



# CRICKIT Exhibit Demo Board

Created by Dano Wall



<https://learn.adafruit.com/crickit-exhibit-demo-board>

Last updated on 2024-06-03 02:40:54 PM EDT

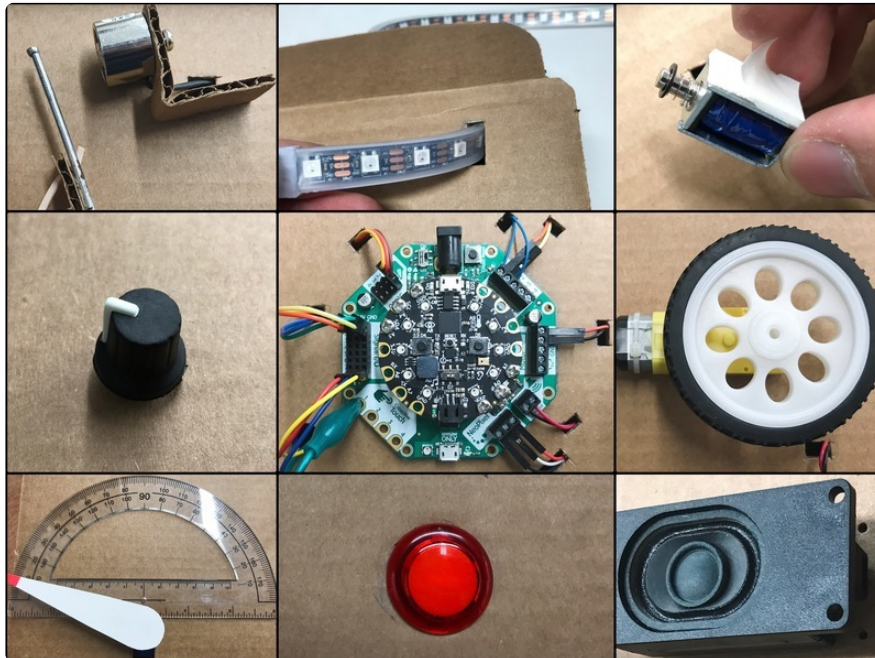
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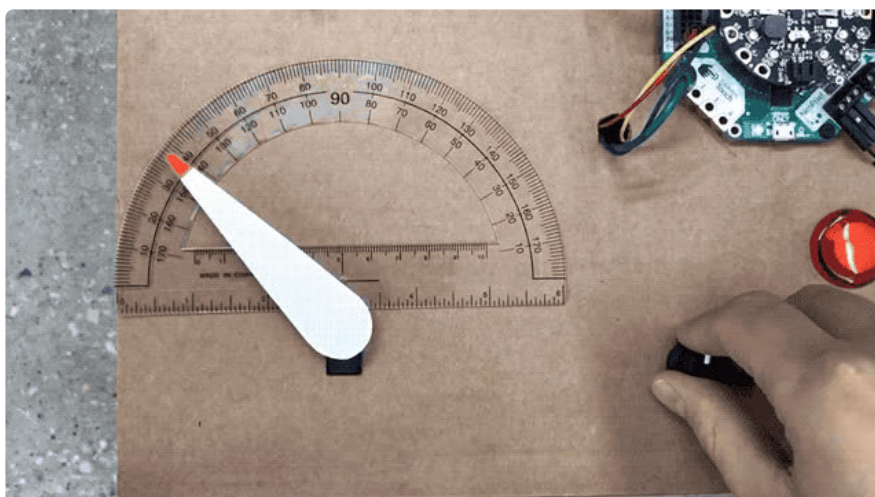
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# Overview

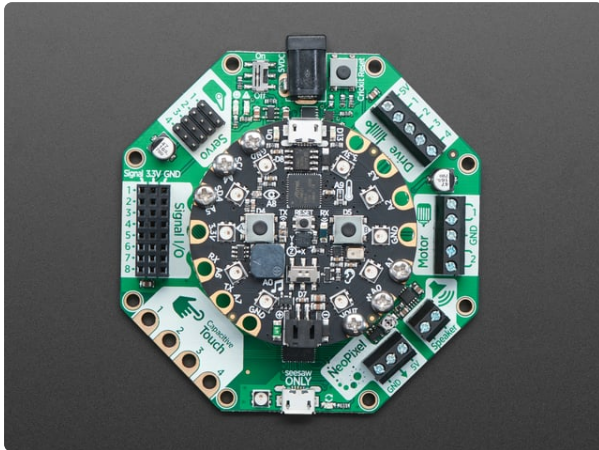
This project shows how to connect a series of buttons, sensors, NeoPixel LED lights, motors, a speaker and more to showcase all the awesome things [CRICKIT](https://adafru.it/Bwa) (<https://adafru.it/Bwa>) can do!



This project provides an excellent and entertaining demonstration of the wide variety of functions that CRICKIT for Circuit Playground Express can perform.



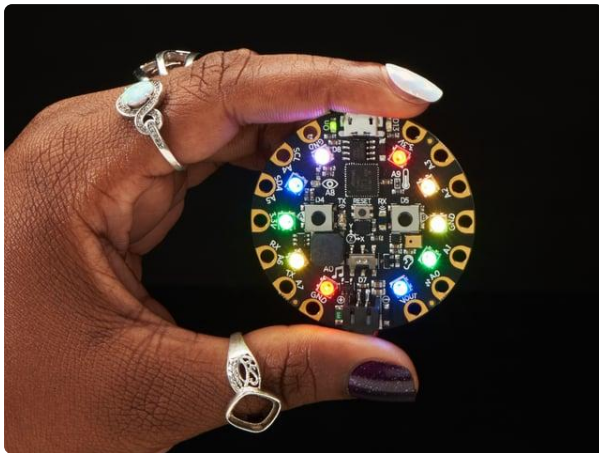
# Electronics



## Adafruit CRICKIT for Circuit Playground Express

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/3093>



## Circuit Playground Express

Circuit Playground Express is the next step towards a perfect introduction to electronics and programming. We've taken the original Circuit Playground Classic and...

