



AdaBox 010

Created by John Park



<https://learn.adafruit.com/adabox010>

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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! [If, rather than learn electronics, 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!

Gone are the days where you need thousands of dollars of equipment and lots physics/math background. If you have a dream of an interactive synthesizer controller, you can build it! Want to use tilt and shake gestures for expressive MIDI control? You can do it!. How about a colored button pad for triggering Euclidean rhythms on your Eurorack modular synthesizer? The dream is yours to realize! Always wanted your own open source app launcher or sound board or pixel art doodle pad? Now is the time to build it with the Trellis M4 and a bit of coding in CircuitPython or Arduino!

Who is this for?

Anyone who loves sounds and lights and squishy buttons, and is interested in learning how to program and build awesome synth controllers, sequencers, samplers, and interactive gizmos! Oh, 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 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!

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?

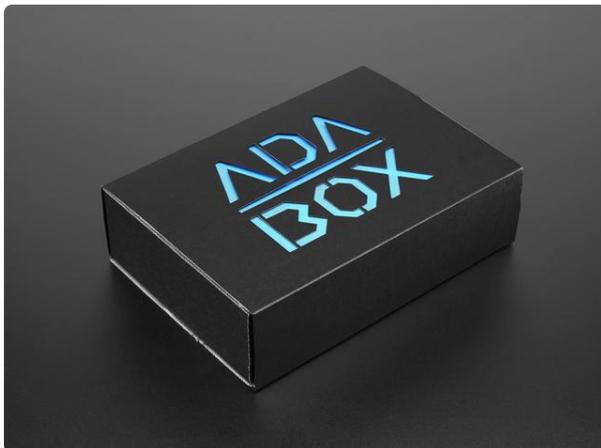
Great question. This is me:

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...

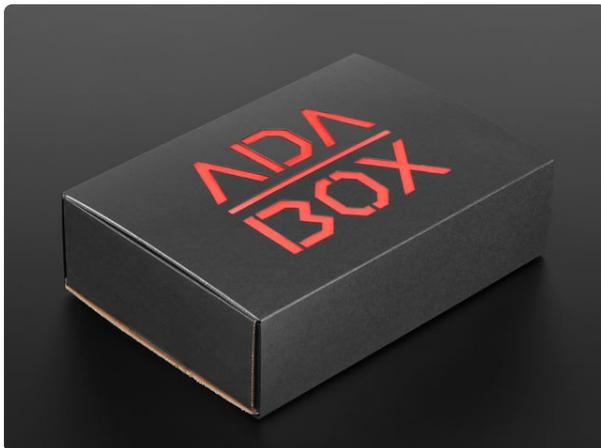
<https://www.adafruit.com/product/3193>



[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...

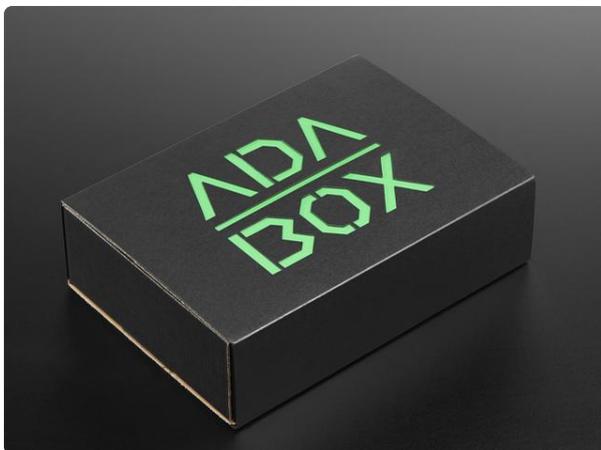
<https://www.adafruit.com/product/3235>



[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...

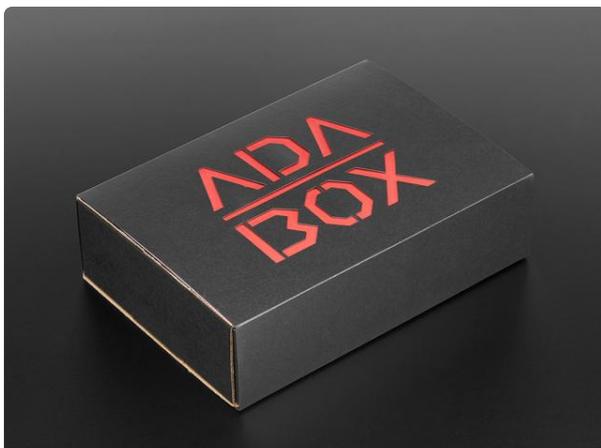
<https://www.adafruit.com/product/3268>



[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...

