

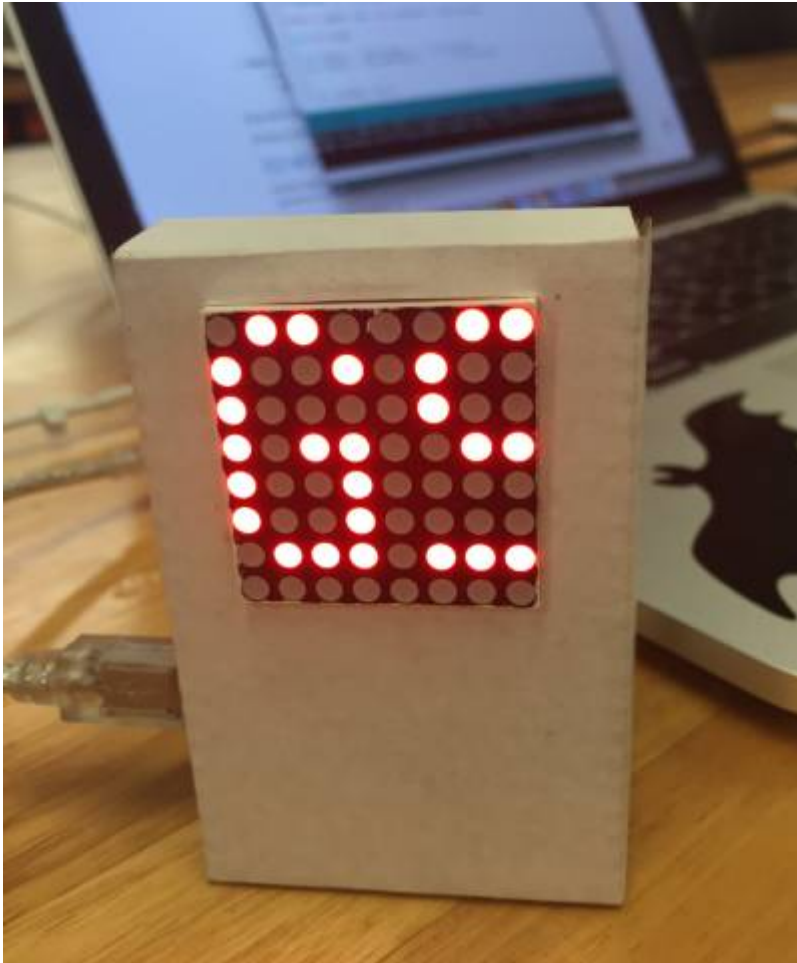


# Deskduino

SLQ Wiki Fabrication Lab 2024/04/25 10:27

~~REVEAL~~

# Deskduino



The Edge March 2018

Created by *Phil Gullberg* on 2018/03/27 14:36.

## contributors

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## Summary

Participants will create an electronic display for their workplace/desk. The display uses a

programmable 8x8 LED Matrix display, an Arduino Nano and a cardboard frame made using a laser-cutter.

This workshop was initially developed for the Flying Arts program ArtizINNOVATE@theEdge in June 2017, then run at Woodford Folk Festival 2017/2018 and eventually run as an in-house workshop. This latest iteration (March 2018) removes the battery and charger so that it can sit on a desk instead of being worn. [Previous Version](#).

## Skills Introduced

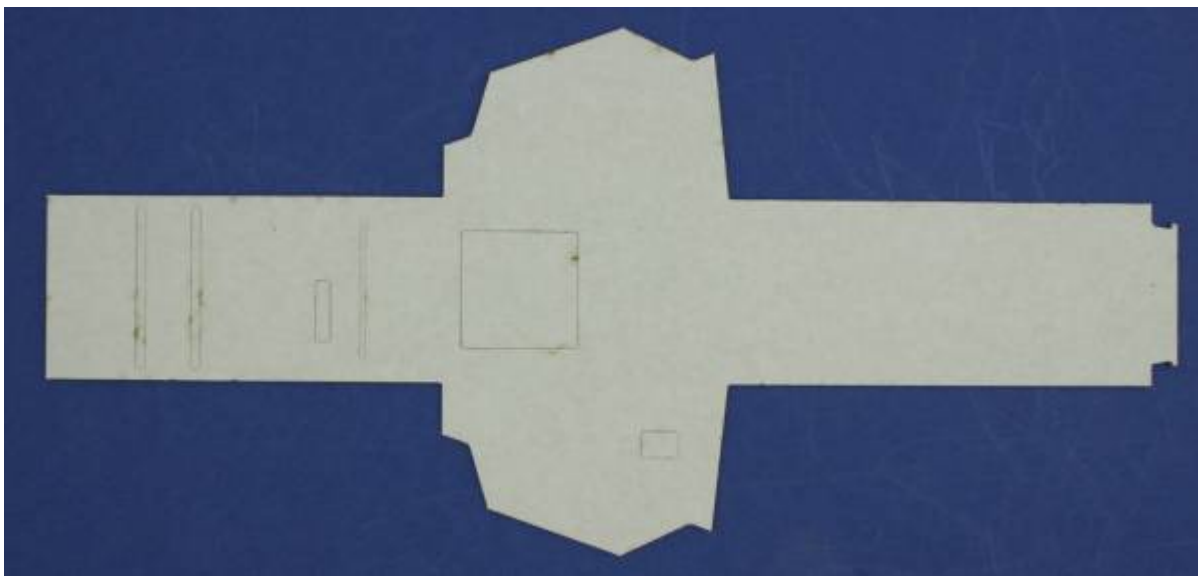
- High level overview of circuit and components
- Case assembly and wiring between components
- Coding in the Arduino IDE

## Materials

### Electronics

| Material                             | Quantity | Cost   | Supplier                   |
|--------------------------------------|----------|--------|----------------------------|
| Arduino Nano v3                      | 1        | \$3.40 | <a href="#">AliExpress</a> |
| MAX7219-dot-matrix-module            | 1        | \$2.10 | <a href="#">AliExpress</a> |
| Short USB Cable - USB-A to Micro USB | 1        | \$2    | <a href="#">Tronixlabs</a> |
|                                      | Total    | \$7.50 |                            |

### Frame



# Tools and Prepartion

## Tools

- Computer with working USB 2.0 ports
- A working internet connection (or pre-downloaded files)
- Pen/Awl
- Ruler

# Introduction to Arduino Microcontrollers

## What is a micro controller?

A microcontroller (or MCU for microcontroller unit) is a small computer on a single integrated circuit.

- one or more CPUs (processor cores)
- memory
- programmable input/output peripherals
- can be mixed signal devices interacting with
  - digital signals
  - analog singals

## Why use an MCU?

Microcontrollers are small, low powered and robust, making them perfect for [embedded systems](#) such as:

- medical devices
- remote controls
- office machines
- appliances
- power tools
- toys
- wearables!