<https://www.adafruit.com/product/3333>

1 x [USB cable - USB A to Micro-B](#)  
3 foot long

<https://www.adafruit.com/product/592>

1 x [5V power supply](#)  
110/240V input, 5V output to 2A

<https://www.adafruit.com/product/276>

1 x [Arcade Button - Yellow](#)  
30mm Translucent

<https://www.adafruit.com/product/474>

1 x [Arcade Button - Red](#)  
30mm Translucent

<https://www.adafruit.com/product/473>

1 x [Premium Male-Male Jumper Wires](#)  
20x12" (300mm)

<https://www.adafruit.com/product/1955>

1 x [Small Alligator Clip Test Lead \(set of 12\)](#)  
15" long

<https://www.adafruit.com/product/1008>

5V

1 x [Mini Push-Pull Solenoid](#)

<https://www.adafruit.com/product/2776>

5V

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1 x [Micro Servo](#)

<https://www.adafruit.com/product/169>

180 degree rotation

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1 x [DC Gearbox Motor - "TT Motor"](#)

<https://www.adafruit.com/product/3777>

200RPM - 3 to 6VDC

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1 x [Thin White Wheel for TT DC Gearbox Motors](#)

<https://www.adafruit.com/product/3763>

65mm Diameter

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1 x [5V Electromagnet](#)

<https://www.adafruit.com/product/3873>

5 Kg Holding Force - P25/20

---

1 x [Mono Enclosed Speaker](#)

<https://www.adafruit.com/product/3351>

3W 4 Ohm

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1 x [Adafruit NeoPixel LED Strip w/ Alligator Clips](#)

<https://www.adafruit.com/product/3812>

30 LEDs/meter - 1 Meter - BLACK

---

1 x [Panel Mount 1K potentiometer](#)

<https://www.adafruit.com/product/1789>

(Breadboard Friendly) - 1K Linear

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1 x [Potentiometer Knob](#)

<https://www.adafruit.com/product/2047>

Soft Touch T18 - White

---

1 x [Conductive Nylon Fabric Tape](#)

<https://www.adafruit.com/product/3961>

5mm Wide x 10 meters long

---

1 x [Small Alligator Clip to Male Jumper Wire Bundle](#) <https://www.adafruit.com/product/3448>

6 Pieces

---

## Other Materials

- A large cardboard box
- Scrap corrugated cardboard
- [Hot glue gun](https://adafru.it/Djk) (<https://adafru.it/Djk>)
- [Hot glue sticks](https://adafru.it/Dlg) (<https://adafru.it/Dlg>)
- A bell
- A protractor (optional)
- [Double sided tape](https://adafru.it/Cni) (<https://adafru.it/Cni>)





## Capacitive Touch

- Connect alligator clip from **capacitive touch input 1** on CRICKIT to conductive tape.

## NeoPixels

- Connect alligator clip from **5V** on the NeoPixel strip to a breadboard wire then insert and screw down that wire to **5V** on the **NeoPixel input** on CRICKIT.
- Repeat for **Data** and **GND** wires.

## Speaker

- Connect speaker wire to CRICKIT **speaker input** (orientation does not matter)

## DC Motor

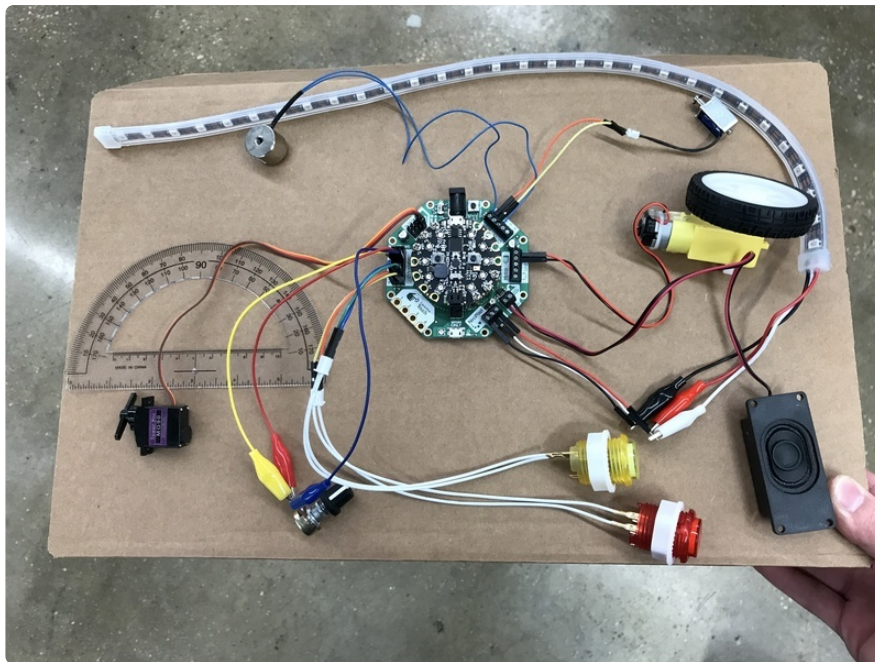
- Connect DC motor wires to CRICKIT **Motor input 1** (orientation does not matter)

## Electromagnet and Solenoid

- On the CRICKIT Drive section, screw in one cable from each the solenoid **and** the electromagnet into **5V**
- Screw in the other cables to **Drive inputs 1 and 2** for the solenoid and the electromagnet respectively.

## The Servo

- Plug in the servo to **Servo input 1** on the CRICKIT with the **brown wire facing inward towards the CRICKIT**.



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## CircuitPython Code

### Getting to know CircuitPython

[CircuitPython](https://adafru.it/CgS) (<https://adafru.it/CgS>) is a programming language based on Python, one of the fastest growing programming languages in the world. It is specifically designed to simplify experimenting and learning to code on low-cost microcontroller boards.

CircuitPython is easiest to use within the Mu Editor. If you haven't previously used Mu, [this guide will get you started](https://adafru.it/ANO) (<https://adafru.it/ANO>).

If you've never used Circuit Playground Express (CPX) with CRICKIT before, make sure you've updated it with the latest special Crickit/seesaw version of the Circuit Playground Express firmware. [This guide will show you how](https://adafru.it/Bfh) (<https://adafru.it/Bfh>).



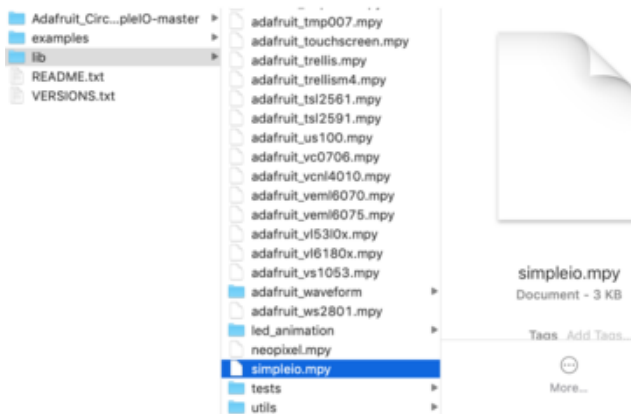


# Preparing your Board

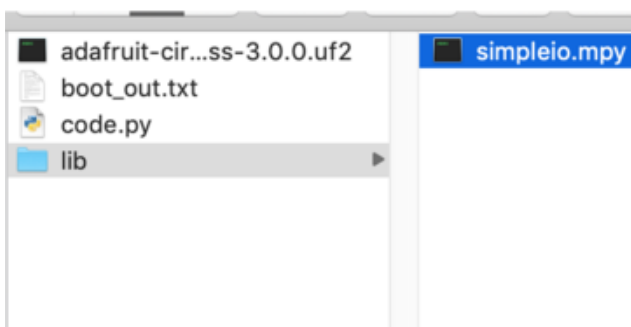
To get your CRICKIT for CPX set up to run this code, follow these steps:

- 1) Install the [latest CircuitPython for CRICKIT](https://adafru.it/Eba) (<https://adafru.it/Eba>) from the CircuitPython GitHub page
- 2) Get the [latest 4.0 library pack](https://adafru.it/zB-) (<https://adafru.it/zB->), unzip it, and drag the library **simpleio.mpy** over into the **/lib** folder on **CIRCUITPY**. If there is no **lib** directory, create one to put the file into.

