lens holder slots so you can more easily wear it on your head.



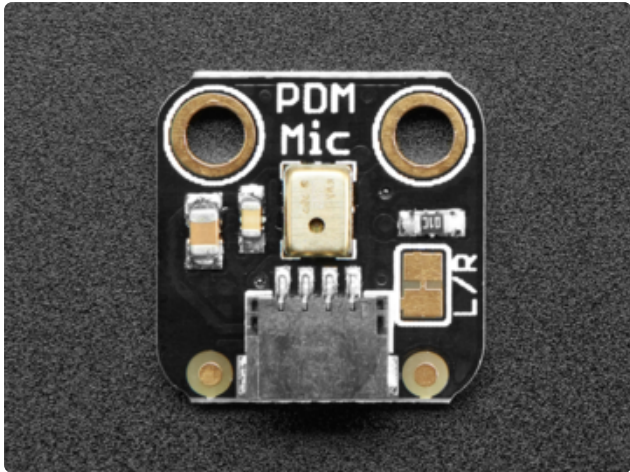
Lithium Polymer Battery

The M4SK can be powered with this battery for portable use, and will recharge it automatically when plugged into USB. Battery will last about 3 hours with both screens on full brightness



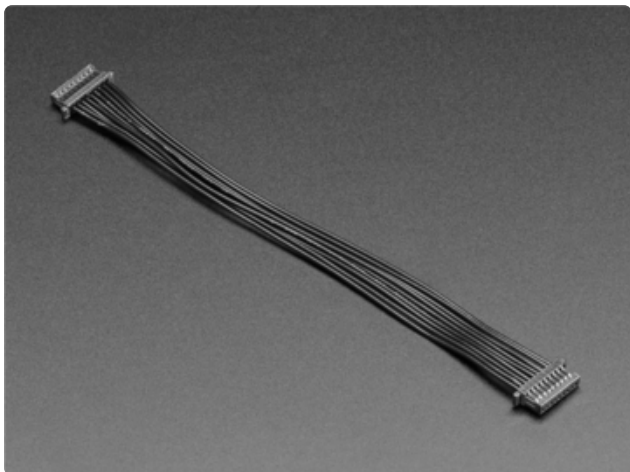
Speaker

Plug this 8 ohm 1W speaker into the M4SK to create sound effects! We particularly like this speaker as it is small and comes with nice skinny wires with a connector on the end. It has a handy "Molex PicoBlade" 1.25mm pitch 2-pin cable, which makes plugging into the M4SK easy.



Microphone + 4 Wire Cable

This PDM microphone can plug into the M4SK for audio input. The STEMMA QT / Qwiic cable makes it easy to connect.



9 Wire Cable

If you like, you can break the nose-bridge from the M4SK and then use this extension cable to keep the eyes electrically connected. Perfect for that beak-faced bird costume!



Blank Masks

Use these with the M4SK or on their own. They can even be decorated, if you like, with paints and glitter by using the included kit!





Decoration Kit

Decorate your masks or costume with this paint, brushes, and glitter kit.



Introducing the MONSTER M4SK

[Introducing the MONSTER M4SK \(https://adafru.it/FFT\)](https://adafru.it/FFT)

Customize Your Eye Graphics

[Customize Your Eye Graphics \(https://adafru.it/FFU\)](https://adafru.it/FFU)

Add MONSTER M4SK to your Costume Mask

[Add MONSTER M4SK to your Costume Mask \(https://adafru.it/FNw\)](https://adafru.it/FNw)

Fish Head MONSTER M4SK Eyes

[Fish Head MONSTER M4SK Eyes \(https://adafru.it/FNx\)](https://adafru.it/FNx)

Candy Bucket GIF Player

[Candy Bucket GIF Player \(https://adafru.it/FR5\)](https://adafru.it/FR5)

Toon Hat -- Pepper's Ghost Eyes

[Toon Hat -- Pepper's Ghost Eyes \(https://adafru.it/FMA\)](https://adafru.it/FMA)

Living Ventriloquist Dummy

[Living Ventriloquist Dummy \(https://adafru.it/FTM\)](https://adafru.it/FTM)

Antenna Eyes

[Antenna Eyes \(https://adafru.it/FR6\)](https://adafru.it/FR6)

3D Printed MONSTER M4SK Case

[3D Printed MONSTER M4SK Case \(https://adafru.it/FNy\)](https://adafru.it/FNy)