



# AdaBox 008

Created by John Park



<https://learn.adafruit.com/adabox008>

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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! You are a beginner who is getting started with your AdaBox or 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 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.

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, you can jump right in for \$100 or less, and any sort of computer. And we're talking about learning a lot of electronics and robotics - from the basics of moving a servo, to making a mini golf course! With a good pack of parts, you can build a base of knowledge that will take you from your first blinking LED to someone who can make the creative interactive robots of their dreams!

## Who is this for?

Anyone who is interested in learning how to program, build robot friends and 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!

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

## Who are you?

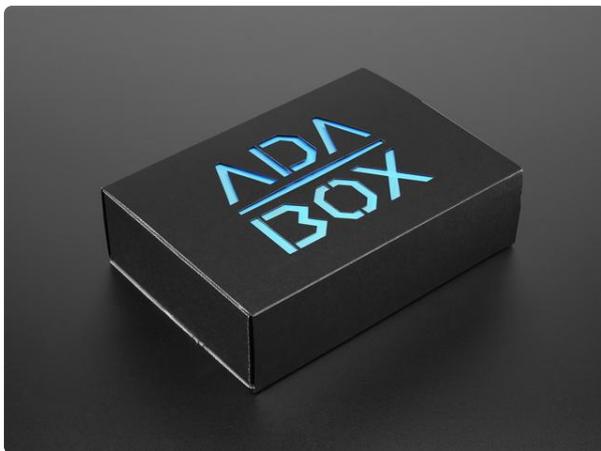
Great question. This is me:

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...

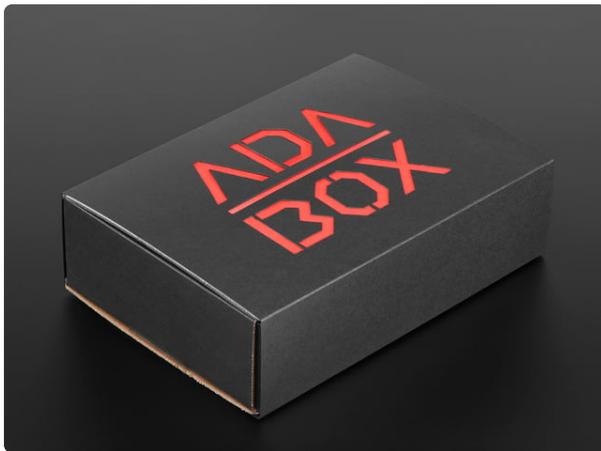
<https://www.adafruit.com/product/3193>



### [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...

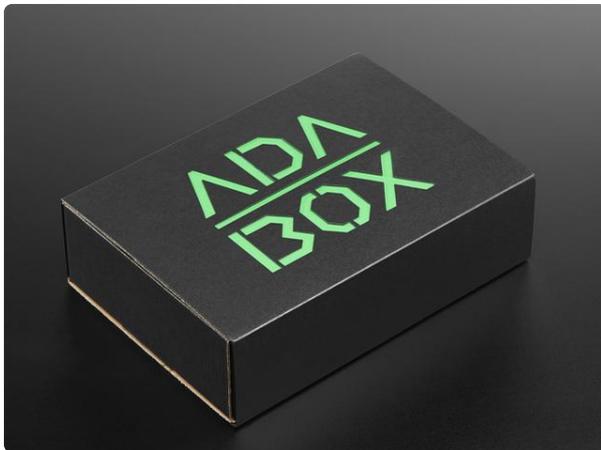
<https://www.adafruit.com/product/3235>



### [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...

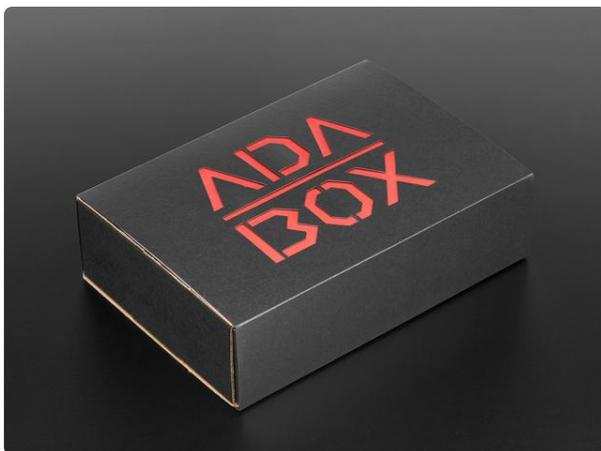
<https://www.adafruit.com/product/3268>



### [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...

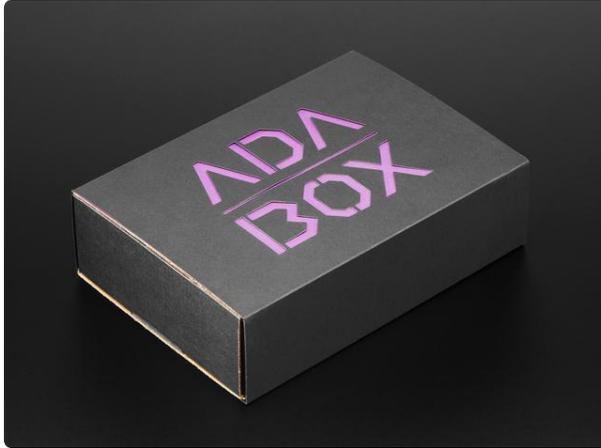
<https://www.adafruit.com/product/3370>



### [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...

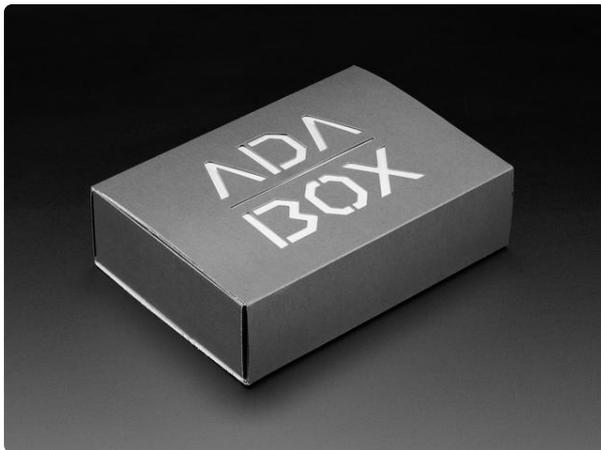
<https://www.adafruit.com/product/3644>



#### [AdaBox006 – CircuitPython](https://www.adafruit.com/product/3697)

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](https://www.adafruit.com/product/3778)

Discontinued - you can grab AdaBox...