More info on installing libraries [here](https://adafru.it/C9M) (<https://adafru.it/C9M>).



Find the **simpleio** library in the library pack as **simpleio.mpy**



Drag to the **lib** folder in the **CIRCUITPY** drive

Before continuing make sure your board's **lib** folder has the **simpleio** library copied over.

# Uploading

Make sure you've connected the Circuit Playground Express to your computer (mac/PC/Linux) via a known good USB A to micro-B cable. Your board should show up as a flash disk drive named **CIRCUITPY** (If you see a disk name **CPLAYBOOT**, try pressing the reset button again. If the only drive name you get is named **CPLAYBOOT**, CircuitPython may not be loaded on the board. You can load CircuitPython as [per this guide \(https://adafru.it/adafruit-cpx\)](https://adafru.it/adafruit-cpx)).

Once your board is connected, copy **code.py** from the window below and paste it into Mu. Press the **Save** button and your code should automatically be saved to the **CIRCUITPY** disk drive (which appears when the Circuit Playground Express is plugged into your computer) as **code.py**.

```
# SPDX-FileCopyrightText: 2019 Dano Wall for Adafruit Industries
#
# SPDX-License-Identifier: MIT

"""
Crickit Exhibit
Project by Dano Wall and Isaac Wellish
Code by Isaac Wellish
The Crickit Exhibit demonstrates almost all of the capabilities
which CRICKIT can offer in one project
"""

# Functions:
#1. Hit a button to trigger a solenoid
#2. Hit a button to turn on an electromagnet
#3. Touch conductive tape to trigger a neopixel animation
#4. Turn a potentiometer to control a servo
#5. Shine light on the CPX to trigger and change the speed of a DC motor
#6. Hit both buttons to trigger a sound from the speaker!

import time
from adafruit_crickit import crickit
import board
import neopixel
from analogio import AnalogIn
from simpleio import map_range, tone

# RGB values
RED = (255, 0, 0)
YELLOW = (255, 150, 0)
GREEN = (0, 255, 0)
CYAN = (0, 255, 255)
BLUE = (0, 0, 255)
PURPLE = (180, 0, 255)

# For signal control, we'll chat directly with seesaw, use 'ss' to shorted typing!
# create seesaw object
ss = crickit.seesaw

# Two buttons are pullups, connect to ground to activate
BUTTON_1 = crickit.SIGNAL1
BUTTON_2 = crickit.SIGNAL2

ss.pin_mode(BUTTON_1, ss.INPUT_PULLUP)
ss.pin_mode(BUTTON_2, ss.INPUT_PULLUP)
```

```

#solenoid at drive spot 1
crickit.drive_1.frequency = 1000

#electromagnet at drive spot 2
crickit.drive_2.frequency = 1000

# initialize NeoPixels to num_pixels
num_pixels = 30

# The following line sets up a NeoPixel strip on Crickit CPX pin A1
pixels = neopixel.NeoPixel(board.A1, num_pixels, brightness=0.3, auto_write=False)

#sleep var for pushing both buttons
SLEEP_DELAY = 0.1

# NeoPixel function
def color_chase(color, wait):
    for i in range(num_pixels):
        pixels[i] = color
        time.sleep(wait)
        pixels.show()
    time.sleep(0.5)

# potentiometer connected to signal #3
pot = crickit.SIGNAL8

# initialize the light sensor on the CPX and the DC motor
light_in = AnalogIn(board.LIGHT)

while True:

    # button + solenoid & electromagnet code
    # button 1 - solenoid on
    if not ss.digital_read(BUTTON_1):
        print("Button 1 pressed")
        crickit.drive_1.fraction = 1.0 # all the way on
        time.sleep(0.01)
        crickit.drive_1.fraction = 0.0 # all the way off
        time.sleep(0.5)
    else:
        crickit.drive_1.fraction = 0.0

    # button 2 electromagnet on
    if not ss.digital_read(BUTTON_2):
        print("Button 2 pressed")
        crickit.drive_2.fraction = 1.0 # all the way on
        time.sleep(0.5)
    else:
        crickit.drive_2.fraction = 0.0 # all the way off

    # Capacitive touch + neopixel code
    touch_raw_value = crickit.touch_1.raw_value

    if touch_raw_value>800:
        print("chase")
        color_chase(PURPLE, 0.1)
    else:
        pixels.fill((0,0,0))
        pixels.show()

    # potentiometer + servo

    # uncomment this line to see the values of the pot
    # print((ss.analog_read(pot),))
    # time.sleep(0.25)

    # maps the range of the pot to the range of the servo
    angle = map_range(ss.analog_read(pot), 0, 1023, 180, 0)

```

```
# sets the servo equal to the relative position on the pot
crickit.servo_1.angle = angle

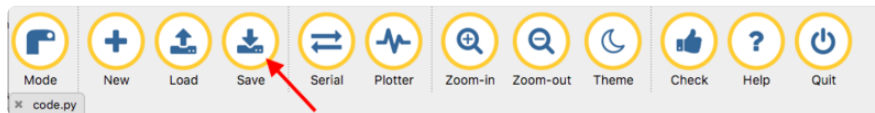
# Light sensor + DC motor

# uncomment to see values of light
# print(light_in.value)
# time.sleep(0.5)

# reads the on-board light sensor and graphs the brightness with NeoPixels
# light value remaped to motor speed
peak = map_range(light_in.value, 3000, 62000, 0, 1)

# DC motor
crickit.dc_motor_1.throttle = peak # full speed forward

# hit both buttons to trigger noise
if not ss.digital_read(BUTTON_1) and not ss.digital_read(BUTTON_2):
    print("Buttons 1 and 2 pressed")
    for f in (262, 294, 330, 349, 392, 440, 494, 523):
        tone(board.A0, f, 0.25)
        time.sleep(SLEEP_DELAY)
```



Make sure the file saved to CIRCUITPY is named "code.py", this will allow it to run automatically when your CPX is powered on.

## Test It Out

Go ahead and test out the code! What happens?

The following should occur:

- Hit a button to trigger a solenoid
- Hit a button to turn on an electromagnet
- Touch conductive tape to trigger a NeoPixel animation
- Turn a potentiometer to control a servo
- Shine light on the CPX to trigger and change the speed of a DC motor
- Hit both buttons to trigger a sound from the speaker!