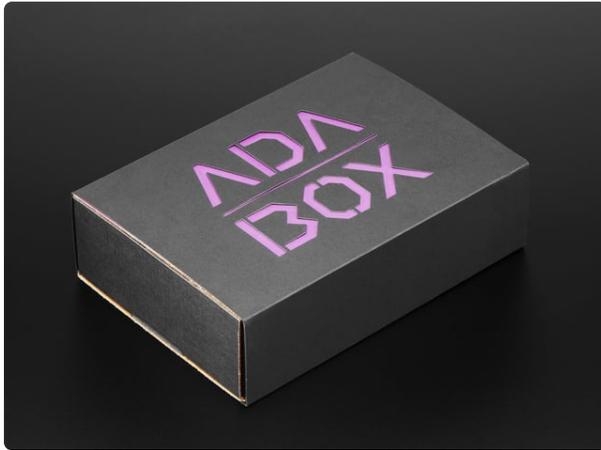
<https://www.adafruit.com/product/3370>



[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...

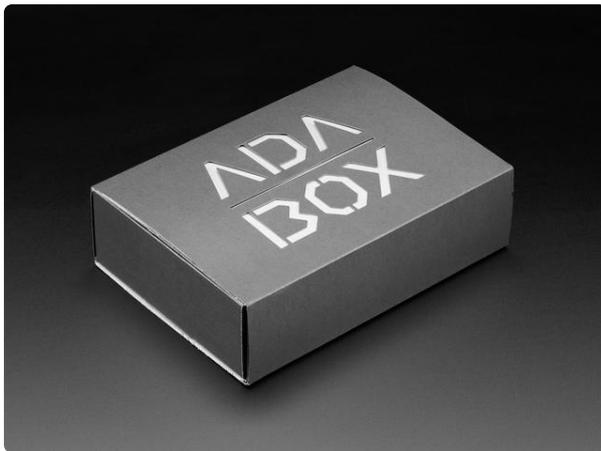
<https://www.adafruit.com/product/3644>



[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...

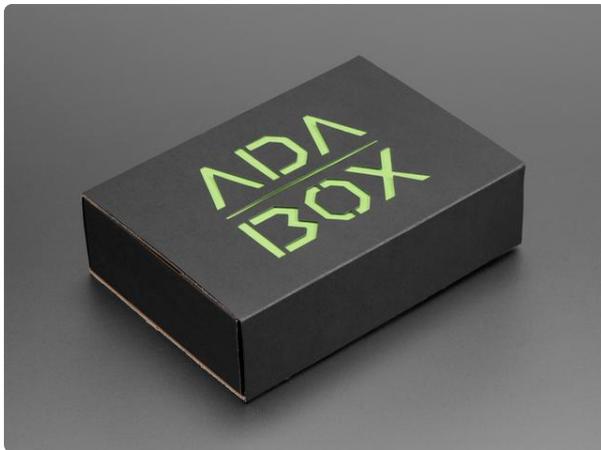
<https://www.adafruit.com/product/3697>



[AdaBox007 - SPY](#)

Discontinued - you can grab AdaBox...

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

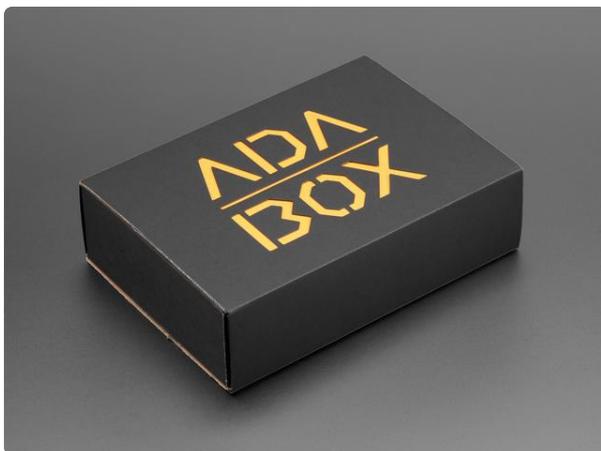


[AdaBox008 - Octo Crickit](#)

[#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/3956>

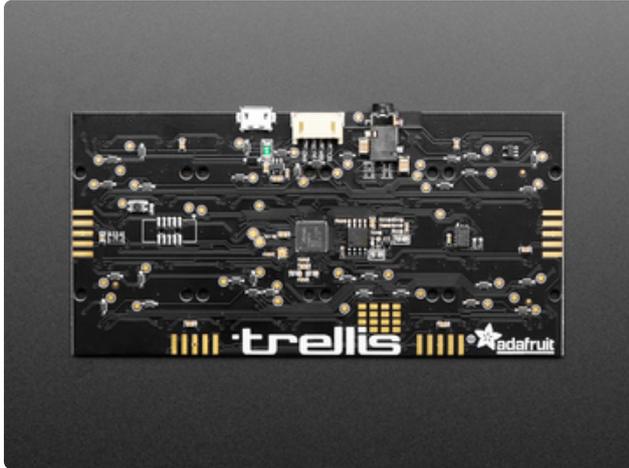
Unboxing AdaBox 010

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 NeoPixel behind each one for rainbow glory. The engine is a ATSAM51 microcontroller with stereo audio channels and microphone input.

NeoTrellis M4 can be an all-in-one synthesizer, drum-machine/sequencer, expressive MIDI keyboard, audio filter, sampler, simple game machine... well, YOU decide what to make it!