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

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## A Crickit Manifesto

This AdaBox is a pretty special one, it's the first box where we're introducing a new robotics platform and also (hopefully!) a new way to think about robotics.

Having an AdaBox dedicated to robotics (not just a single robot rover like we did in AdaBox 002) is a bit of a change. Yes, we've got tons of fun projects that you can build 'out of the box' but we're hoping we can present you with more than just parts and tutorials.

This AdaBox is meant to be an inspiration to us humanoids - to **Make Robot Friend** not robot enemy or robot slave.



Our poster (<http://adafru.it/2415>) with art by Bruce Yan celebrates our robotics motto with a friendly Adabot!

You even got a jig-saw puzzle version in your Box!

For those who are curious, or perhaps a little bored, I thought I'd write down a Cricket Manifesto - where and why and how this Adabox came to be!

## The Octo Box

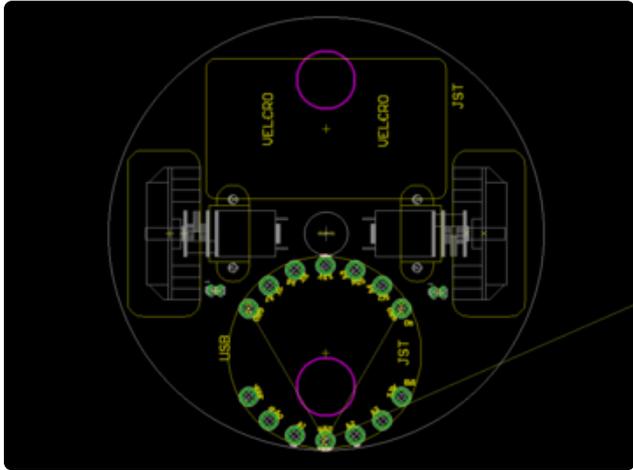
When we first sat down at a tasty dim sum lunch to discuss this adabox we wrote down the number of the box **8** ! Now, box #7 was pretty easy to figure out, with the number 007 it was clearly going to be spy themed. But 008 isn't as obvious. What would it be about?

8 stands for octopus, magic 8 balls, and [octagons \(https://adafru.it/BOt\)](https://adafru.it/BOt).

We thought about some projects that had to do with 8, and started drawing a lot of octagons on a piece of paper...

## Flashback to 2 months earlier...

Sometime around February, we'd been thinking about little robots. We had a robot chassis in the store and [even designed ADABOX 002 to come with a full kit \(http://adafru.it/3235\)](http://adafru.it/3235) that included a Feather Bluefruit for wireless control. But I'd been thinking about having a sensor-bot in the shop, you know something that could do line-following or light sensing. I was also thinking about having it be able to draw with a marker. I'd started sketching out a design in EagleCAD PCB software!



The "CPX Bot" would have the Circuit Playground bolt onto the body and control two micro DC motors. On the opposite side, a velcro'd on battery box would provide power. The motor control circuitry and sensors would be on the PCB itself.

The hole in the center is where a marker would go.

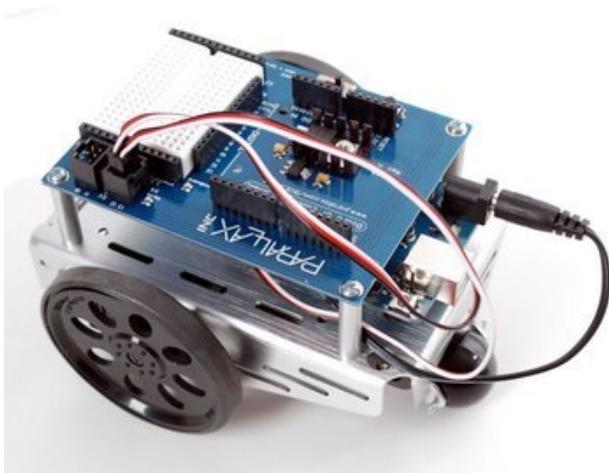
Since I had this robot thought out, it seemed like a good candidate for something to ship with ADABOX! It would be a fun scribbling robot, maybe have programmability in CircuitPython or MakeCode.

Heck, we could even make the PCB an octagon, to keep it thematic!

Art bot + Octagon = sounds like we're done!

## Well, maybe?

We starting chatting with friends (like [the wonderful Carol Willing \(https://adafru.it/AEO\)](https://adafru.it/AEO)), asking them what they thought about robotics. What we kept hearing, and agreed with, is that robotics is overwhelmed with "rolling rovers": two or maybe 4-wheeled robots that have some sensors attached to them. They often do some basic sensor -> motion algorithms like "line following" or "wall avoidance"



This is not to say we don't like these rover-bots. They're surprisingly fun, and you get to make something that runs around your room!

We even carry a few of the well designed ones! (<https://adafru.it/BOu>) For example the BoE Bot from Parallax is a classic rover, exceptionally popular and used by thousands to learn programming.

These robots are popular, but we had this nagging feeling that basically every company or maker who wanted to 'do robotics' would take that basic idea, and make their own version. The innovation was in the chassis, maybe microcontroller chip, power supply or sensor assortment. But the basic design was pretty much the same. It's a well-traveled robot road.

## Personally, though?

My own personal view? I never really liked rovers that much. I'd build them, maybe run them around the room then get bored. It wasn't the hardware design or the software or programming language. I just never really took a shine to things that roll around.

I always sort of felt like "OK now I've built this robot and it moves. Now what?" There was never any creative endeavor or way to improve upon the robot. There were Things It Could Do and you'd dutifully complete those projects and follow that line. And... that's it.

I'm sure that Adafruit could design a totally awesome rover. It would be cute, work well, be easy to program. All that good stuff. But it wouldn't be something that could inspire.

**That's to say: if someone was already interested in building a rover, I'm sure they'd like ours. But it wouldn't get someone who was not already interested to be inspired to build robots.**

So. Back to the drawing board.

## The Ladyada Robotic Backstory

I started thinking back...a long way back. To when I was in school! Back when I was an undergrad, I had participated in the MIT 6.270 competition during 2001 January IAP (winter break). My teammates (Amittai & w0z) and I built the **g0thb0t** - a decidedly g0th LEGO robot.