## Troubleshooting

**Problem:** I get an error in the REPL that says "map\_range undefined"

**Solution:** Make sure simplio library is installed! Info on installing libraries [here](https://adafru.it/C9M) (<https://adafru.it/C9M>).

**Problem:** My Circuit Playground Express isn't recognized by Mu!

**Solution:** Make sure your board is set up with CircuitPython, which has the Circuit Playground Express show up as a flash drive named **CIRCUITPY** when you connect the CPX to your computer. If it is showing up as **CPLAYBOOT** on your computer, you can [follow the steps in this guide](https://adafru.it/AFI) (<https://adafru.it/AFI>) to ensure CircuitPython is loaded and you see the **CIRCUITPY** drive.

**Problem:** My buttons don't work!

**Solution:** Make sure you've updated the [CircuitPython firmware for CRICKIT](https://adafru.it/Bfh) (<https://adafru.it/Bfh>) from the CRICKIT guide.

**Problem:** Nothing is moving!

**Solution:** Check that your Circuit Playground Express is connected to a 5V power supply and the small slide switch on CRICKIT is set to "ON". Be sure the lightest servo wire faces away from the CRICKIT board, the darkest (black.brown) is closest to the center of CRICKIT.

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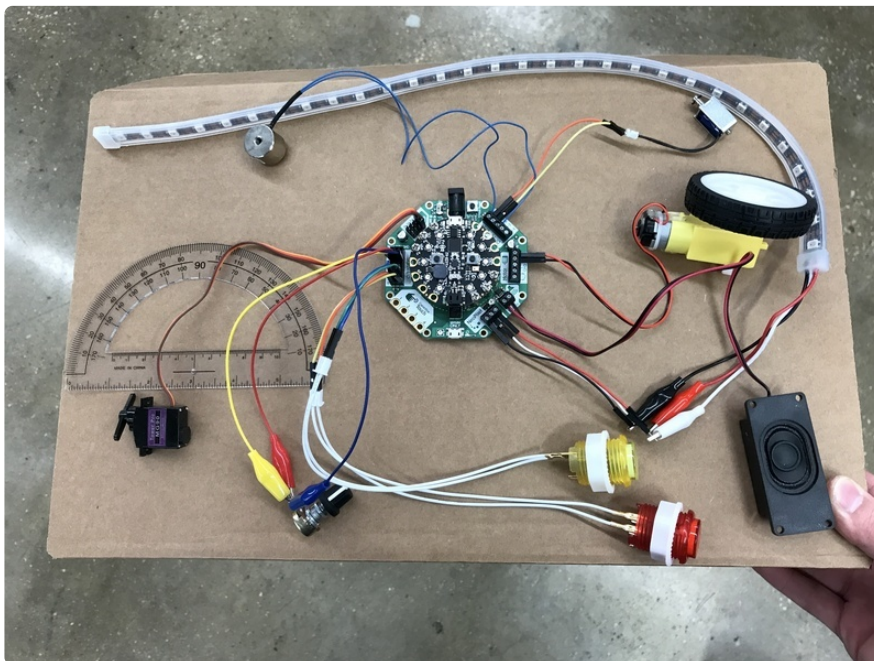
## Prepare the Box

Find yourself a large, flat box, with enough surface area to accommodate all the electronics you want to mount on it.

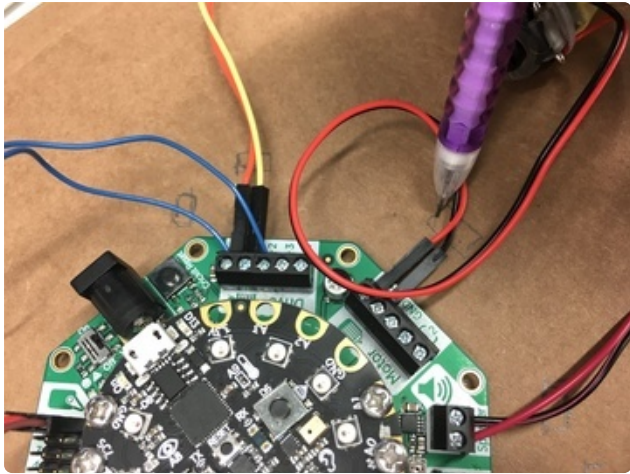


At this point, it's a good idea to lay out your electronics to get an idea for how they'll fit when mounted.

Some choices about where to arrange certain items must be made at this point, giving consideration to the placement of CRICKIT's various plugs and terminal blocks.







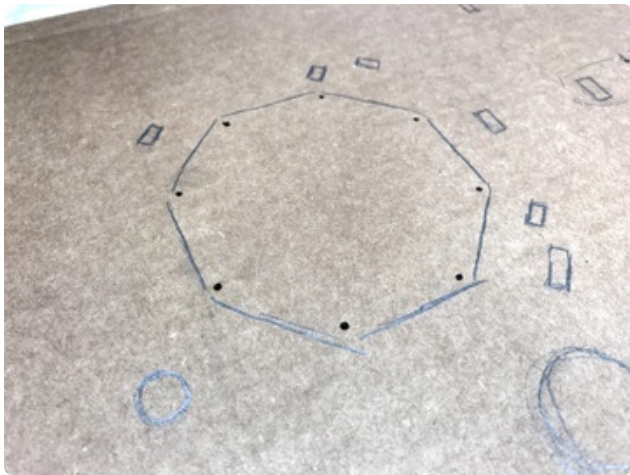
## Sketch out placement of holes

Trace outlines of where you will need holes on cardboard box.

The holes cut in the box will make routing the cables to and from CRICKIT easy to organize.



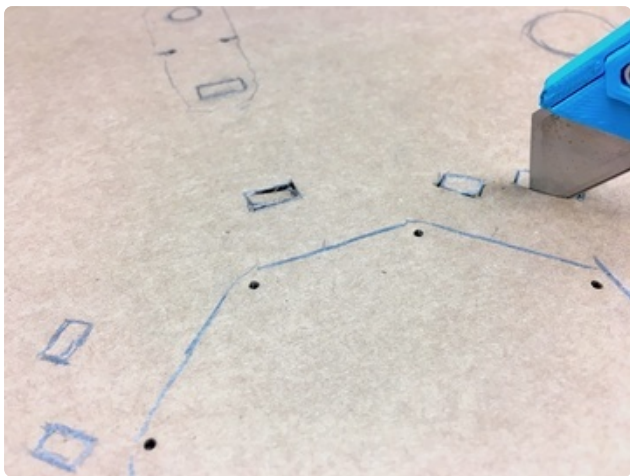
For younger makers, we suggest having an older maker assist. All should be careful of sharp objects.