## What is Arduino?

Arduino is an open source computer hardware and software company, project, and user community <sup>1)</sup>

- The hardware is based on the Amtel 8-bit AVR MCU

- The software uses the Processing IDE, with a simplified version of the C++ language
- Open source has led to the creation of a huge range of
  - clones
  - compatible devices
  - peripherals
- A strong community means
  - “Someone, Somewhere has solved the problem”
  - we can run this workshop using and adapting existing resources.

## Assembly and Testing

It's time to get started!

### Step One: Connecting and Testing the Arduino Nano

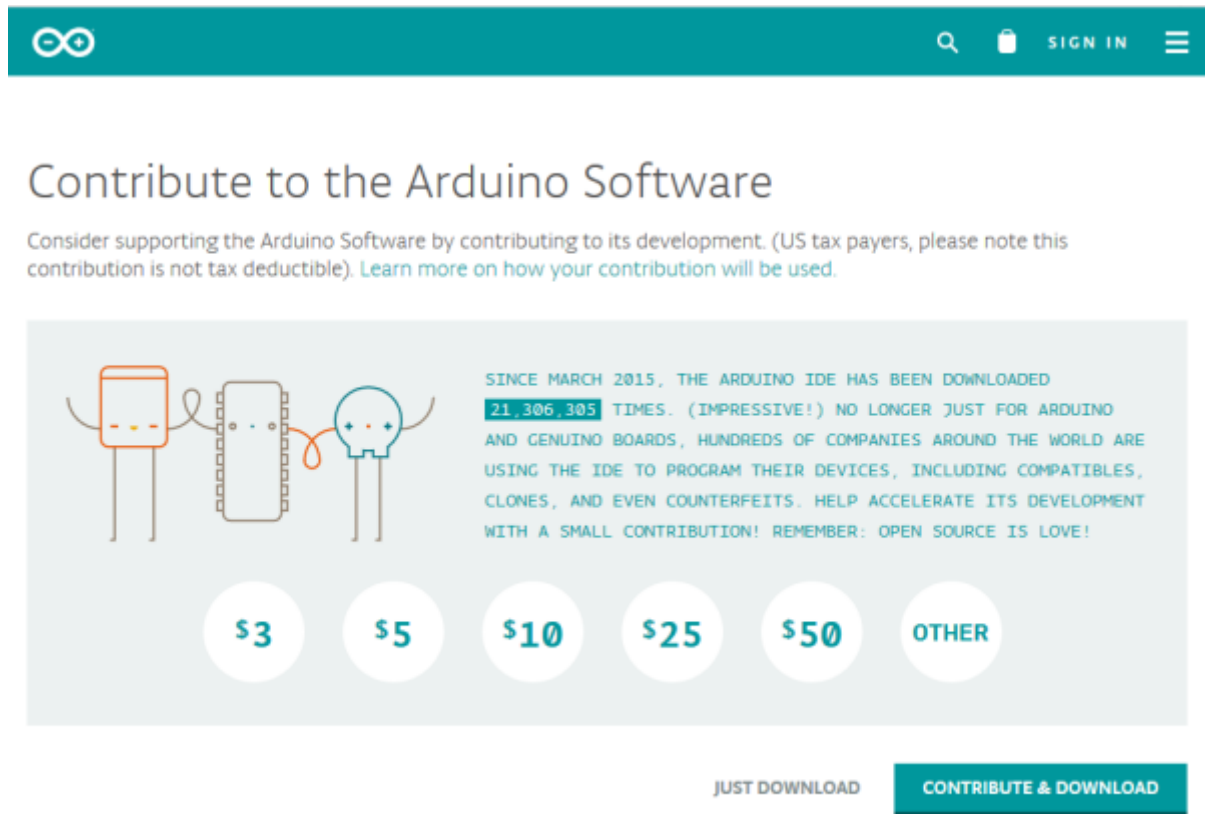
#### Download the Arduino IDE




Download the latest version of the [Arduino IDE](#).



The screenshot shows the Arduino IDE download page. At the top is a teal header with the Arduino logo, a search icon, a folder icon, and a 'SIGN IN' link. Below the header, the main heading is 'Download the Arduino IDE'. The central content area features the Arduino logo on the left and text on the right stating 'ARDUINO 1.8.5'. The text describes the IDE as open-source, easy to use, and compatible with various boards. To the right of this text is a teal sidebar with links for 'Windows Installer', 'Windows ZIP file for non admin install', 'Windows app' (with a 'Get' button), 'Mac OS X 10.7 Lion or newer', 'Linux 32 bits', 'Linux 64 bits', 'Linux ARM', 'Release Notes', 'Source Code', and 'Checksums (sha512)'. Below the main content area are two sections: 'HOURLY BUILDS' and 'BETA BUILDS'. The 'HOURLY BUILDS' section includes a 'LAST UPDATE' box showing '4 January 2018 0:34:46 GMT' and a description of the preview release. The 'BETA BUILDS' section includes a 'BETA' badge and a description of the beta version.

Select your operating system and when prompted choose “Just Download”.



 SIGN IN 



SINCE MARCH 2015, THE ARDUINO IDE HAS BEEN DOWNLOADED **21,306,305** TIMES. (IMPRESSIVE!) NO LONGER JUST FOR ARDUINO AND GENUINO BOARDS, HUNDREDS OF COMPANIES AROUND THE WORLD ARE USING THE IDE TO PROGRAM THEIR DEVICES, INCLUDING COMPATIBLES, CLONES, AND EVEN COUNTERFEITS. HELP ACCELERATE ITS DEVELOPMENT WITH A SMALL CONTRIBUTION! REMEMBER: OPEN SOURCE IS LOVE!

\$3

\$5

\$10

\$25

\$50

OTHER

JUST DOWNLOAD

CONTRIBUTE & DOWNLOAD

If you are using a genuine Arduino with the FT chipsets you won't need to download any drivers on PC and MacOS Sierra. If you are using a knockoff Arduino with the CH340G chip you will need to download the [drivers](#) for Mac.

Follow the instruction and install the program on your computer.