The only living proof I have left is this old photo I took with my Nikon, starring Amittai at his most g0th. (I'm not so old that we only had black and white photos, but what I didn't have yet was a digital camera)

You can see the wooden stick attached to the robot that would act as a homing beacon. **Fun Fact** - [the IR beacon at the top of the stick was the first product sold by Pololu \(https://adafru.it/BOv\)!](https://adafru.it/BOv)

The robot body was made from LEGO, with 'standard' DC motors that would be built into a fully-LEGO gearbox. There were a few basic sensors like a light sensor, bump sensors, distance sensor, one servo and a ton of LEGO pieces ([full contents list here \(https://adafru.it/BOw\)](https://adafru.it/BOw)).

The thing I remember most about the 6.270 competition (besides the sponsor/recruiters shooting a T-shirt cannon into the 26-100 seating, hitting our bot with a wadded up shirt and knocking it off the desk) was how incredibly tedious the whole process was.

This is not the 6.270 organizers' or designers' fault - they did the very best they could with the technology available.

But it was just so awful to build a robot. And hard! It was so incredibly hard that if your robot could not break during the competition rounds, it would probably win!

We spent most of our time [building a lead-acid power supply \(https://adafru.it/BOx\)](https://adafru.it/BOx), building a gear box, [learning CVS \(https://adafru.it/BOy\)](https://adafru.it/BOy), [calibrating motors \(https://adafru.it/BOz\)](https://adafru.it/BOz). Calibrating sensors. [Downloading sparse C code \(https://adafru.it/BOA\)](https://adafru.it/BOA) onto Handy Boards. We're talking at least 20 hours of trained-by-MIT-best-of-the-best-engineering-student-work before you could even think about what your robot would do or how it would look.

# The Handy Board



The brains of the 6.270 robot was this robotic control board called the Handy Board. Perhaps because it was handy and fit into your hand? Anyhow it looked like this. All through hole parts with a 16x2 LCD.

Behind the board is a AA battery pack that would keep it powered separately from the robot's motors (they used a 6V lead acid battery pack).

Despite not having a great time building this robot, the Handy Board was an interesting development board. It had a Motorola MC68HC11 microcontroller, 4 DC motor controllers, IR input, analog inputs, servo outputs, etc.

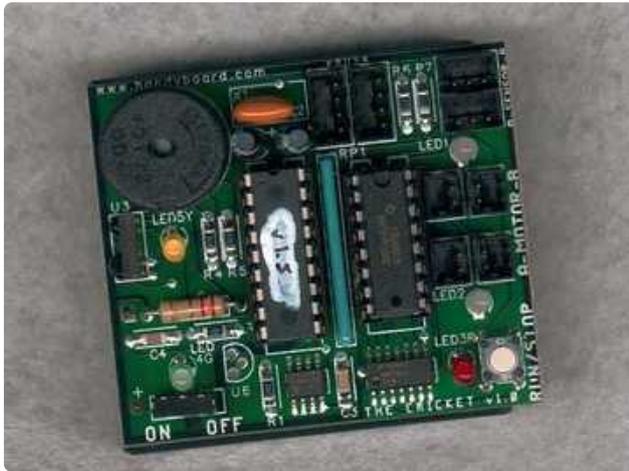
You can read the full manual here:

[hbmanual.pdf](#)

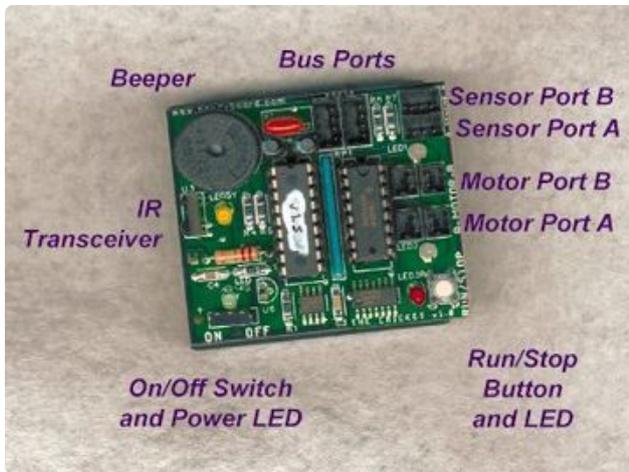
<https://adafru.it/BOB>

This idea of an all-in-one robot controller stuck with me, so I decided to research more about it now 17 years later. [The Handy Board website is still up if you're interested in reading about the design \(https://adafru.it/BOC\)](https://adafru.it/BOC) and I found that a year after I'd done 6.270 the Handy Board had a little sister - the [Handy Cricket \(https://adafru.it/BOD\)](https://adafru.it/BOD).

# The Handy Cricket



What I find fascinating is how close the Handy Cricket was to an "Arduino of Robotics" but many years before Arduino was invented!



It was flexible (<https://adafru.it/BOE>), LEGO programmable (<https://adafru.it/BOF>), and had add-on sensors and outputs (<https://adafru.it/BOG>).

According to the website:

- The Cricket is a tiny computer, that you can program using Logo.
- You can control motors and lights with the Cricket.
- The Cricket can receive information from sensors, like touch sensors and light sensors.
- Crickets can "talk" to each other, sending messages with infrared (IR) light.
- People have used Crickets to build little robots, animated rocking horses, automatic gift boxes, and other personal animated toys.

What's neat to see is how the Handy Board (a powerful robot controller) turned into the Cricket, something for "little robots, animated rocking horses, automatic gift boxes, and other personal animated toys."

In fact, lots of people wanted to make projects like those and not just rovers. The Handy Cricket would become the [PICO Cricket, a plug-and-play animatronics/robotics platform](https://adafru.it/BOH) (<https://adafru.it/BOH>)

## The PICO Cricket

The PicoCricket has been discontinued but the website describes it thus: (<https://adafru.it/BOI>)

A PicoCricket is a tiny computer that can make things spin, light up, and play music.

You can plug lights, motors, sensors, and other devices into a PicoCricket, then program them to react, interact, and communicate.

For example, you can make a cat and program it to purr when someone pets it. Or you can make a birthday cake and program it to play a song when someone blows out the candles.



Luckily by this time we not only had digital cameras, but YouTube! So you can see a video of the kinds of projects kids were building with PICO Cricket here:

OK so now we're three generations down, from the Handy Board to the Handy Cricket to the PICO Cricket.

The story doesn't end there for this lineage, the PICO Cricket design would eventually become [LEGO Mindstorms](https://adafru.it/BOJ) (<https://adafru.it/BOJ>) and [LEGO WeDo](https://adafru.it/BOK) (<https://adafru.it/BOK>) so if you're wondering why LEGO robotics seems so similar to the Handy designs, that's why!