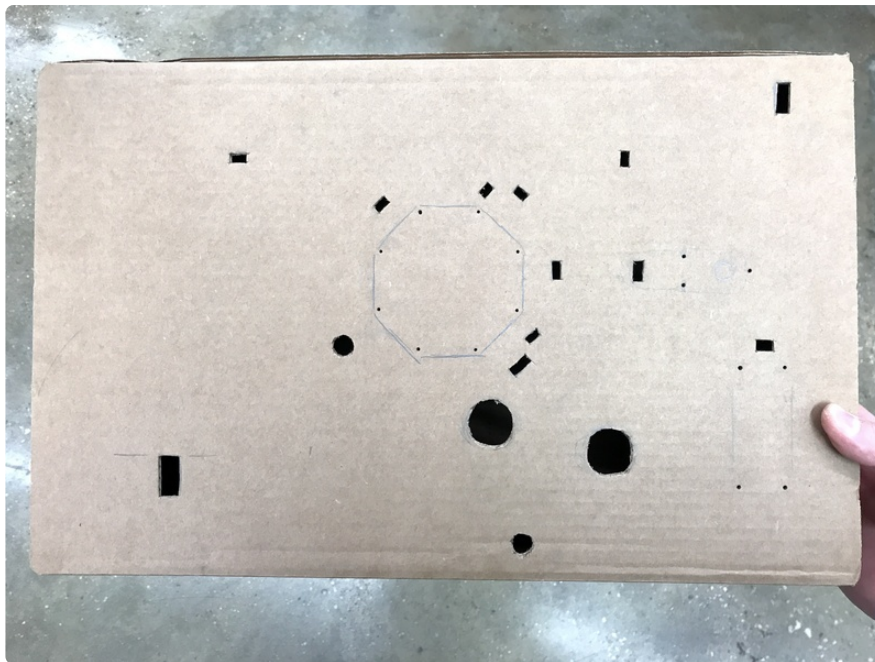
## Cut out holes

Use something sharp (like a pen tip or tweezers) to poke holes.

Use a box cutter to cut out the larger rectangular holes.



Your box should now be ready to install CRICKIT and all its assorted electronics.



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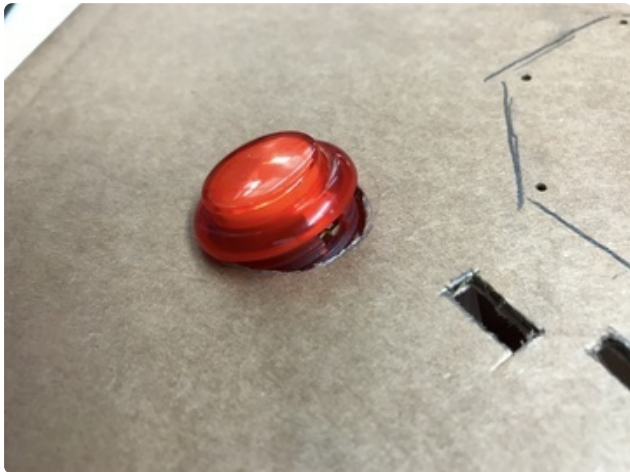
# Making Connections



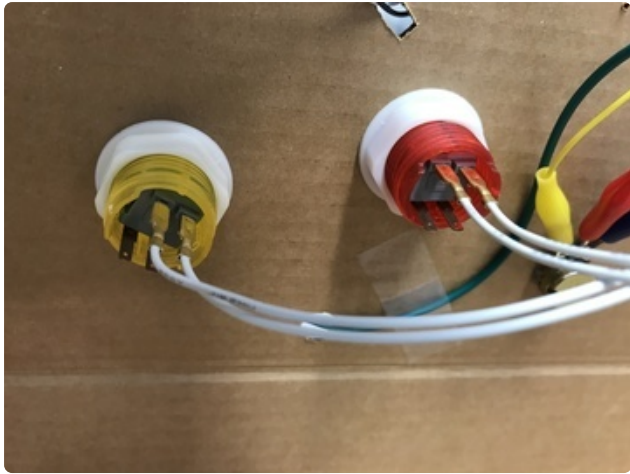
## Buttons

Screw [arcade buttons \(https://adafru.it/BLV\)](https://adafru.it/BLV) into holes in the box.

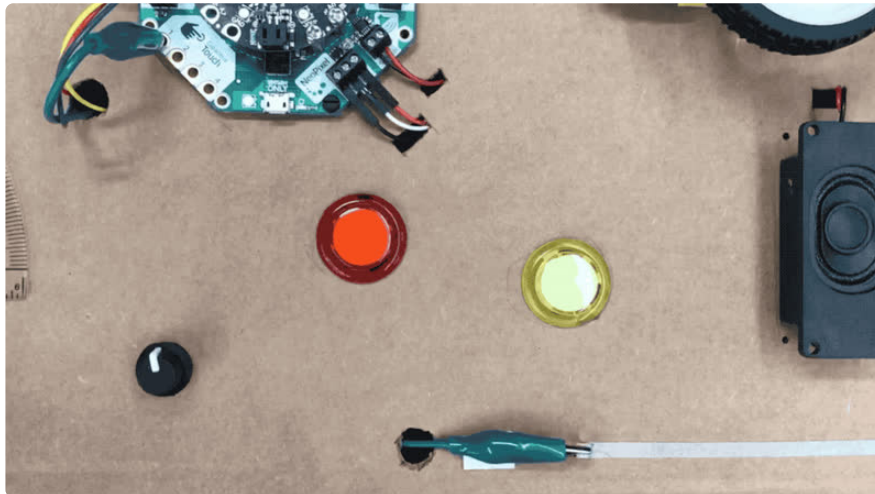
Connect the button terminals to CRICKIT's Signal port using [male-to-male jumper wires \(http://adafru.it/1957\)](http://adafru.it/1957) plugged into the [quick connect wires \(http://adafru.it/1152\)](http://adafru.it/1152).