## Connect Your Arduino

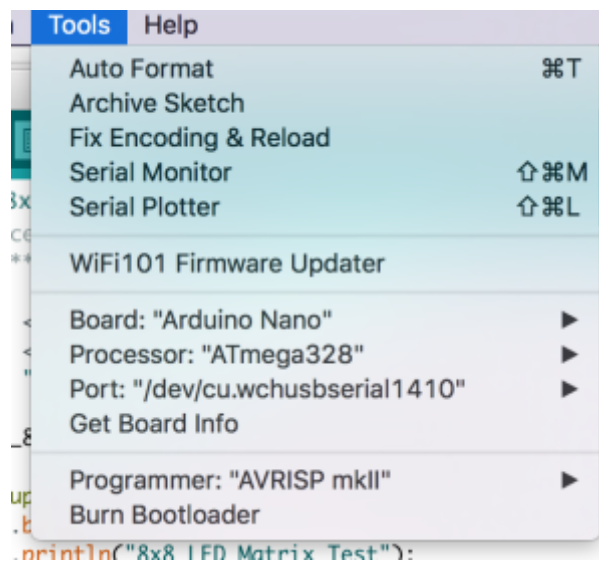
A red and then a green LED will light up on the Arduino, indicating that it's receiving power (for some Arduinos this may just be a single red light)



Now launch Arduino IDE

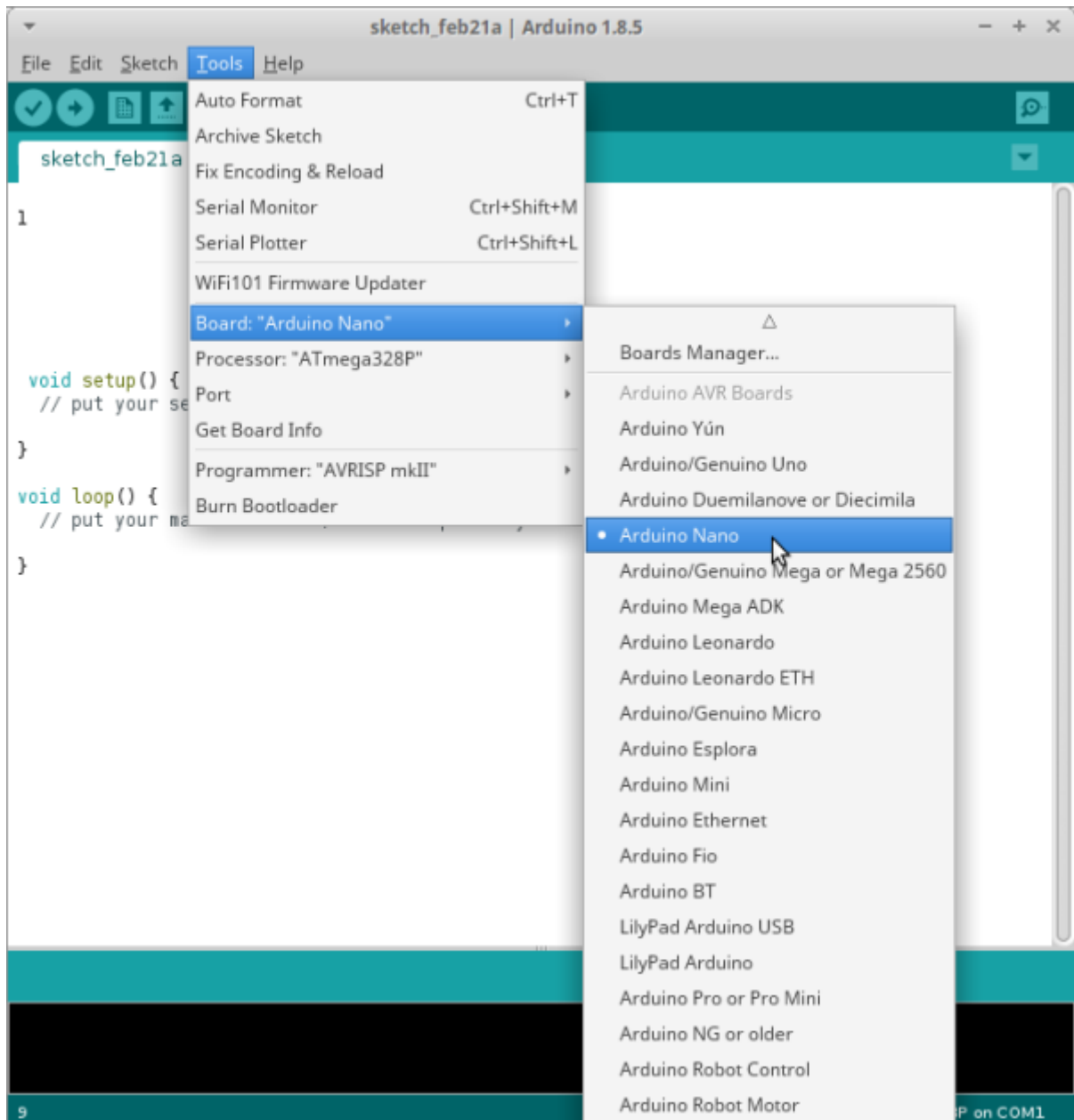


Go to the *Tools* menu and change the following:

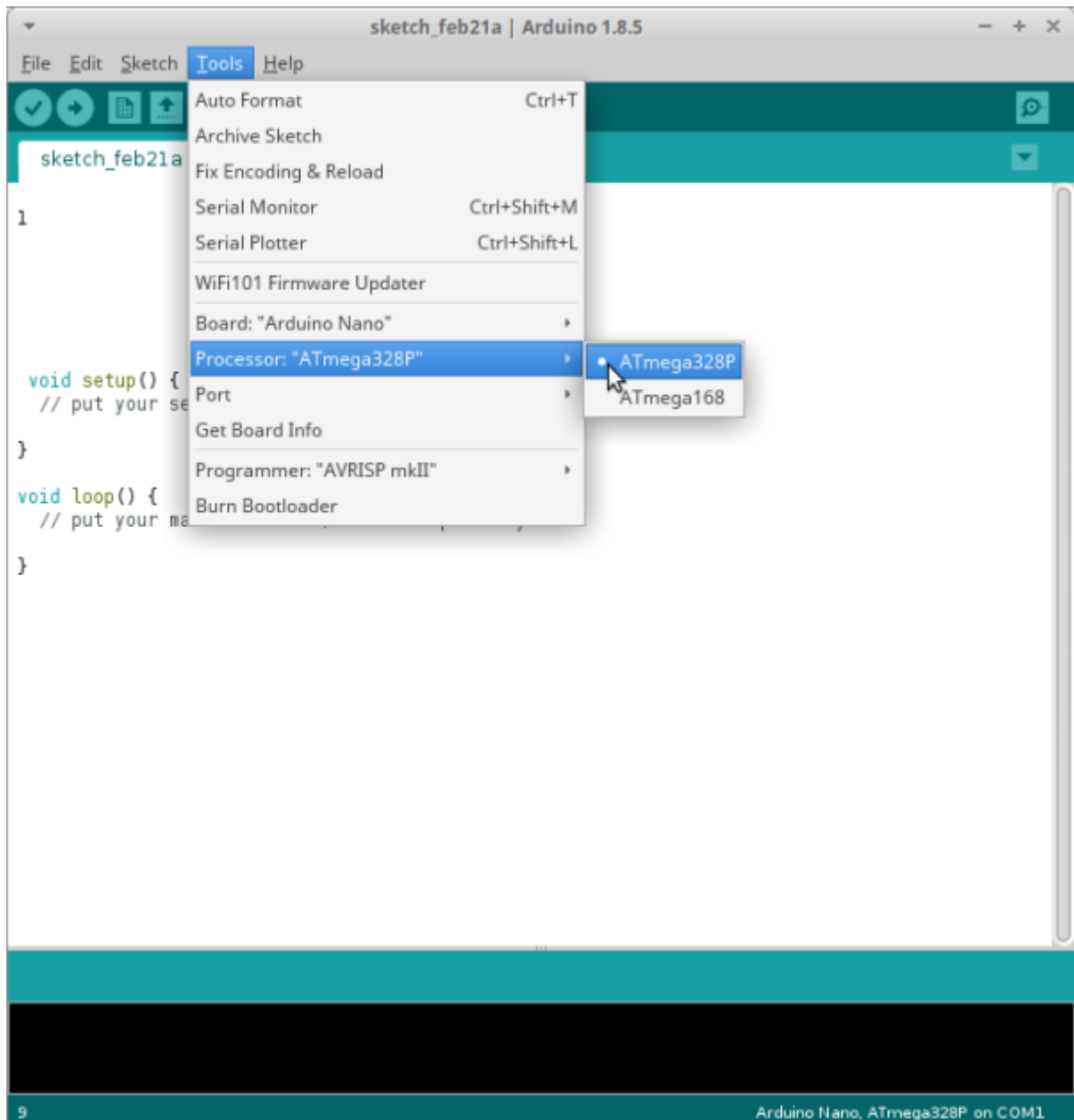


- **Board** to **Arduino Nano**





- **Processor to ATmega328**



- **Port** to USB/Serial (different depending on OS and Chip)
  - If you are having problems finding a USB port you most likely need to download the correct drivers.

Once again, the exact OS (and version) as well as the chip make a big difference.

Once that is done, run "Get Board Info" in the same menu, this should bring up a small pop-up with some information.

As long as you're not receiving an error in the console, you have successfully connected your Arduino!

## Test with the Blink Example

Another step you can take to test that everything is working is to load one of the basic example projects and upload it to the Arduino.

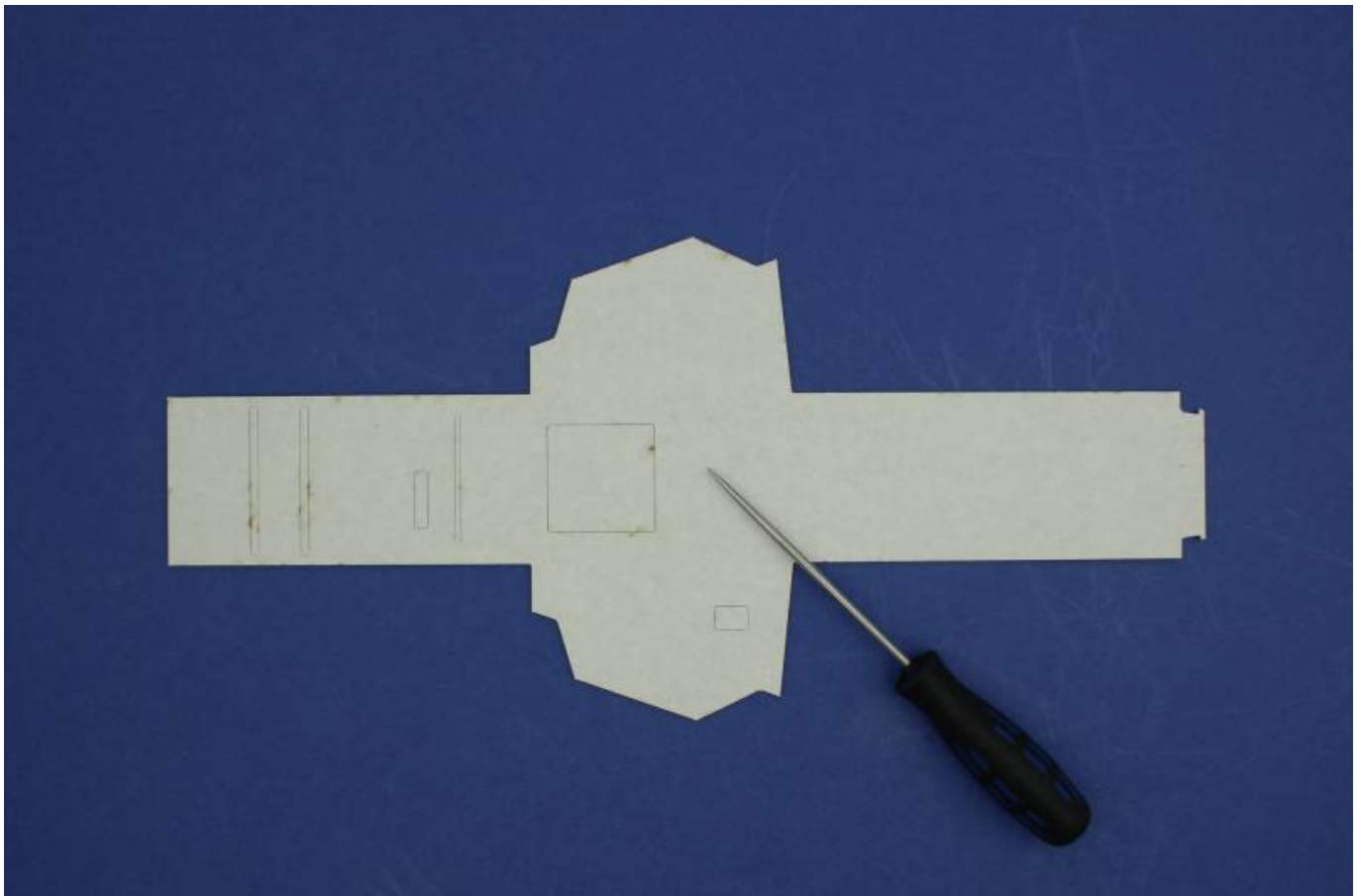
- Go to File → Examples → 01.Basic → Blink
- Click on the verify button (Check mark) and let it compile. You should get a message at the top of the console telling you when it's done (this should take no more than a few seconds)
- Once this is done, without any errors, click the Upload button (Arrow)
- This will upload the instructions to the Arduino and it will say "Done Uploading" when everything worked
- Your red LED on the Nano should now be blinking, one second on, one second off
- Uploading scripts to your Arduino works!