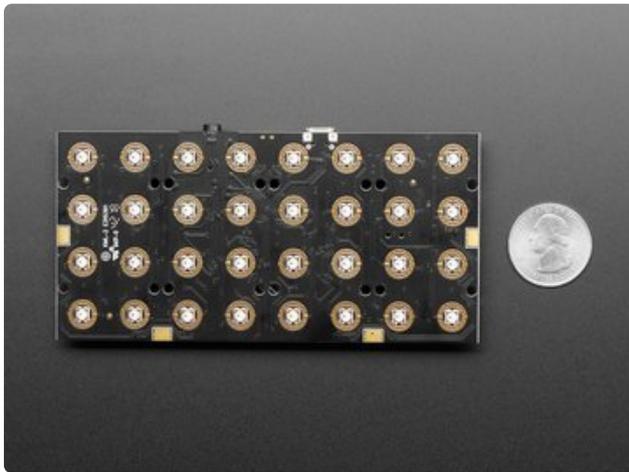
Thanks to the generous sponsorship and support from Analog Devices and Digi-Key, we've even included a fancy triple-axis accelerometer! Each Trellis M4 comes with an ADXL343 built right in, so your lights and music can react to movement and tilt.

AdaBox 010 Contents

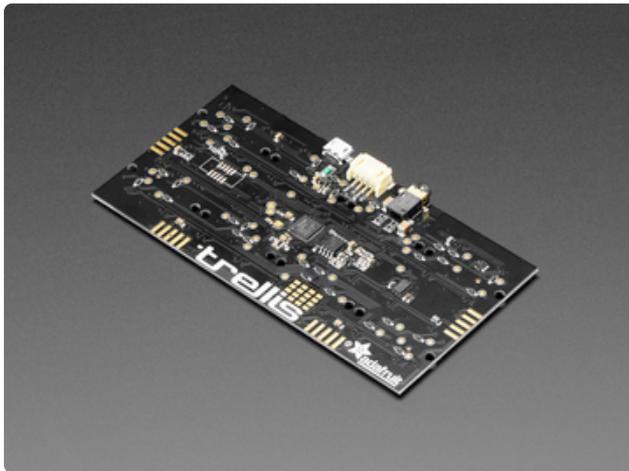


Adafruit NeoTrellis M4 featuring Analog Devices ADXL343

We got a big ol' blender and tossed in an ItsyBitsy M4, two NeoTrellis boards and an electret mic amp - turned on the 'mix' button and out came the NeoTrellis M4 - a super fun dev board for anyone who likes to squish buttons, see pretty lights and maybe make a tune or two.



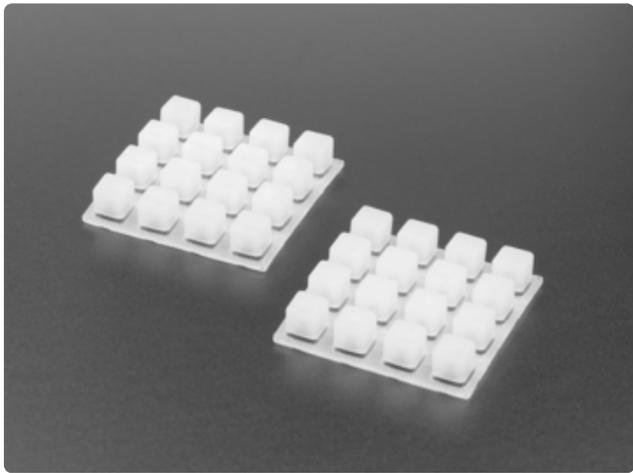
The NeoTrellis M4 is an all-in-one USB + NeoPixel + Elastomer + Audio board. It's powered by our new favoritest-chip-in-the-world, the SAMD51, a Cortex M4 core running at 120 MHz. This chip has a speedy core with CircuitPython and Arduino support, hardware DSP/floating point, dual DACs (more on that later!) and all the goodies you expect from normal chips like I2C, ADC, DMA, etc. It has a roomy 512KB of flash and 192KB of SRAM so it's great for CircuitPython, we added a full 8MB flash chip so tons of space for files and audio clips. Or you can load Arduino in for bonkers-fast audio processing/generation [with our fork of the PJRC Audio library \(https://adafru.it/CVT\)](https://adafru.it/CVT).



The native USB port can turn it into a MIDI USB device if you like - currently that's only supported in Arduino. Tether it to a computer or tablet, if you like. Or use it in standalone mode, as long as its powered from a USB power plug, it'll run whatever firmware is burned into it.