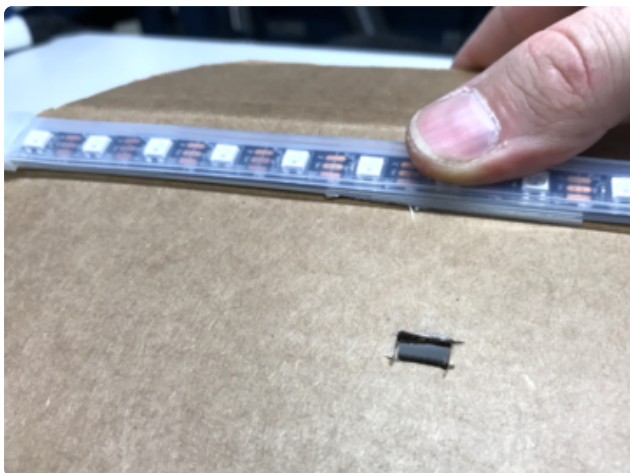
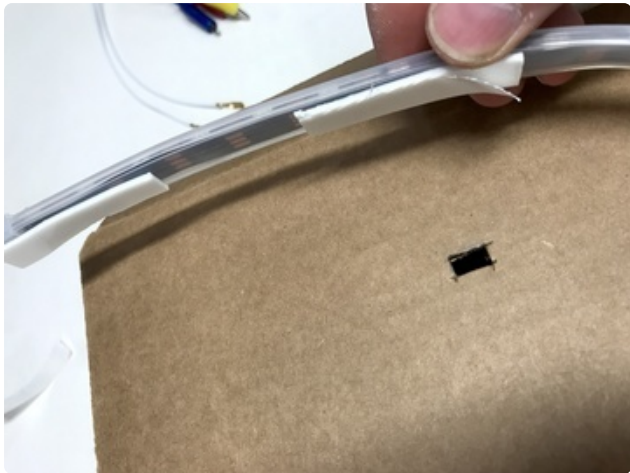
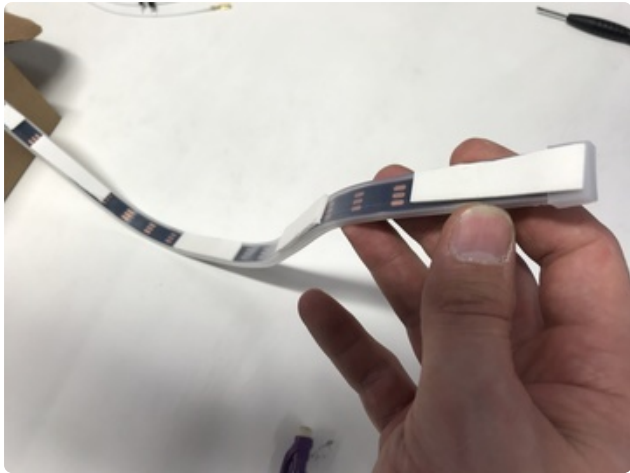






These buttons can be configured to control other things connected to CRICKIT, like the electromagnet and solenoid.





## NeoPixel Strip

Feed the [NeoPixel strip \(http://adafru.it/3811\)](http://adafru.it/3811) through hole in box.

Hold the strip in place with sections of double sided foam tape.

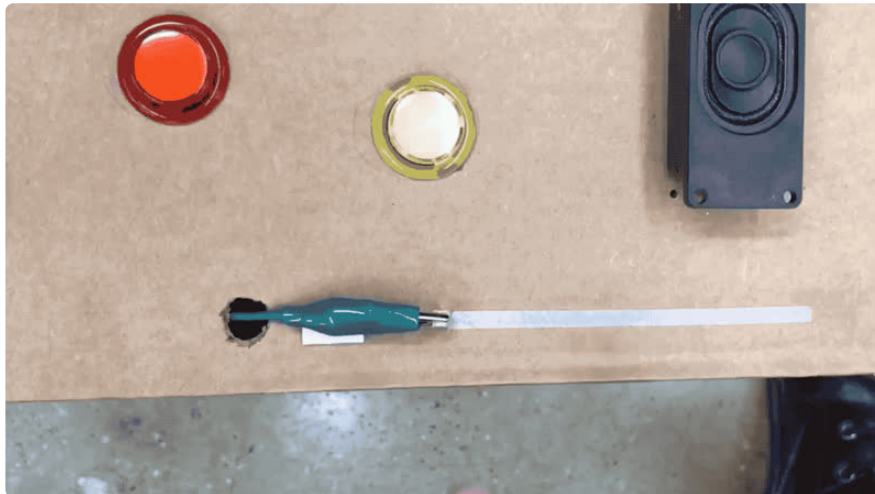


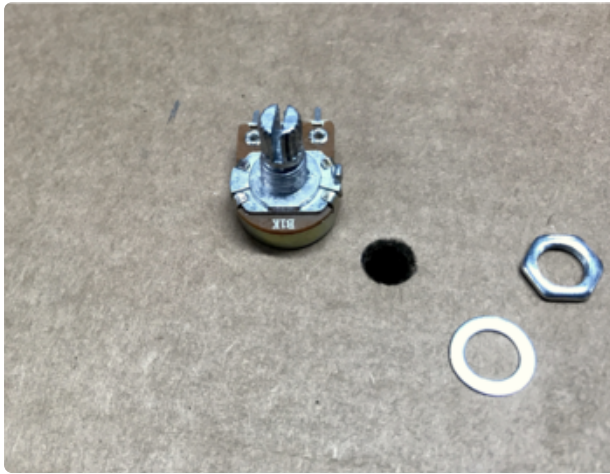


## Capacitive Touch

Place a line of [conductive tape](http://adafruit.it/3961) (<http://adafruit.it/3961>) on the box, leaving a small section at the end free to connect to an alligator clip.

When touched, this capacitive strip can be used to trigger things such as NeoPixel animations.



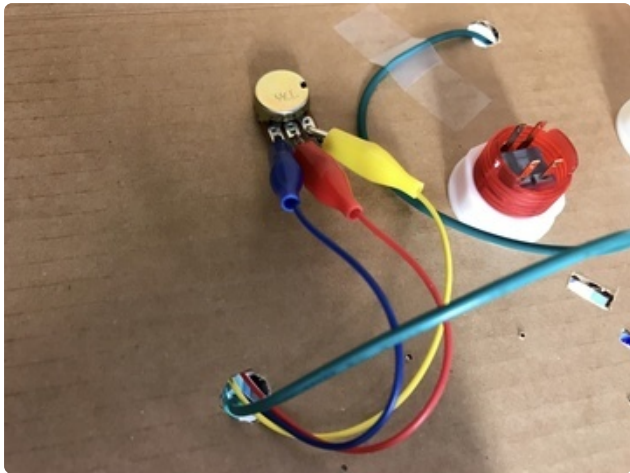


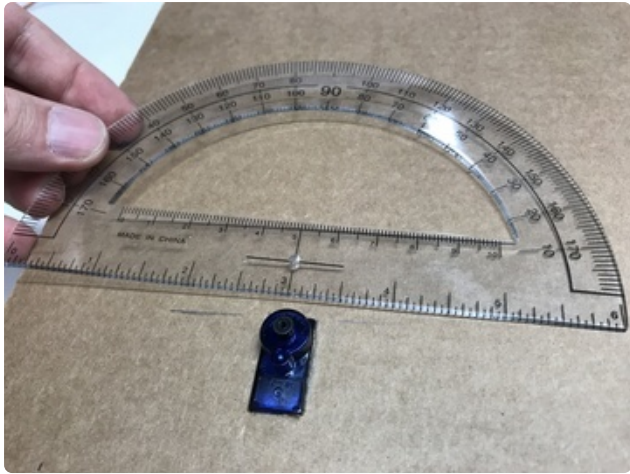
## Potentiometer

Install the [potentiometer \(http://adafru.it/1789\)](http://adafru.it/1789), screwing it tightly into place

Connect [alligator clips \(http://adafru.it/3255\)](http://adafru.it/3255) to the terminals of the potentiometer inside the box.