But this is where we get off the Handy train, because while I was interested & excited to read about the Handy Cricket / PICO Cricket and the creative and crafty robots that they inspired kids to make... **"little robots, animated rocking horses, automatic gift**

boxes, and other personal animated toys"... the LEGO Mindstorms robots departed from that kind of animatronics, and shifting more towards the 6.270-style robot rovers and mechatronics.

And, lets be honest, those LEGO robot sets are expensive! The expense is for a good reason, the LEGO robotics parts are durable and very well made. But, still, I wanted something that we could ship in an Adabox!

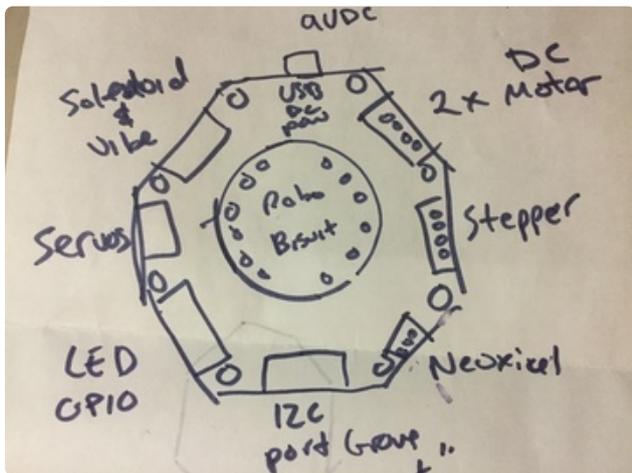
## Oh Right! Adabox!

You thought I'd forgotten, but no...this was still all about Adabox 008!

By this time we were thinking "Man, maybe a little octagon-bot isn't what we should make. Why re-make the same rover bot everyone else had so many times over?" and all that Handy/Cricket research kind of inspired us.

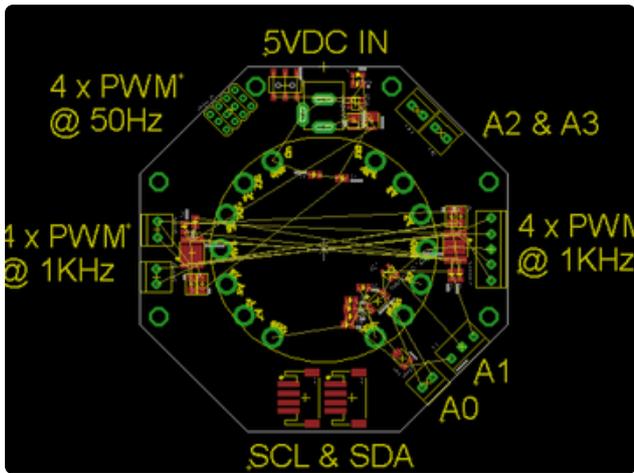
We wanted to make a robotic platform for building artistic and creative robots. Sure you could build a rover if you wanted to, but lets make it easy to add NeoPixels and sound too!

So we went back to our drawings of octagons.

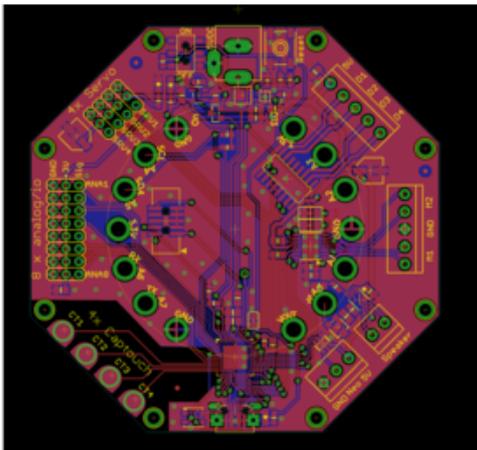


We took that octagon, and put the Circuit Playground in the center. (The "biscuit" refers to a post we'd just put up (<https://adafru.it/A-4>) by dastels about his CPX-to-PCB connection).

Then around the 8 sides we put different types of robotic interfaces: servos and DC motors of course. Maybe also steppers, NeoPixels, a GPIO port and something to drive solenoids and vibration motors. There was also thought of an I2C port area for Stemma or Grove connections.



I also started sketching out the PCB design. Just to see what would fit! I decided on the power supply (5V) and how the Circuit Playground would attach.



To my second draft, with the basic design complete:

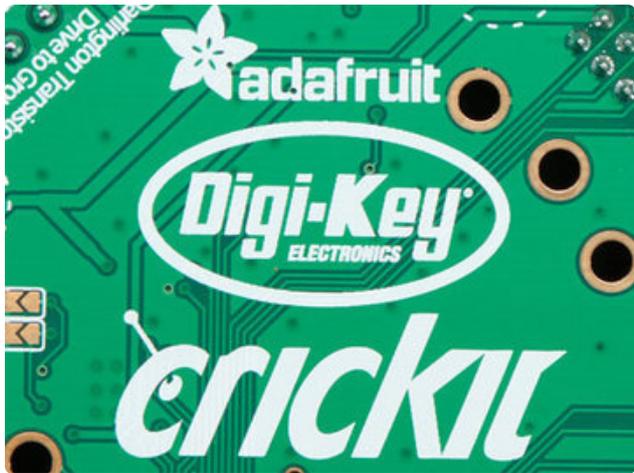
- 4 x Servos
  - 4 x Drive transistors
  - 2 x DC motors
  - 4 x Capacitive touch
  - 8 x GPIO & sensor inputs
  - 1 x Audio amplifier
  - 1 x NeoPixel port
- All still in an octagonal shape.



To the final design which you have in your hands.

## DigiKey at Our Side!

As we started to come up with what we'd want to put in the AdaBox - Circuit Playground Express, Crickit, servos, motors, wheels, and tons of parts - we quickly realized we needed some help from a partner to get all those Crickits made and shipped.



That's when DigiKey stepped up to the plate! With their help we were able to manufacture fast, get all the components we needed and our supply chain worked out so that we could ship the thousands of AdaBoxes to subscribers!

We could not have done it without them.

Thanks to DigiKey, this AdaBox was a GO!

## So, Why Did We Design Crickit?

One of the things I really liked about the Handy Crickit / PICO Crickit is that it didn't do everything - it couldn't control a hexapod walker, or a 4WD tank bot. It didn't have optical encoder support, or line following sensors. It had limitations, but those limitations pushed one to be creative.

We wanted to make our board affordable and broad.

- Affordable so people felt comfortable making something and maybe it wouldn't work the first time - hey that's ok if its under \$50!
- Broad in that it does **a little bit of a lot of things**. Do some robots need 8 servos? Sure, but those robots aren't the ones you can build with Crickit.