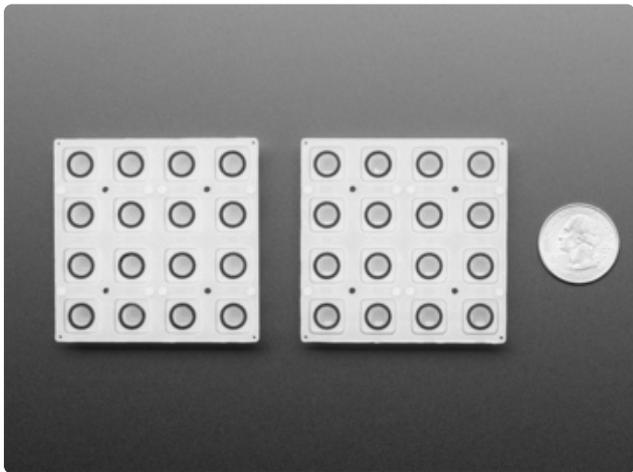
OK so you've got this big brain, but now you need inputs and outputs! There's a 4x8 grid of elastomer button pads with a NeoPixel nestled in the center of each one. You

can read any/all button presses simultaneously thanks to the fully diode'd matrix, and also set each button color to any of 24-bit colors. (We've even got some DMA Arduino code for the NeoPixels so that they won't take up any processor time.) The elastomer buttons are translucent so they glow beautifully when lit.

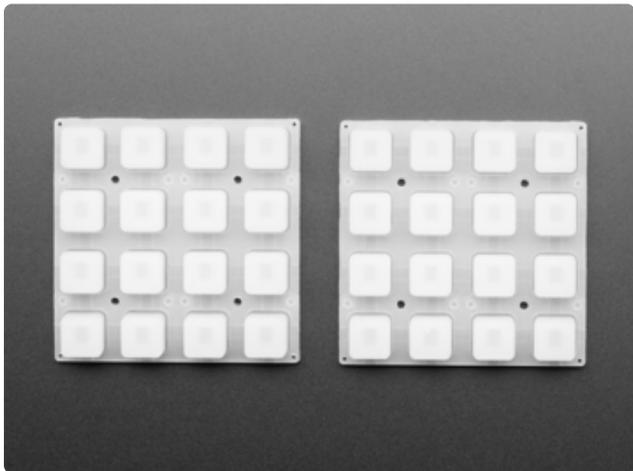


4x4 Trellis Keypad x 2

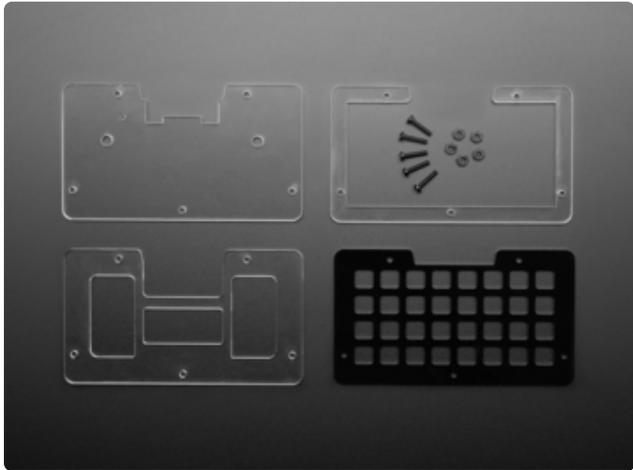
So squishy! These silicone elastomer keypads are just waiting for your fingers to press them. Go ahead, squish all you like! (They're durable and easy to clean, just wipe with mild soap and water) These are just like the light up rubber buttons you find on stuff like appliances and tools, but these are open source and easy to integrate into your next Trellis M4 project!



Each button is **10mm x 10mm square and 10mm tall**. There is 5mm of grid spacing between the buttons. You can 'tile' the button pads edge-to-edge and they'll grid up correctly. You can also cut the pads down if you like, the silicone is very soft. The way they're molded, they give about 3mm of travel when pressed for a very satisfying feel. They are completely quiet, however.

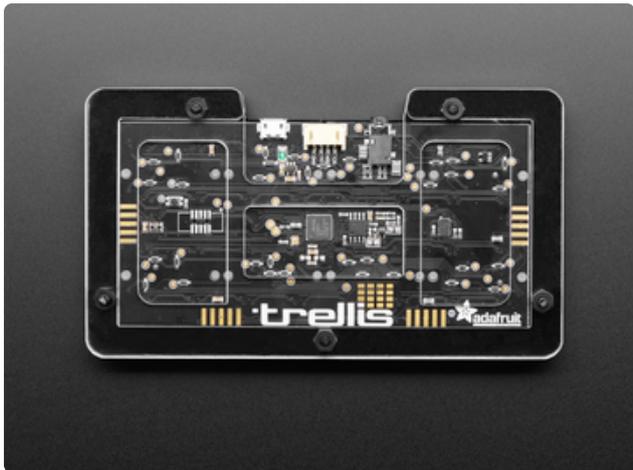


You get two (2) button pads in this pack so this is **the** elastomer pack for dressing up your Trellis M4!