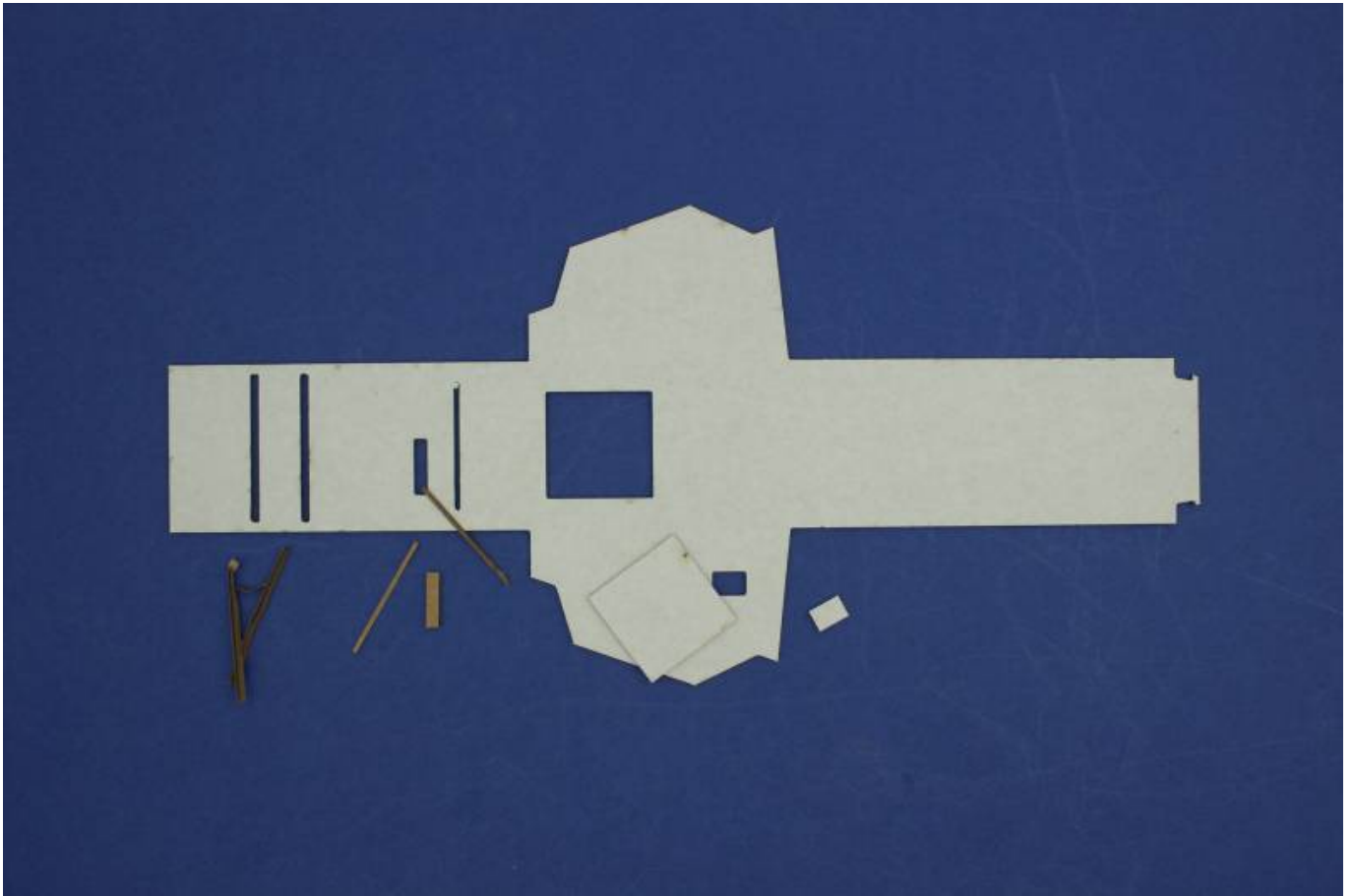
Now we are ready for the real projects

## Step Two: Assembly

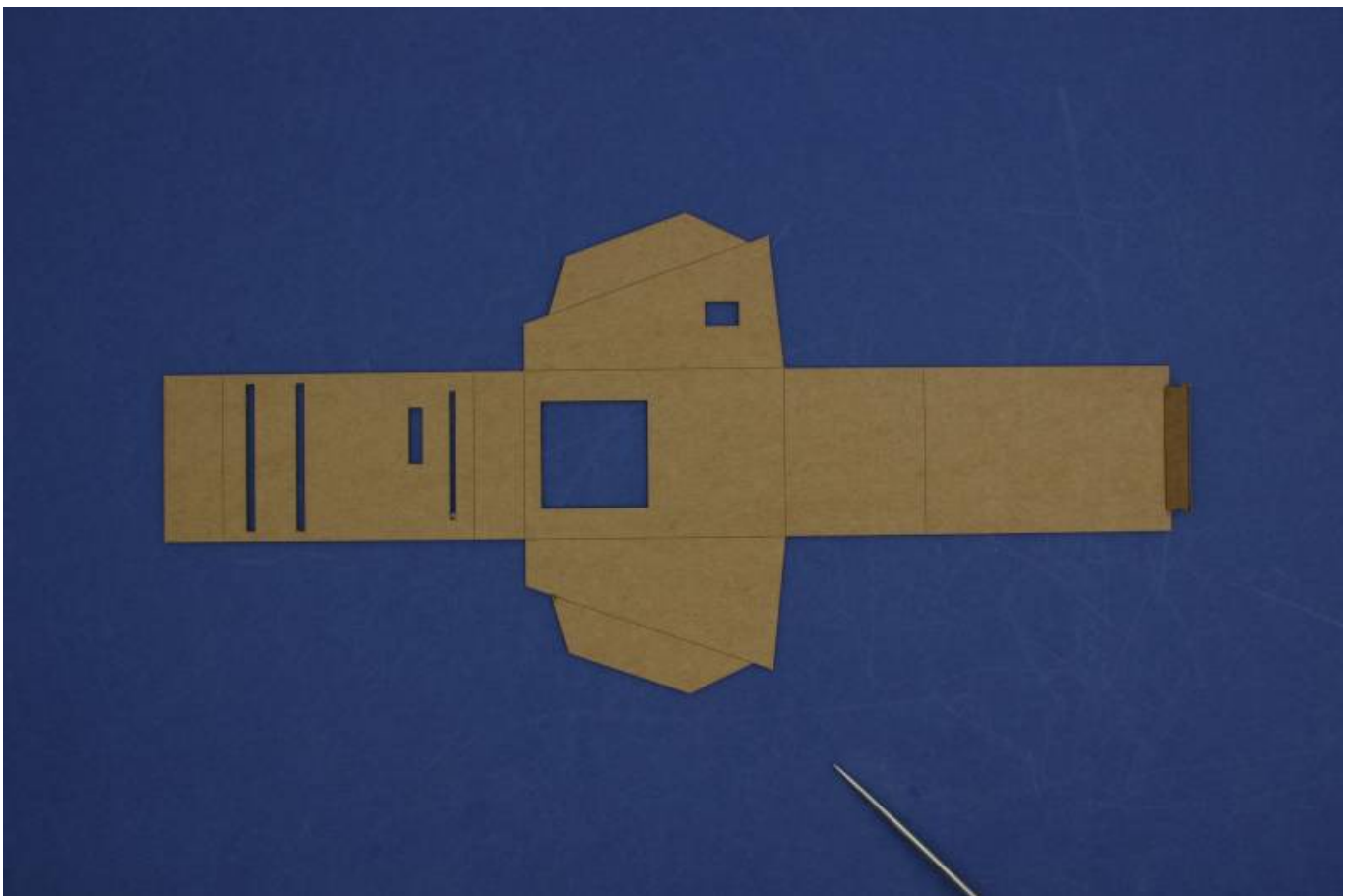
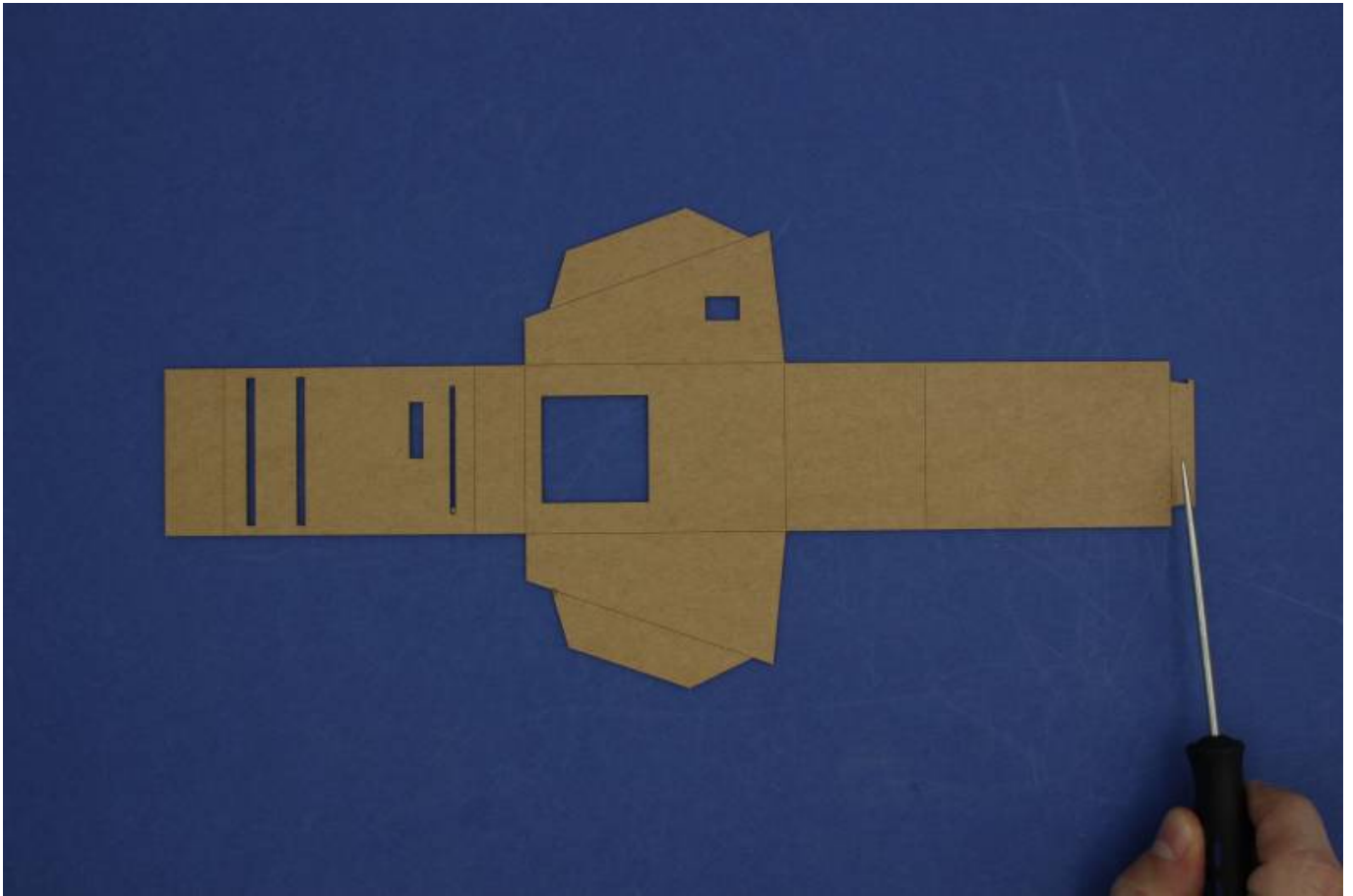
When working with the cardboard frame make sure you take care not to accidentally bend it other than where we have bend lines as this may affect the structural integrity later on.