I like to think of Crickit as a 'bento box' of electronics and robotics. You're going to get a taste of servos, a sample of steppers, a nibble of capacitive touch.

And like a bento that introduces you to new flavors and textures, we added some elements that normally don't make it into robotics controllers - like capacitive touch for human-interactivity, NeoPixels for blinking lights, and a real audio amplifier for playing sound effects.

[Bento image from Wikipedia \(https://adafru.it/BOL\)](https://adafru.it/BOL)

By integrating all those capabilities together, we can unlock projects that are **Creative** and **Interactive** Robots. Thus the (backronym) name - **CRICKIT** for **Creative Robot** and **Interactive Construction KIT**. It's a clear nod to the Handy Cricket, but a slight twist on the name so they won't get confused.

## Creative and Interactive Robotics

We really mean it when we say Creative and Interactive! Once we started designing Crickit we wanted to make weird, creative, interesting and funny interactive robot projects.

Like this Bubble Blowing robot, that moved a servo with a bubble wand attached, and then turns on a DC motor to blow a stream of bubbles

Or a full animatronic interpretation of [an SNL skit \(https://adafru.it/BOM\)](https://adafru.it/BOM) with servos, NeoPixels, audio effects and even a fog machine - [all controlled by Crickit and CircuitPython \(https://adafru.it/BON\)](https://adafru.it/BON)

Note, not all these parts are in your Adabox - they're inspirations to show you what a robot friend can be!

# Simplify Programming with MakeCode & CircuitPython

We made sure you could [design your interactive robot in MakeCode \(https://adafru.it/BKC\)](https://adafru.it/BKC), by dragging-and-dropping blocks, for beginners who are just starting out learning to code.

We also have the [Crickit programmable in CircuitPython \(https://adafru.it/Bfh\)](https://adafru.it/Bfh). In particular we wanted to make sure that the long "edit, compile, upload, debug" loop that haunts C programming would not be an impediment.

With robotics, there's a lot of times you need to tweak values, sensors, calibrations...you may need to make 15 small changes to get the smooth motion and range of servos, or to make sure the sound triggers at the right time.

Doing that in CircuitPython is really nice because you can just save and it will automatically reload. It takes only 5 minutes to do what in Arduino would take an hour!

## Go Forth and Make Robot Friend!

This Adabox has a ton of projects that we've built and you can follow along. But we also hope to inspire you to make your own unusual, strange, creative, and fun animatronic projects. You don't need to make a rolling rover (although we do have a fun cardboard bumper bot!).

Our projects focus on recycling cardboard, paper, office supplies, maybe some stuff out of your recycling bin like plastic cups and toilet-paper roll cores. You don't need to spend hundreds of \$ to make a robot! Make a project, then if you want to try something else you can just remove the Crickit and wire it up to something else.

Look around your home, find something you can recycle, craft and create. Make it move, sing, light up – then post it up to share with the world with our hashtag..

#MakeRobotFriend



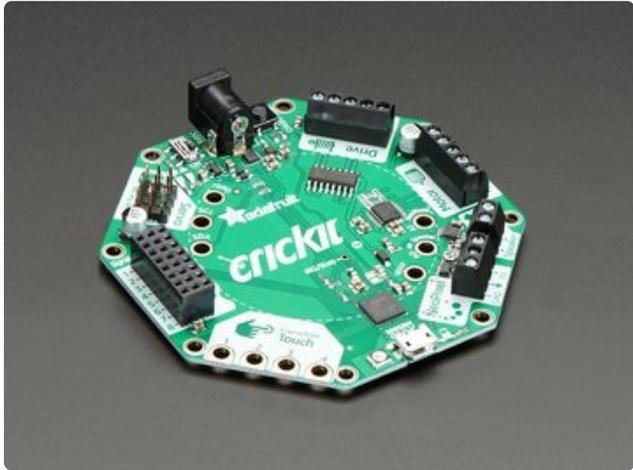
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## Unboxing AdaBox 008

Sometimes we wonder if robotics engineers ever watch movies. If they did, they'd know that making robots into slaves always ends up in a robot rebellion. Why even go down that path? Here at Adafruit we believe in making robots our **friends!**

This ADABOX is based around **CRICKIT** a **Creative Robotics and Interactive Creations** tool **KIT**. When paired with motors, servos, a Circuit Playground Express and your own creativity, you'll be able to craft your very own Robot Friend!

# AdaBox 008 Contents



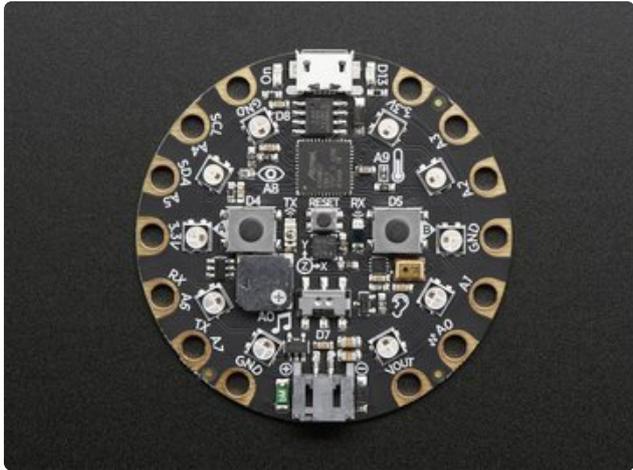
## Adafruit Cricket for Circuit Playground Express + Mounting Kit

Creative Robotics & Interactive Construction Kit add-on to our popular Circuit Playground Express that lets you **#MakeRobotFriend** using CircuitPython, MakeCode, or Arduino.



Bolt on your Circuit Playground using the included stand-off bolts and start controlling motors, servos, solenoids. You also get signal pins, capacitive touch sensors, a NeoPixel driver and amplified speaker output. It complements & extends the Circuit Playground so you can still use all the goodies on the CPX, but now you have a robotics playground as well.

## Adafruit Circuit Playground Express + USB Cable

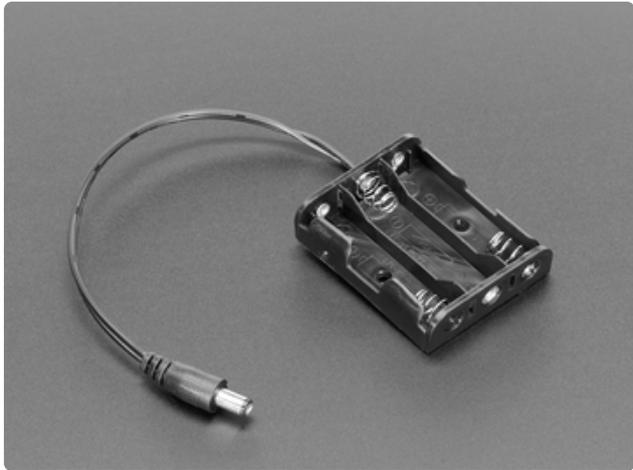


Circuit Playground Express is the next step towards a perfect introduction to electronics and programming.