Trellis M4 Laser Cut Enclosure

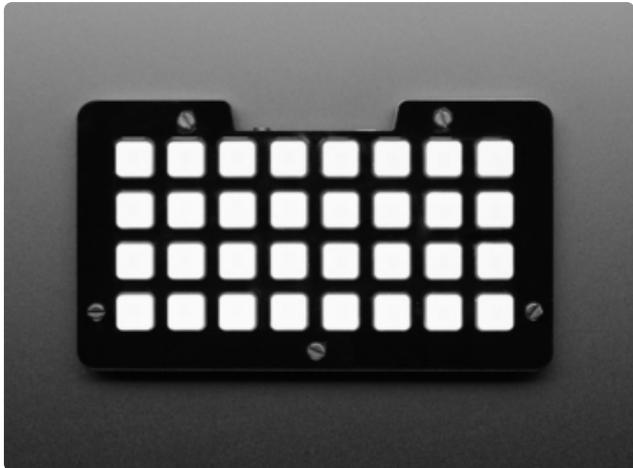
So you've got your Trellis M4, a cool/witty name for your band, a Soundcloud account, a [3D-printed Daft Punk helmet](https://adafru.it/CVS) (<https://adafru.it/CVS>)... so what could be missing from your road to stardom?



The **NeoTrellis M4 Enclosure**, of course! A super-specifically laser-cut enclosure that turns your 'Trellis into a handheld light/music maker!

Includes:

- 3 x Clear Acrylic Cutouts
 - 1 x Black Acrylic Cutout
 - 5 x M3 Black nylon hex nuts
 - 5 x M3x14mm Black nylon screws
- These come with paper backings on both sides (it protects the acrylic while laser cutting and shipping). You'll need to peel those off before assembly.



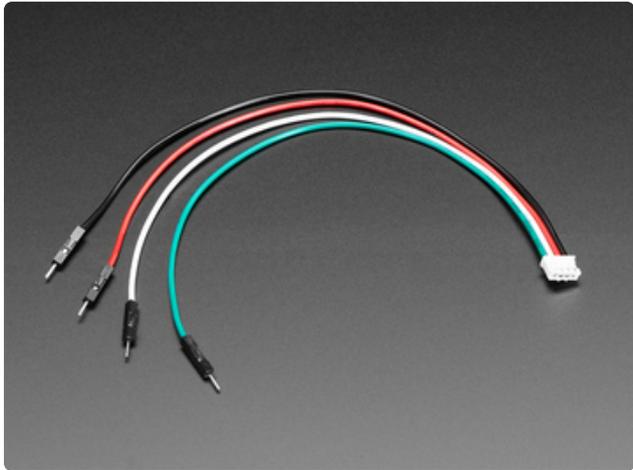


Wire Stand

This handy bent-wire display stand was originally designed to hold up 7" tablets but the rubberized design is great for general purpose electronics & TFT holding. It's perfect for holding your NeoTrellis M4!

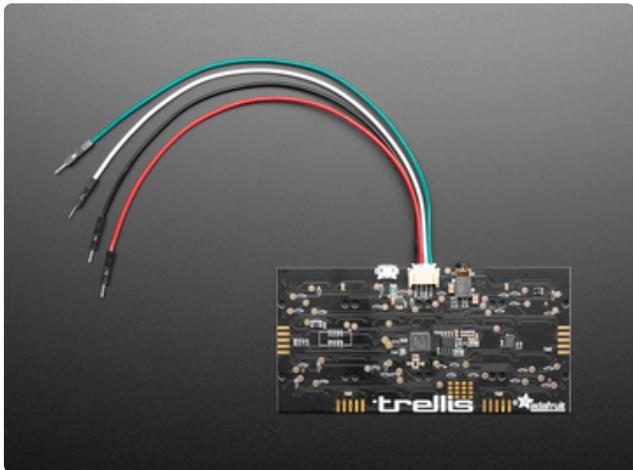


You can adjust the angle and collapse it for travel.

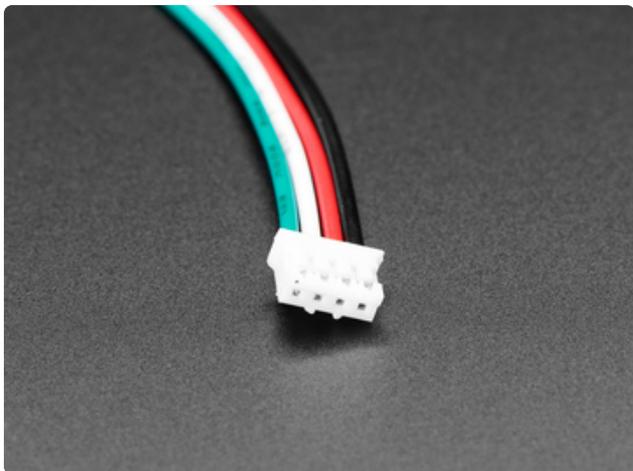


JST 4PH to Plug Header Cable

This cable will let you turn a JST PH 4-pin cable port into 4 individual wires with high-quality 0.1" male header plugs on the end.