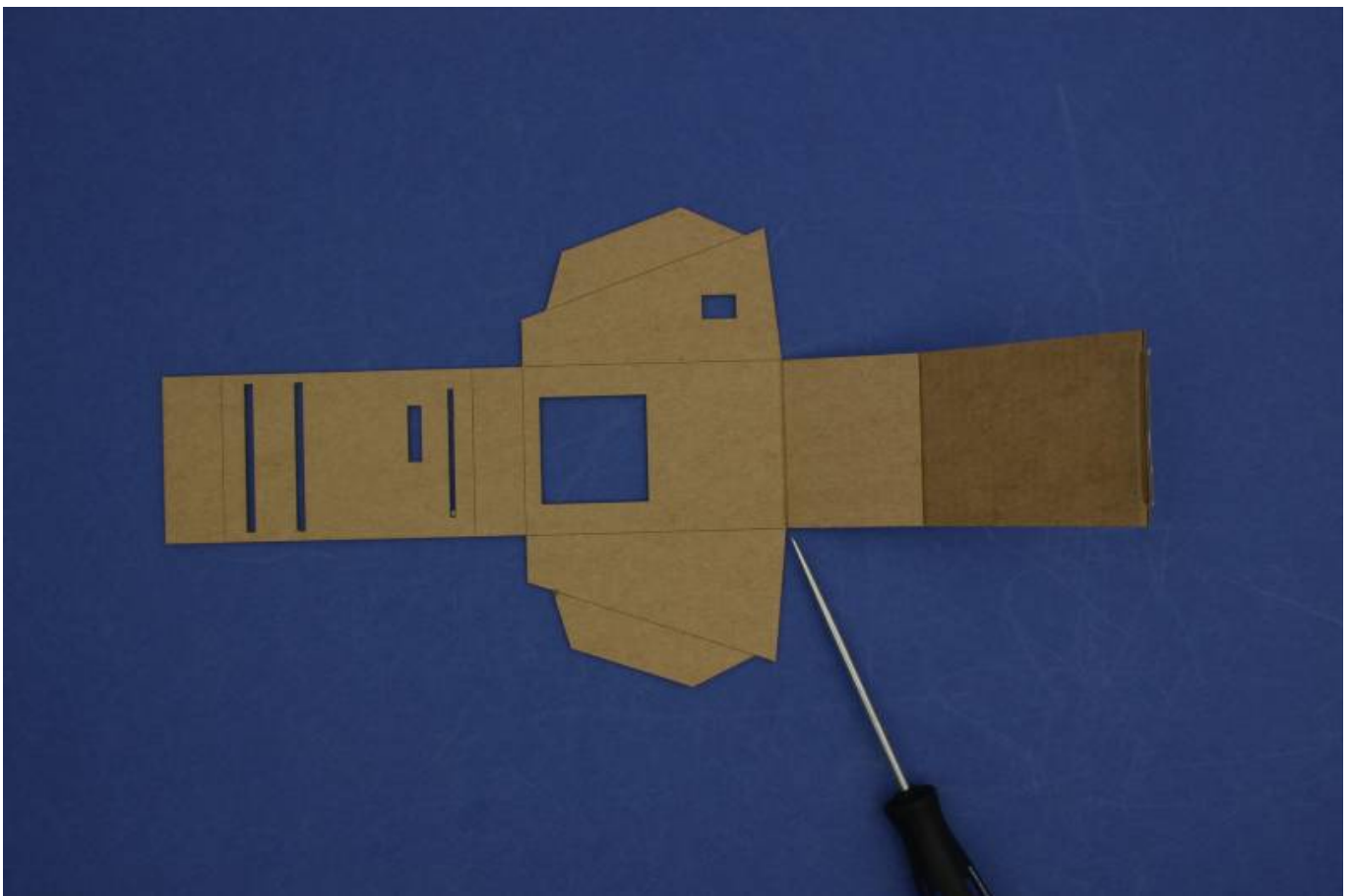
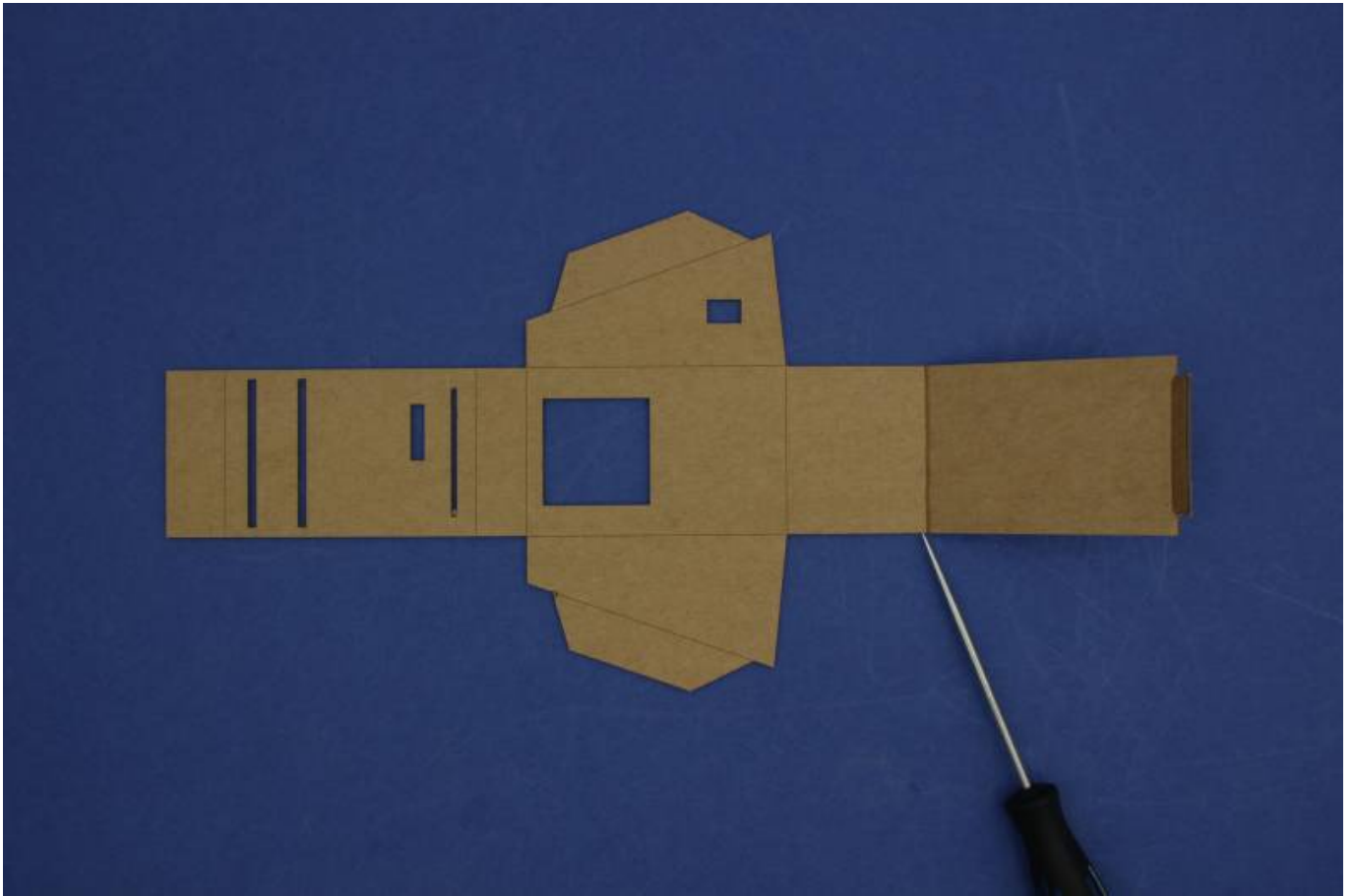
If your frame has any holes filled in, make sure you remove them. Using an awl or pen/pencil works well but your hands should be sufficient.