Because you can program the same board in 3 different ways -- CircuitPython, MakeCode, & Arduino -- the Express has great value and re-usability. From beginners to experts, Circuit Playground Express has something for everyone.



Here's just some of what's baked into this board: NeoPixels, motion sensor, temperature sensor, light sensor, sound sensor, speaker, IR transmitter/receiver, buttons, slide switch, and alligator clip friendly pads!



### AA Battery Holder & 3 AA Batteries

Power your Crickit and Circuit Playground Express with this battery pack and batteries. The 2.1mm plug is a perfect fit for the Crickit's power jack.



### 8 Ohm Speaker

Listen up! This tiny 1" diameter speaker cone is the perfect addition to any small audio project where you need an 8  $\Omega$  impedance and will be using 0.5W or less of power. We particularly like this cone as it's very simple and its metal body is extremely lightweight.



Plugs right into the amplified Speaker output terminal blocks on the Crickit!



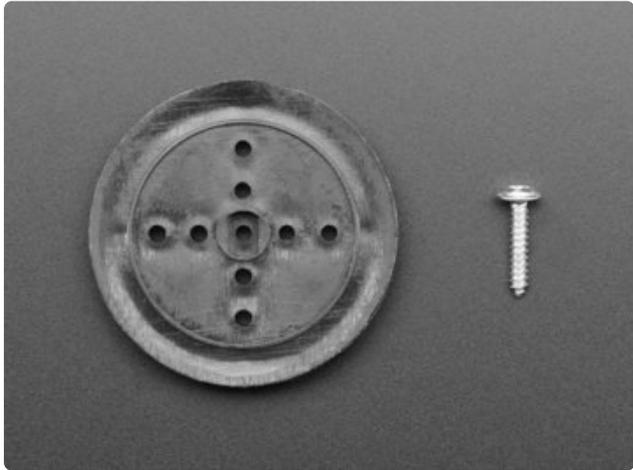
## 2x DC Gear Motors & 2 x Motor Wheels

Perhaps you've been assembling a new robot friend, adding a computer for a brain and other fun personality touches. Now the time has come to let it leave the nest and fly on its own wings— err, wheels!

These durable (but affordable!) plastic gearbox motors (also known as 'TT' motors) are an easy, low-cost way to get your projects moving. This is a **TT DC Gearbox Motor** with a gear ratio of **1:48**, and it comes with 2 x 200mm wires with breadboard-friendly 0.1" male connectors. Perfect for plugging into a breadboard or terminal blocks.

The Orange & Clear TT Motor Wheels are equipped with nice, thick silicone treads and press-fit design to make connecting super quick and easy. Make cute robots today with a couple of these orange wheels!

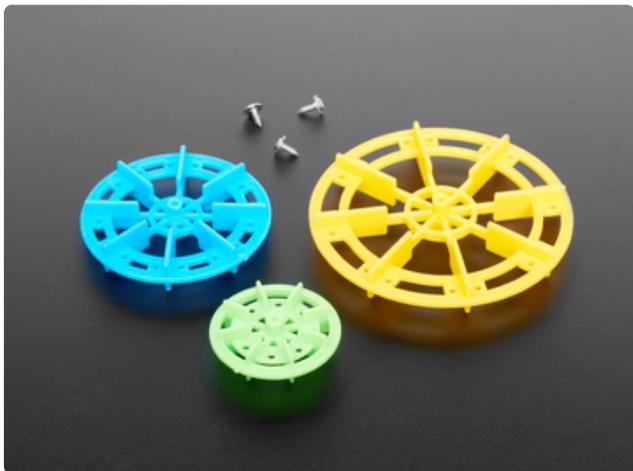
## Motor Pulley and 3 x Paddle Wheels



Mechanical transmission for the win, this simple plastic pulley can attach to your TT motor to transmit rotation from the motor axle to...somewhere else.

This is a very useful part when you require more than wheels for your robotics project. A belt and pulley solution can be light-weight and very efficient.

This **TT Motor Pulley** has a slot for fitting onto our DC gearbox motors and even comes with a mounting screw for secure attachment. A belt is not included, you could use a rubber band, twine, yarn or any other strong and flexible material with a 2mm diameter.

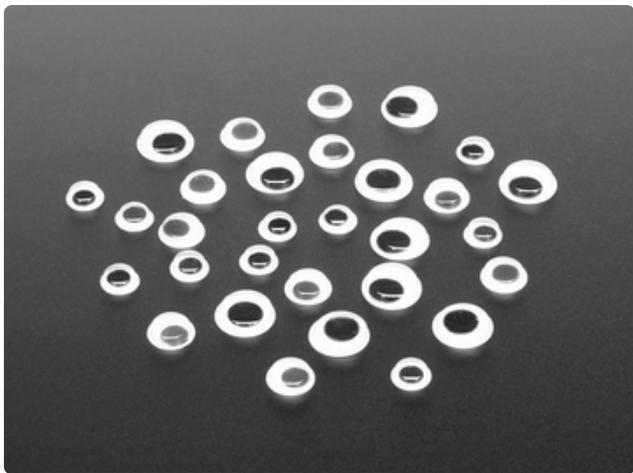
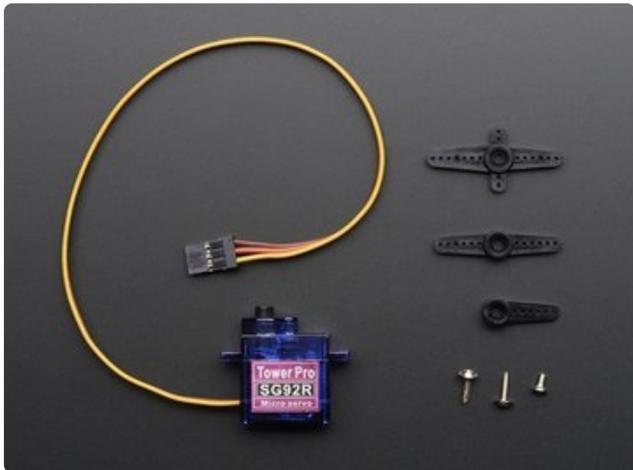


These paddle wheels in small, medium, and large are excellent for attaching all sorts of things to your motors, such as popsicle sticks, flailing weighted yarn dangly bits, or ???