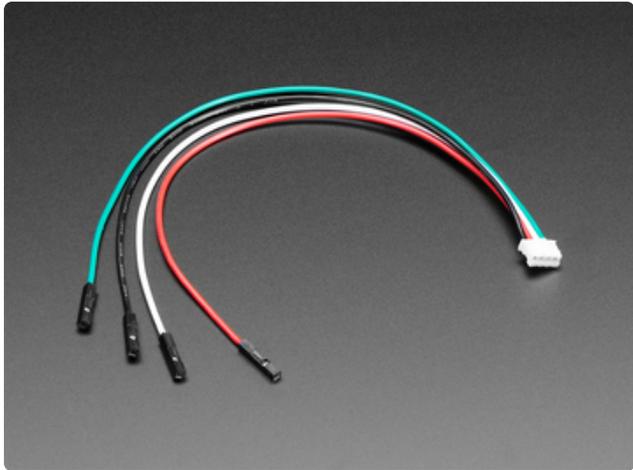


We're carrying these to match up with any of our boards with **STEMMA** connectors on the NeoTrellis M4. [Can also be used with any STEMMA breakouts \(https://adafru.it/D81\)](https://adafru.it/D81)! This one has header pins, so it can be used to connect to socket header or breadboards.

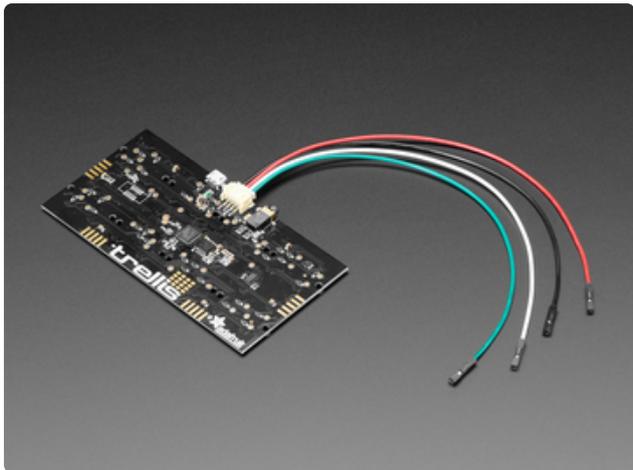


The wires are even color coded:

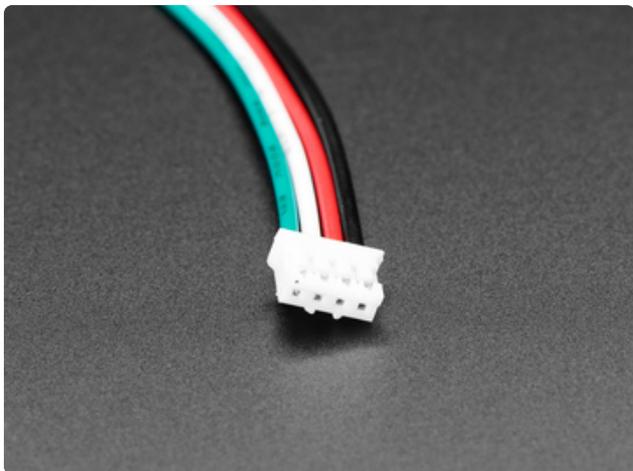
Black for GND
Red for V+
White for SDA
Green for SCL



JST 4PH to Socket Header Cable



This cable will let you turn a JST PH 4-pin cable port into 4 individual wires with high-quality 0.1" female sockets on the end. We're carrying these to match up with any of our boards with 'STEMMA' connector on the Trellis M4. [Can also be used with any STEMMA breakouts \(https://adafru.it/D81\)](https://adafru.it/D81)! This one has socket pins, so it can be used to connect to wires or headers.



Headphones



These earbud headphones are the perfect accessory for your Trellis M4 - they've been tested to work with our modules - but can be used with any iOS or Android device that uses a TRRS pinout. The buds themselves are 16mm in diameter with a nice 40" long cable. They come with a standard 4-pole TRRS headphone jack and have a small microphone for recording audio samples on your Trellis M4 (or for making calls on a mobile phone).



Micro B USB Cable

This here is a beautiful metallic A to micro-B USB cable! Perfect for connecting a computer to your NeoTrellis M4. In one of four randomly selected finishes.