Press the [potentiometer knob \(http://adafru.it/2047\)](http://adafru.it/2047) into place.



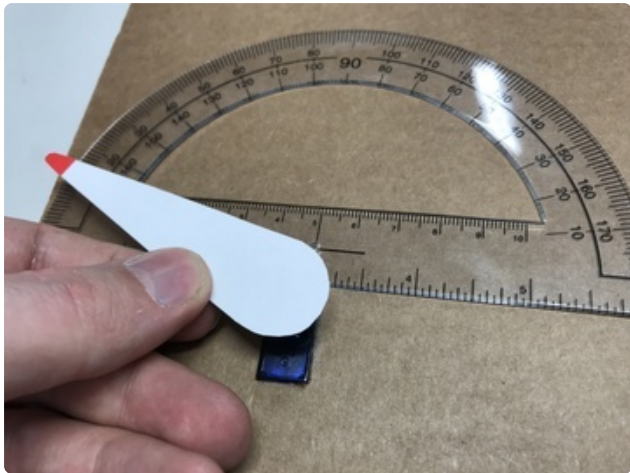
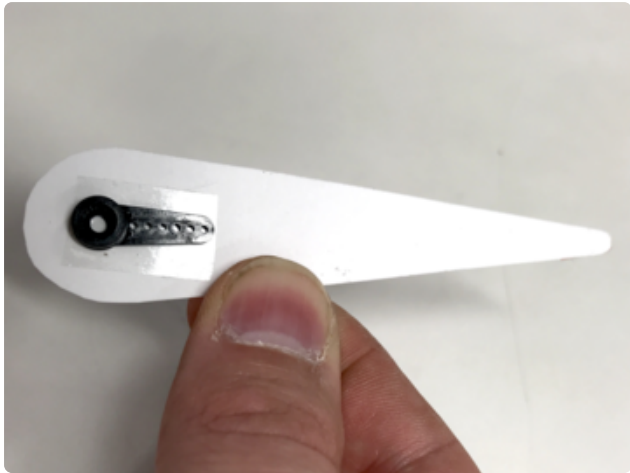


## Servo Motor

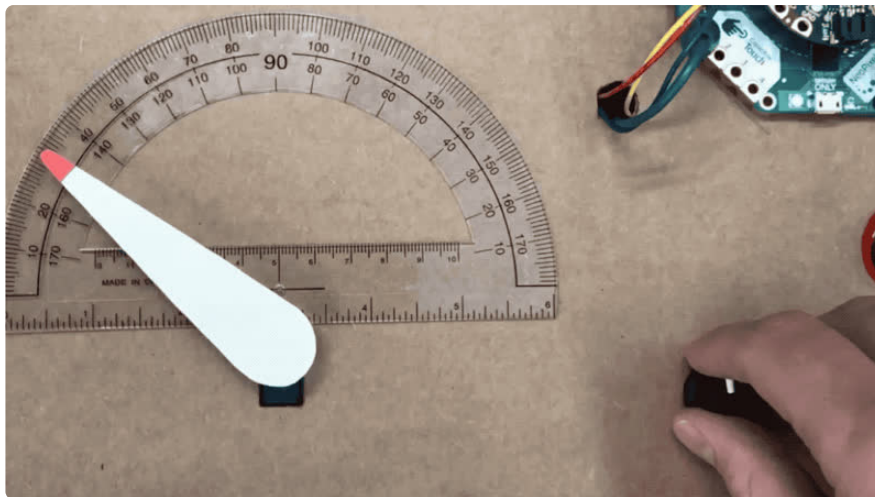
Press servo motor through rectangular hole, hold in place with a couple dabs of hot glue if necessary.

A protractor can make a fun addition as an angle indicator, or draw your own indicator directly on the box.

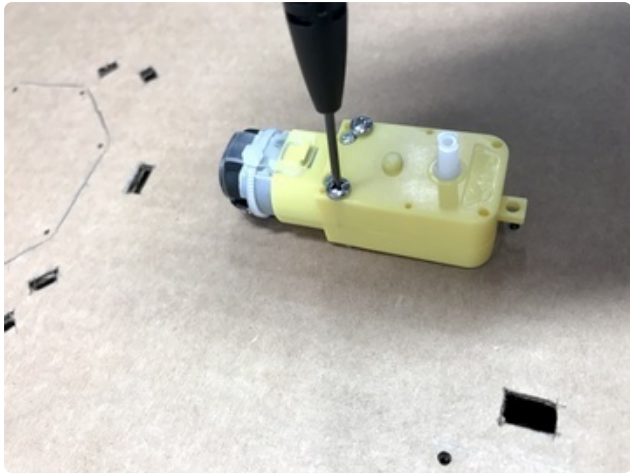
Cut an arrow out of paper and tape this to the servo arm, then press onto the servo horn.



The potentiometer in this example is connected to the servo motor, allowing the user to control the angle of the motor arm by turning the potentiometer knob.



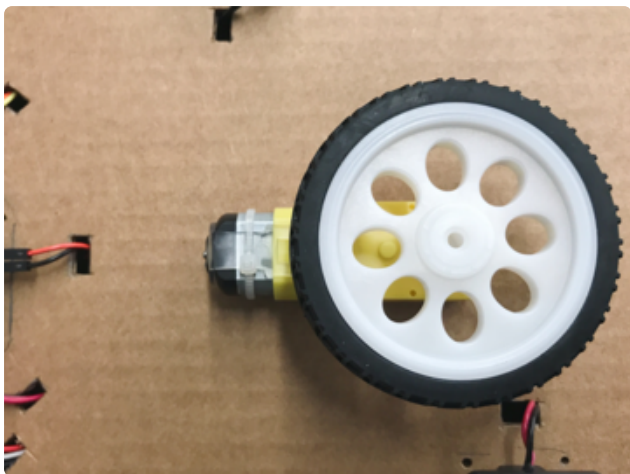
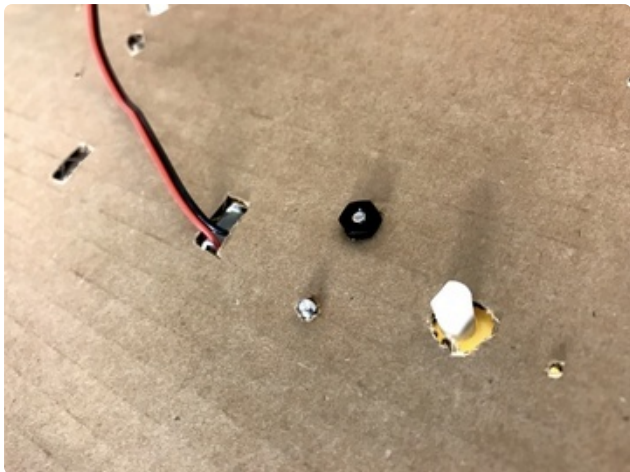