### Standard and Micro Servo Pack

This pair of high-torque standard servo and tiny micro servo can each rotate approximately 180 degrees (90 in each direction). Code them to do your rotational bidding in CircuitPython, MakeCode, or Arduino running on the Circuit Playground Express -- the Crickit board has four dedicated PWM Servo outputs. Plug them in and go!



### Googly Eyes

Add personality to your robots with googly eyes! Glue or tape these on to nearly any object for instant charm.



### Cardboard Rivet Kit

Instead of slapping on tape or waiting for your hot glue to warm up, you can use these Large Plastic Rivets! So easy to install. Just poke them through the cardboard and fasten with the back piece. This will ensure clean, movable joints and attachments. You can even remove them with some effort (but they'll hold as long as you don't pry them apart)



**R is for Robot Coloring Book** is a coloring book adventure with robots, their inventors and more.

Makers of all ages can learn, color and share their favorite robots and roboticists.

Ranging from **Isaac Asimov** and his [three laws of robotics](http://adafru.it/1062) to the [Jacquard loom](https://adafru.it/BJ1), the R is for Robotics A-Z coloring book is not just an art class endeavor, but also a history lesson and a homage to the past and to the future of robotics.



### Adafruit Robot Friend Sticker

Such robot! So happy! Slap Adabot's grinning visage onto your laptop, lunchbox, skateboard deck, guitar case, ferret crate, refrigerator, oscilloscope, wiffle ball bat, moped, Dungeon Master's screen, Unimog windshield, trapeze bar, nunchaku, boombox, or Trapper Keeper.



### Make-Up Sticker Sheets

These three sheets of stickers are perfect for adding facial expressions to your favorite robots!



### Adafruit Crickit Sticker Sheet

Who is this adorable little bug in Blinka-purple sneakers? Yes, it's a new member of the Adafruit family! Please give a warm welcome to Crickit, a chirping cyber creature who will gladly help you with all the robotics projects in your maker imagination! This sheet features three shiny, vibrant stickers.

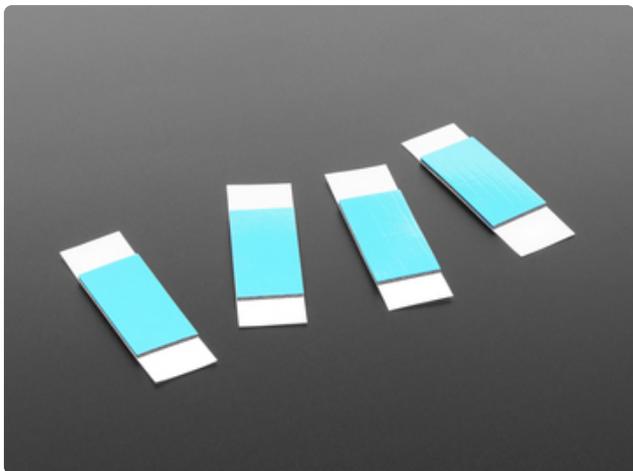


### Crafting Supplies (Sticks, Ties, & Tape)

Add to your cardboard construction arsenal with colored craft sticks! (Craft sticks is the name you use for "popsicle sticks" when you worry that maybe that's a trade name and some giant conglomerate is gonna come down on you hard. So, "craft sticks".)



And, zip ties! (Craft ties? No. Don't think there's a "Zip Tie Co." out there. Whew.) These are awesome for connecting things. And not only the usual way you were taught in zip tie class, but also by connecting multiple zip ties together for larger girth, or even improvising an awesome little zip tie rivet.



Double stick foam tape. Sticky. On BOTH sides. And the squishy compliance of foam means better adhesion between irregular and textured objects! Great for connecting servos and motors to cardboard.

## Bonus Extras for Subscribers!



### Rainbow Magic Spring

This plastic coil can slink its way down stairs, demonstrate transverse and longitudinal waves when stretched out and plucked, and even form the basis of a robotic appendage! It's up to you how to put this magical rainbow spring to work!



### Rainbow Yarn

You'll find nearly infinite uses for this colorful yarn as you build your own cardboard and Crickit-based robots. Pulley belts, cable drives, decorations, lashing parts together, and on and on!



### Rainbow Pipe Cleaners

Pipe cleaners are excellent for adding style and character to your robot builds, but they're also highly functional. You can use them to securely fasten parts, as actuators (twist a few together for a stiffer part), and more.



### Adafruit Robot Friend Puzzle

Enjoy a good jigsaw puzzle? Like robot friends? This fun puzzle is just the thing!



### Makedo Construction Kit

Makedo is a simple to use, open-ended system of tools for creative cardboard construction. Great for fastening corrugated cardboard, the "scrus" come in two sizes, with the extra long ones being perfect for thicker shipping boxes. The multifunction ring tool can be used to punch holes and screw in the scrus!

## Projects

Now that we've seen all the terrific stuff that's inside, let's start making things!

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## Getting Started

Now that we've taken a look at all the great stuff inside AdaBox 008, let's start using it! We packed this AdaBox 008 guide chock full of so much stuff that we decided to write this "Guide to the Guides" to help you navigate it all! Just click on the links on the left hand side of this page to get around.

Here in the **Getting Started** section, you'll take a tour of the Crickit platform in the [Introducing Adafruit Crickit](#) guide.



Introducing  
Adafruit Crickit  
#MakeRobotFriend

Learn some vital fabrication skills in the [Cardboard Fundamentals](#) guide.



Cardboard  
Fundamentals

Then, dive a bit deeper into the different ways to drive motors, servos, and steppers in the [Make it Move with Crickit](#) guide.



Make it Move with  
Crickit

## Project Sections

Then, once you're ready, the fun really gets going in the **AdaBox 008 Projects** sections!

You'll start off in the **First Projects** section, to begin making awesome projects using Crickit & Circuit Playground Express coded with **MakeCode**, and involving some of your new cardboard construction skills!

Next, you can take your coding to the next level using **CircuitPython** to program the Crickit and Circuit Playground Express in the **Intermediate Projects** section. Of course, as your skills grow you can go off of the beaten path and build projects of your own devising -- these guides are here to teach and inspire you so that you can make your own original creations!!

When you like, you can move into the **Advanced Projects** section. These projects will involve coding in either **MakeCode** or **CircuitPython** and will involve some increasingly involved building techniques to flex your fiberboard fabrication chops!