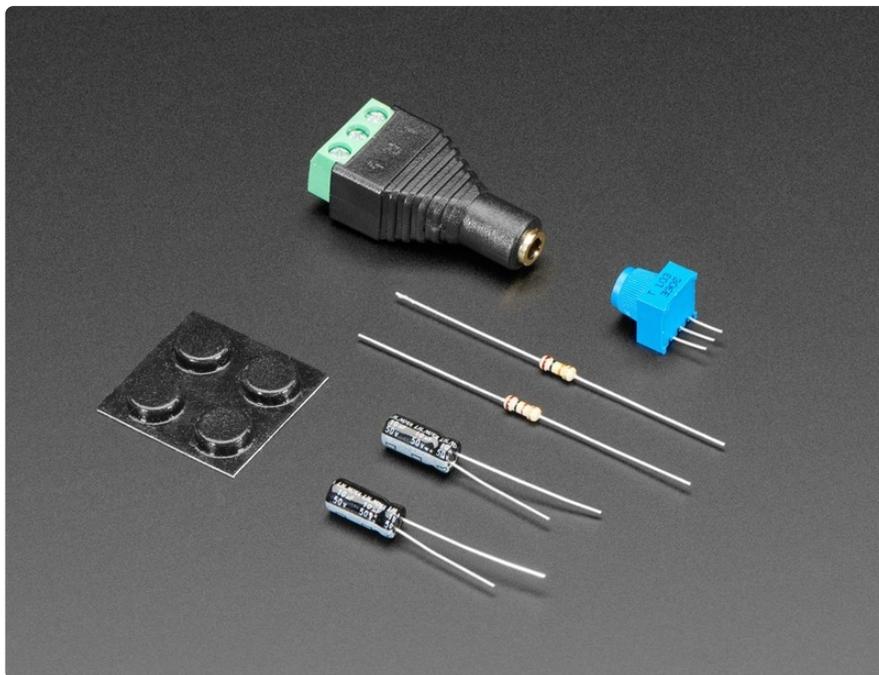




3.5mm Audio Cable

Seamlessly transmit high-quality stereo audio with this 3.5mm Male/Male TRS audio cable. You can use it to connect your Trellis M4 to powered speakers and rock the house.

And even more!



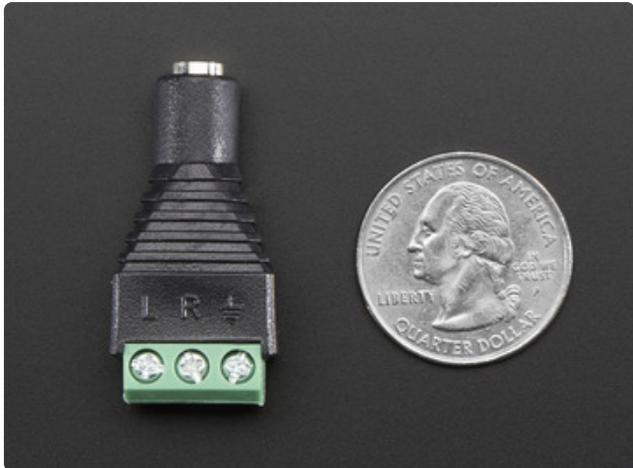


Audio Jack Terminal Block

One truth about working with audio is you always need the cable or adapter you don't have in your toolbox. That's why we love these terminal-block audio connectors so much. No soldering required! Use stranded or solid core wire and a small screw driver to create custom wiring jigs.



You'll even be able to use it to make a MIDI cable adapter to control classic synths!



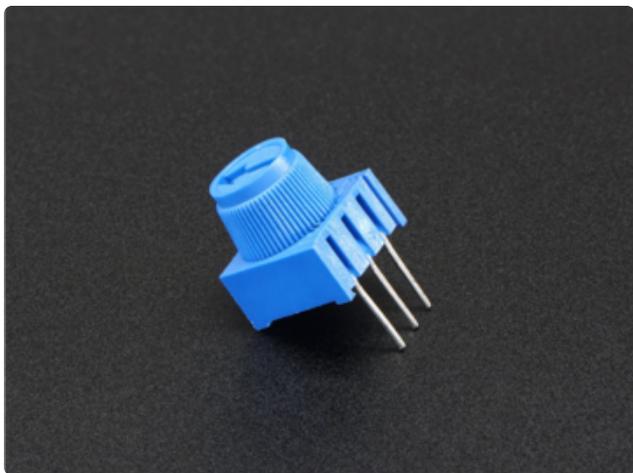
This is the 3.5mm (1/8") Stereo Audio Jack Terminal Block. It's the most common size and style of audio connector, used in most headphones or basic audio connections you're looking to make.

Bumper x 4



Keep your Trellis M4 from going barefoot, give it little rubber feet! These small sticky bumpers are our favorite accessory for any electronic kit or device. They are sticky, but not impossible to remove.

Bumpers may vary in style depending on our supplier but all are approx 8mm diameter and 4mm tall.



10K Potentiometer

These are our favorite trim pots, perfect for breadboarding and prototyping. They have a long grippy adjustment knob and with 0.1" spacing, they plug into breadboards or female jumper cables with ease.

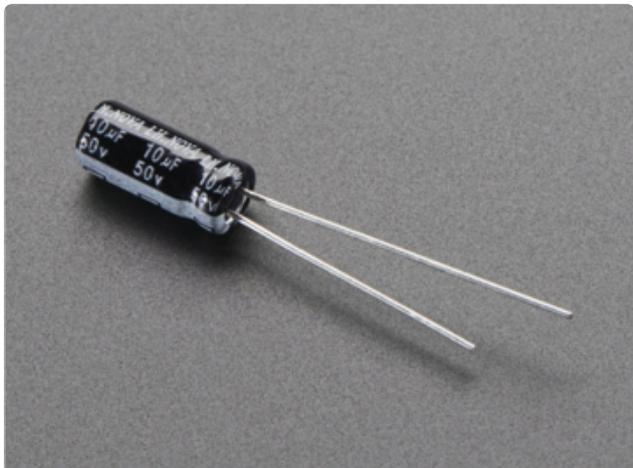
10K Resistor x 2



ΩMG! You're not going to be able to resist these handy resistors! Well, axially, they do all of the resisting for you!

This is a 2 pack of 10K Ω Resistors. More specifically, they are carbon film, through-hole axial type, with 1/4 Watt max dissipation, 300V max voltage, 5% precision resistors. Whew! These are super common and great for use in any kit, breadboard, perf-board, or other project. We got ones with 0.4mm thick wires so they plug in nicely into solder-less breadboards.