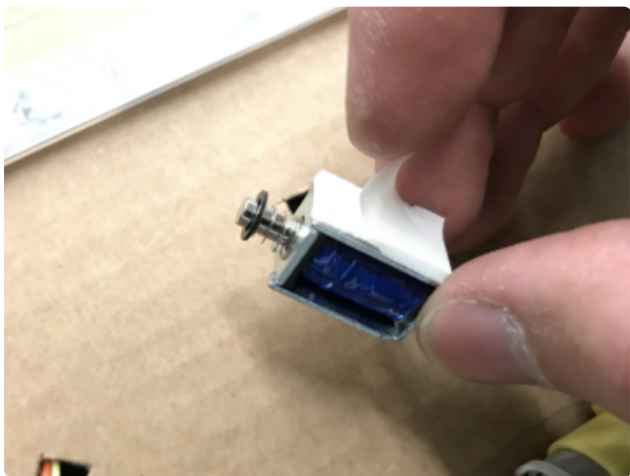
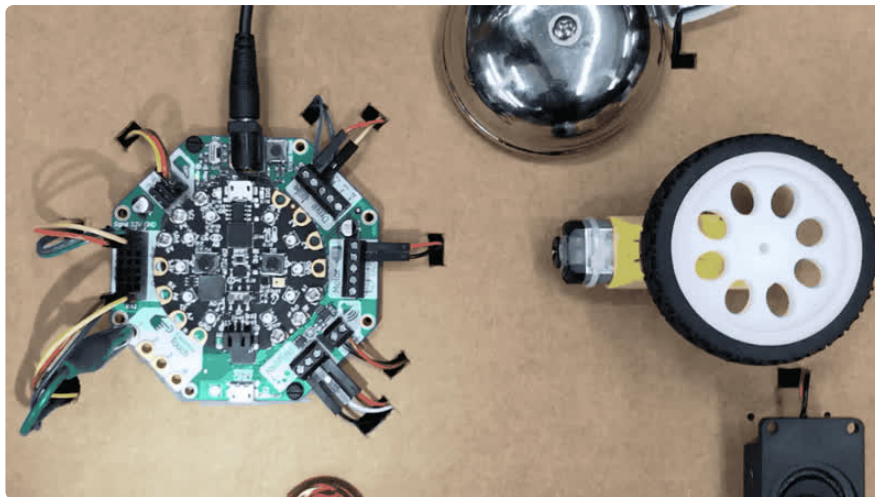
## DC Motor

Screw the [DC motor \(http://adafru.it/3777\)](http://adafru.it/3777) into place. If bolts aren't handy, a square of double-sided tape works just as well.

Affix a wheel to the hub of the motor.



For this project, the DC motor is used as a brightness indicator, increasing in speed in accordance with data received from the light sensor onboard Circuit Playground Express.



## Solenoid

Use a small square of double sided foam tape to stick the solenoid to the box.

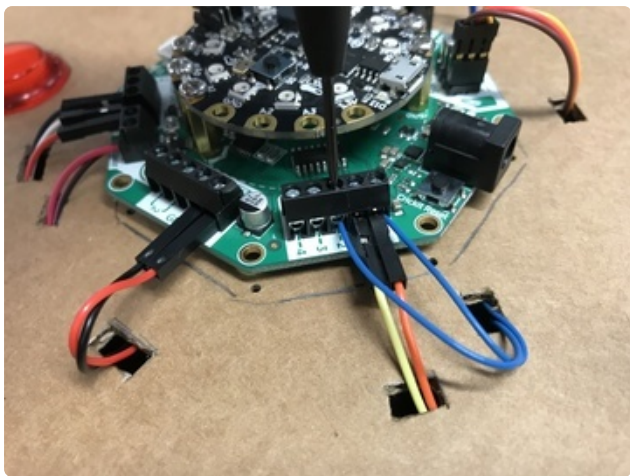
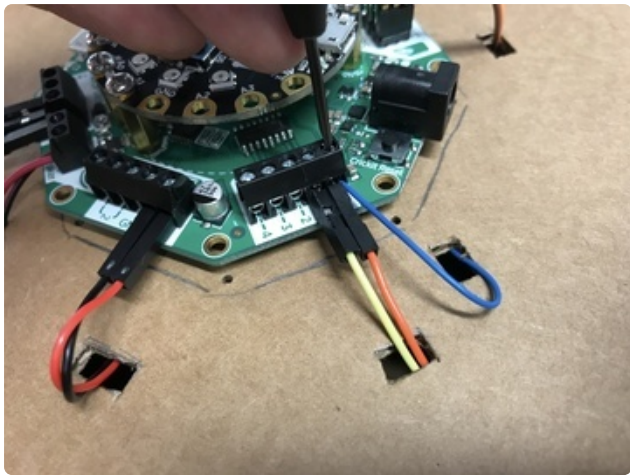
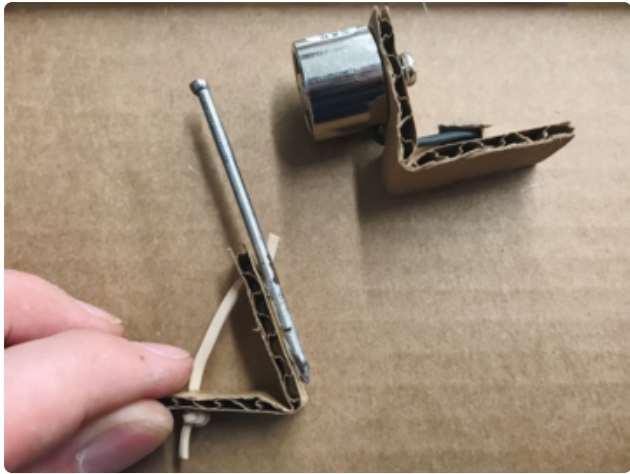


A bell taken from a generic [hotel bell](https://adafru.it/Ec5) (<https://adafru.it/Ec5>) or bike bell works great when paired with this mini solenoid.

The solenoid can be triggered by a button press, and used to tap a bell or tuning fork to make it ring.







## Electromagnet

Use a small piece of cardboard to hold the [electromagnet \(http://adafru.it/3873\)](http://adafru.it/3873) perpendicular to the surface of the box.

Screw the wires coming out of the electromagnet into the Drive terminals on CRICKIT.

The electromagnet generates a magnetic field current is run through it, and loses its magnetism when the current is cut off. A nail or other sufficiently large piece of metal works well as an indicator for when the electromagnet is on or off.



## Speaker

The small [mono enclosed speaker \(http://adafruit.it/3351\)](http://adafruit.it/3351) can be stuck in place with double-sided tape, or connected with bolts to the box.

Pressing two buttons at once can perform a different function that either button on its own, like in this example, playing sound through the speaker.