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## Introducing Adafruit Crickit

[Introducing Adafruit Crickit \(https://adafru.it/BD7\)](https://adafru.it/BD7)

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## Cardboard Fundamentals

[Cardboard Fundamentals \(https://adafru.it/BNH\)](https://adafru.it/BNH)

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## Make it Move with Crickit

[Make it Move with Crickit \(https://adafru.it/BNS\)](https://adafru.it/BNS)

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## AdaBox 008 Projects

Now it's time to build! Head into the First Projects, Intermediate Projects, and Advanced Projects sections to get experience building a variety of creative robotics projects with Crickit!

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## ---First Projects Using MakeCode---

The projects in this section are perfect starting projects for you to begin making your initial forays into Crickit-based creative robotics! They use **MakeCode** as the programming platform, with it's excellent graphical block-based interface.

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# Sparky the Blue Smoke Monster Automaton

[Sparky the Blue Smoke Monster Automaton \(https://adafru.it/BNL\)](https://adafru.it/BNL)

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# Stroboscopic Zoetrope

[Stroboscopic Zoetrope \(https://adafru.it/BPJ\)](https://adafru.it/BPJ)

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# Crickit Collapsible House

[Crickit Collapsible House \(https://adafru.it/BNN\)](https://adafru.it/BNN)

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# Cam Follower Automaton

[Cam Follower Automaton \(https://adafru.it/BNK\)](https://adafru.it/BNK)

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# Crickit Carnival Bumper Bot

[Crickit Carnival Bumper Bot \(https://adafru.it/BNJ\)](https://adafru.it/BNJ)

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# ---Intermediate Projects with CircuitPython---

These intermediate level projects will get you going with **CircuitPython** on Crickit!

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# Tightrope Unicycle Bot

[Tightrope Unicycle Bot \(https://adafru.it/BNM\)](https://adafru.it/BNM)

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# Minerva Owl Bot

[Minerva Owl Bot \(https://adafru.it/BNO\)](https://adafru.it/BNO)

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# Trash Panda

[Trash Panda \(https://adafru.it/BJd\)](https://adafru.it/BJd)

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## Stumble-Bot

[Stumble-Bot \(https://adafru.it/BNI\)](https://adafru.it/BNI)

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## Papercraft Zoetrope

[Papercraft Zoetrope \(https://adafru.it/BQA\)](https://adafru.it/BQA)

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## Hello World of Robotics with Crickit

[Hello World of Robotics with Crickit \(https://adafru.it/BRr\)](https://adafru.it/BRr)

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## ---Advanced Projects---

The guides in this **Advanced Projects** section use a mix of **MakeCode** and **CircuitPython**, and involve more elaborate builds.

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## Crickit Controlled Animatronic Eyeball

[Crickit Controlled Animatronic Eyeball \(https://adafru.it/BK-\)](https://adafru.it/BK-)

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## Mini Golf Course w Windmill & Gate Obstacles

[Mini Golf Course w Windmill & Gate Obstacles \(https://adafru.it/BNT\)](https://adafru.it/BNT)

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## Hammer Time Mini Golf Hazard

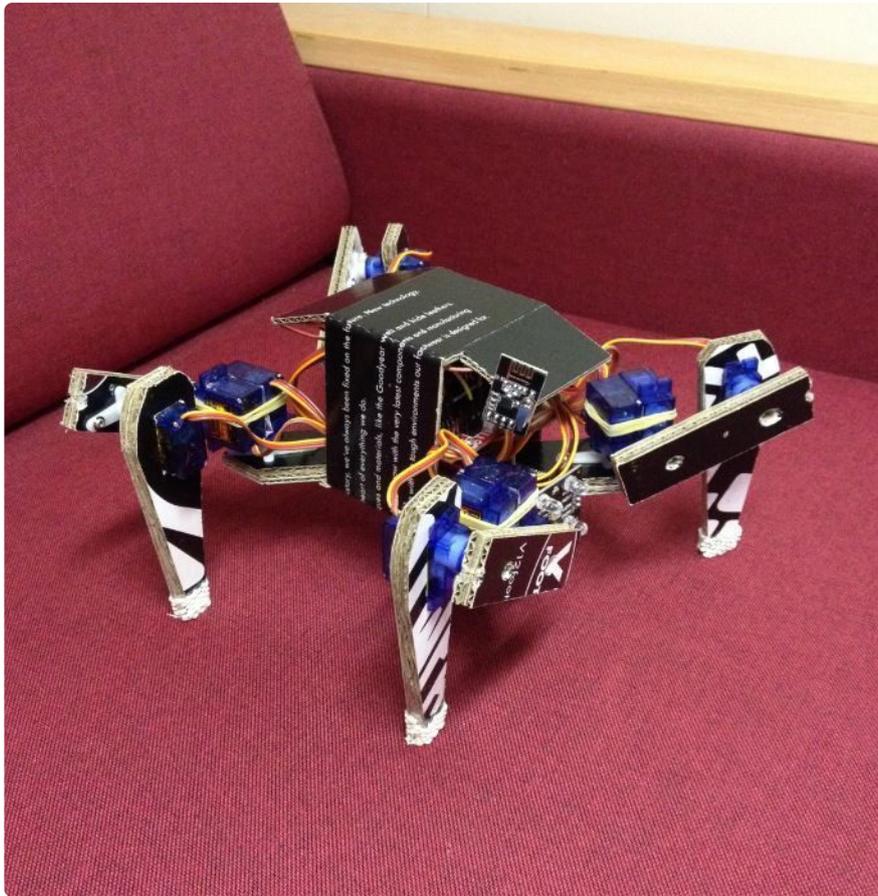
[Hammer Time Mini Golf Hazard \(https://adafru.it/BNU\)](https://adafru.it/BNU)

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## Project Inspiration

We hope this AdaBox serves as a launching off point for your explorations into robotics and cardboard/junkbot project invention! Here are some inspiring projects that people have created to get your creative circuits buzzing!





- [Cardboard Spider DIY Quadrupe](https://adafru.it/BJ3) (<https://adafru.it/BJ3>)



- [Simple Bots \(https://adafru.it/BJ4\)](https://adafru.it/BJ4)
- [Hummingbird Cardboard Projects \(https://adafru.it/BJ5\)](https://adafru.it/BJ5)
- [Mini Gear Cardboard Projects \(https://adafru.it/BJ6\)](https://adafru.it/BJ6)
- [The Q's cardboard creations \(https://adafru.it/BJ7\)](https://adafru.it/BJ7)
- [SKM cardboard DIY \(https://adafru.it/BJ8\)](https://adafru.it/BJ8)

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## Need Help? Questions?

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