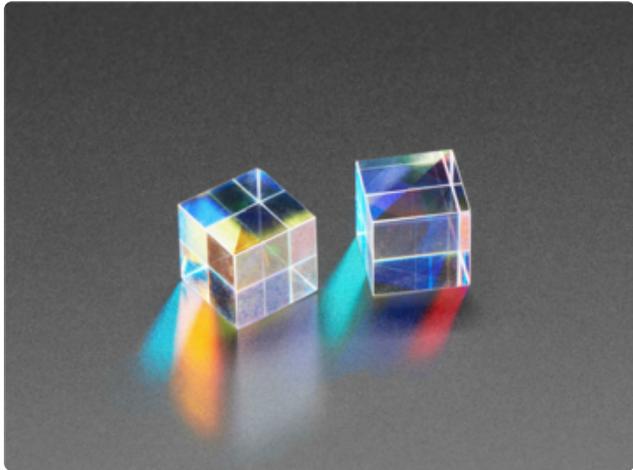
10uF Capacitor x 2



We like capacitors so much we made a [kids show about them. \(https://adafru.it/dtv\)](https://adafru.it/dtv) They're super handy and it's really helpful to have a variety lying around to pick and choose from.

This is a 2 pack of 10uF 50v capacitors, so they can be used with any DC voltage up to 50V. They have a tolerance of $\pm 20\%$ and long flexible pins that make them great for perf or breadboards.

Bonus Extras!



Cube Prism

This beautiful prism is a sight to behold! It's great for splitting light into its component colors and making dazzling effects when positioned over, say, the NeoPixels on your NeoTrellis M4 buttons!



Rainbow Stickers

Want to snaz things up a bit? Put rainbow stickers on everything you own! Some restrictions apply, please do not sticker your cat.

Note: Due to rainbow scarcity issues, stickers may vary from those shown here. Some AdaBoxes will contain **Adabot Head**, **LEDs!**, and **Circuit Bender!** stickers.

Introducing the Trellis M4

[Introducing the Trellis M4 \(https://adafru.it/D1J\)](https://adafru.it/D1J)

Trellis M4 Beat Sequencers

[Trellis M4 Beat Sequencers \(https://adafru.it/D4z\)](https://adafru.it/D4z)

Trellis M4 Expressive USB MIDI Controller

[Trellis M4 Expressive USB MIDI Controller \(https://adafru.it/D3L\)](https://adafru.it/D3L)

Trellis M4 Arpeggiator Synth

[Trellis M4 Arpeggiator Synth \(https://adafru.it/D7R\)](https://adafru.it/D7R)

Classic MIDI Synth Control with Trellis M4

[Classic MIDI Synth Control with Trellis M4 \(https://adafru.it/D7S\)](https://adafru.it/D7S)

Trellis M4 Synth Design Tool

[Trellis M4 Synth Design Tool \(https://adafru.it/Dmh\)](https://adafru.it/Dmh)

Trellis M4 Audio Filter Visualizer

[Trellis M4 Audio Filter Visualizer \(https://adafru.it/DIt\)](https://adafru.it/DIt)

Trellis M4 MIDI File Player

[Trellis M4 MIDI File Player \(https://adafru.it/DkO\)](https://adafru.it/DkO)

Launch Deck Trellis M4 App Launcher

[Launch Deck Trellis M4 App Launcher \(https://adafru.it/Dbl\)](https://adafru.it/Dbl)

NeoTrellis M4 Light Paintting

[NeoTrellis M4 Light Paintting \(https://adafru.it/Dpb\)](https://adafru.it/Dpb)

FlappyBird Game for Trellis M4

[FlappyBird Game for Trellis M4 \(https://adafru.it/DfG\)](https://adafru.it/DfG)

Trellis M4 Memory Game

[Trellis M4 Memory Game \(https://adafru.it/DkP\)](https://adafru.it/DkP)

Trellis M4 Animated Dice Roller

[Trellis M4 Animated Dice Roller \(https://adafru.it/D7T\)](https://adafru.it/D7T)

Trellis M4 Tabletop RPG Soundboard

[Trellis M4 Tabletop RPG Soundboard \(https://adafru.it/DkQ\)](https://adafru.it/DkQ)

Christmas Soundboard with Trellis M4

[Christmas Soundboard with Trellis M4 \(https://adafru.it/D8C\)](https://adafru.it/D8C)

ABC Soundboards with Trellis M4

[ABC Soundboards with Trellis M4 \(https://adafru.it/DkR\)](https://adafru.it/DkR)

Star Trek Soundboard with Trellis M4

[Star Trek Soundboard with Trellis M4 \(https://adafru.it/D7U\)](https://adafru.it/D7U)

Trellis M4 3D Printed Bumper

[Trellis M4 3D Printed Bumper \(https://adafru.it/DdD\)](https://adafru.it/DdD)

Need Help? Questions?

[Need Help? Questions? \(https://adafru.it/uZD\)](https://adafru.it/uZD)