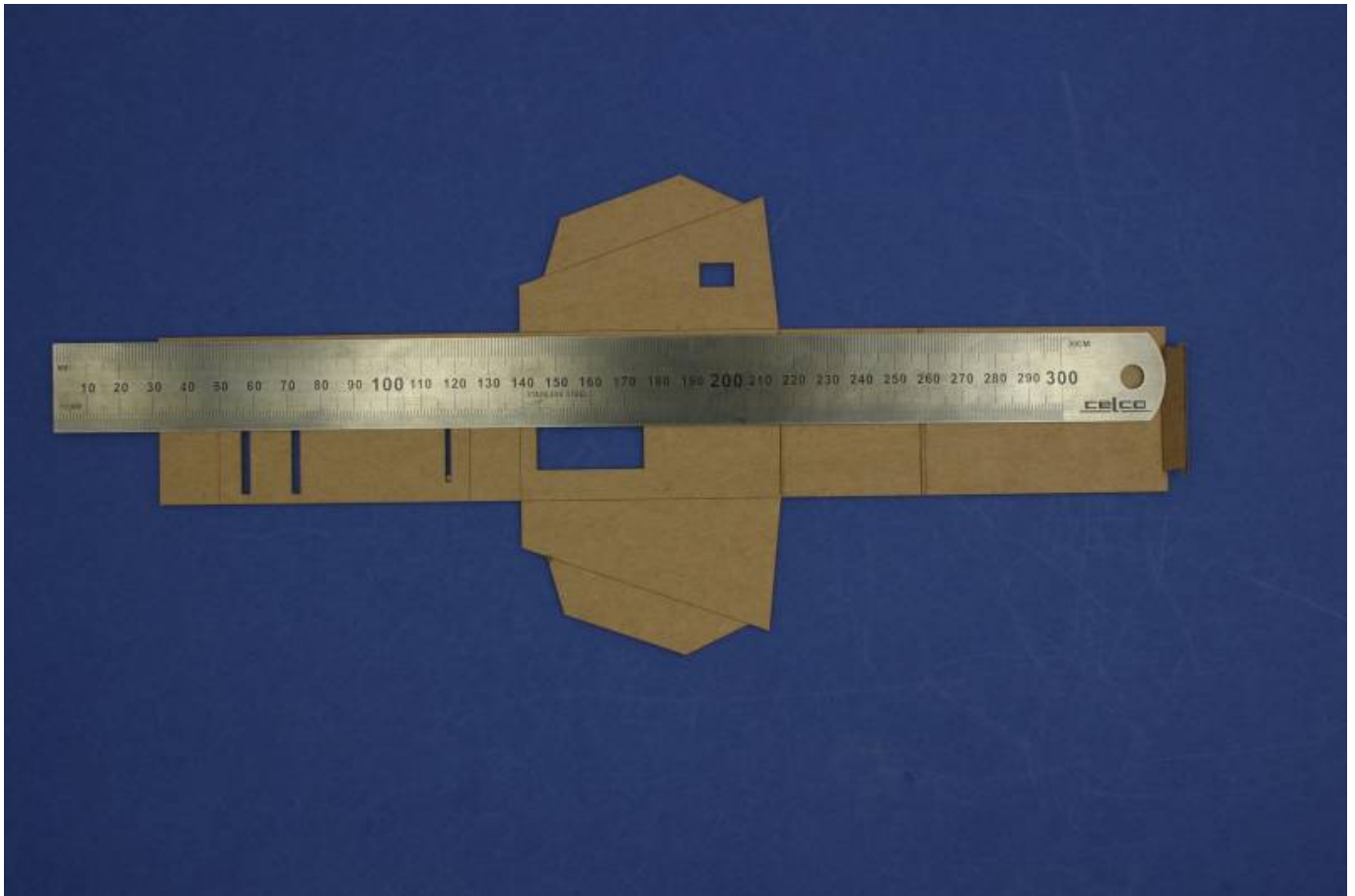


Flip the frame so that the natural side faces up. We are now going to start shaping the frame using the bend lines

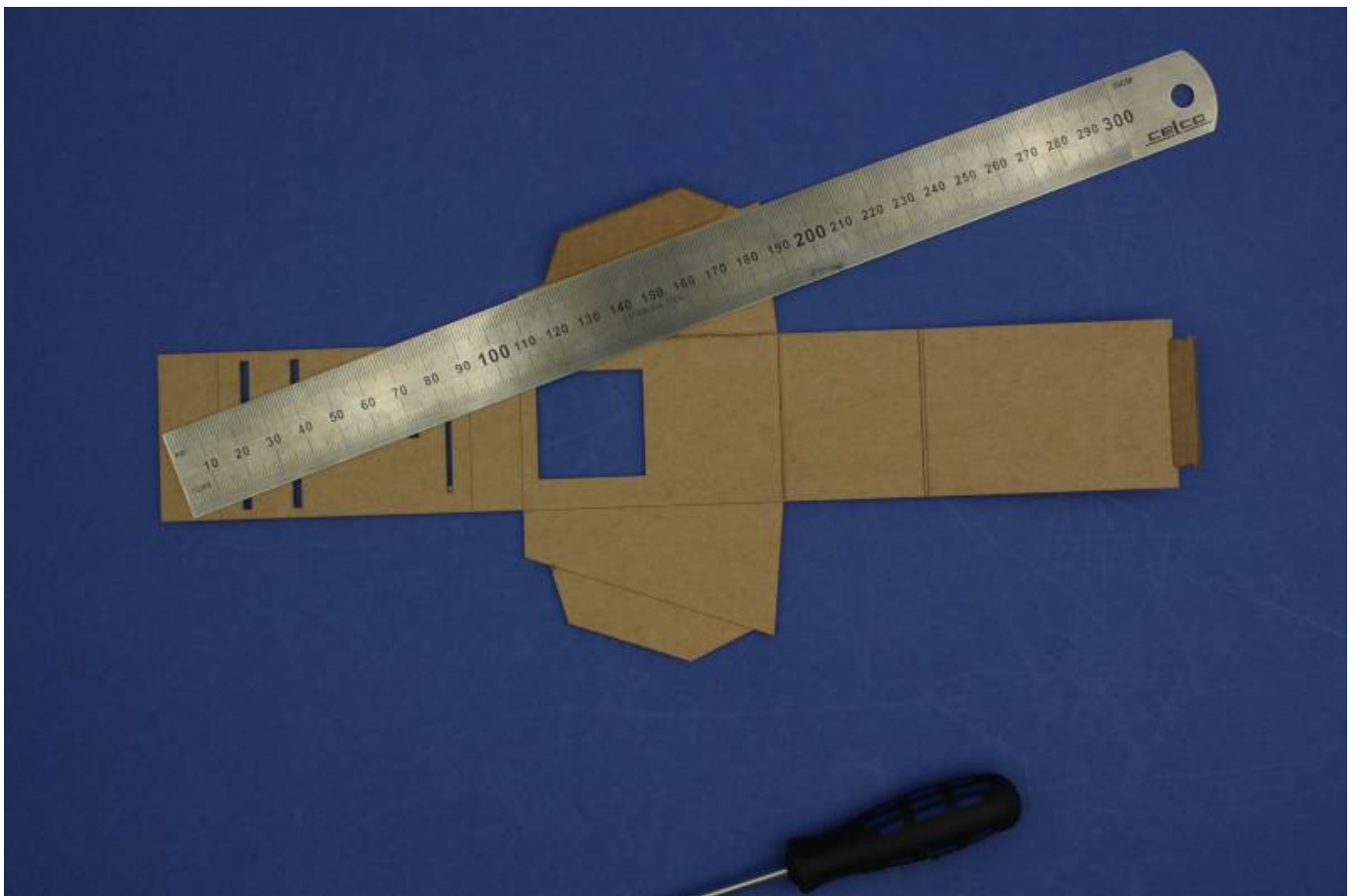
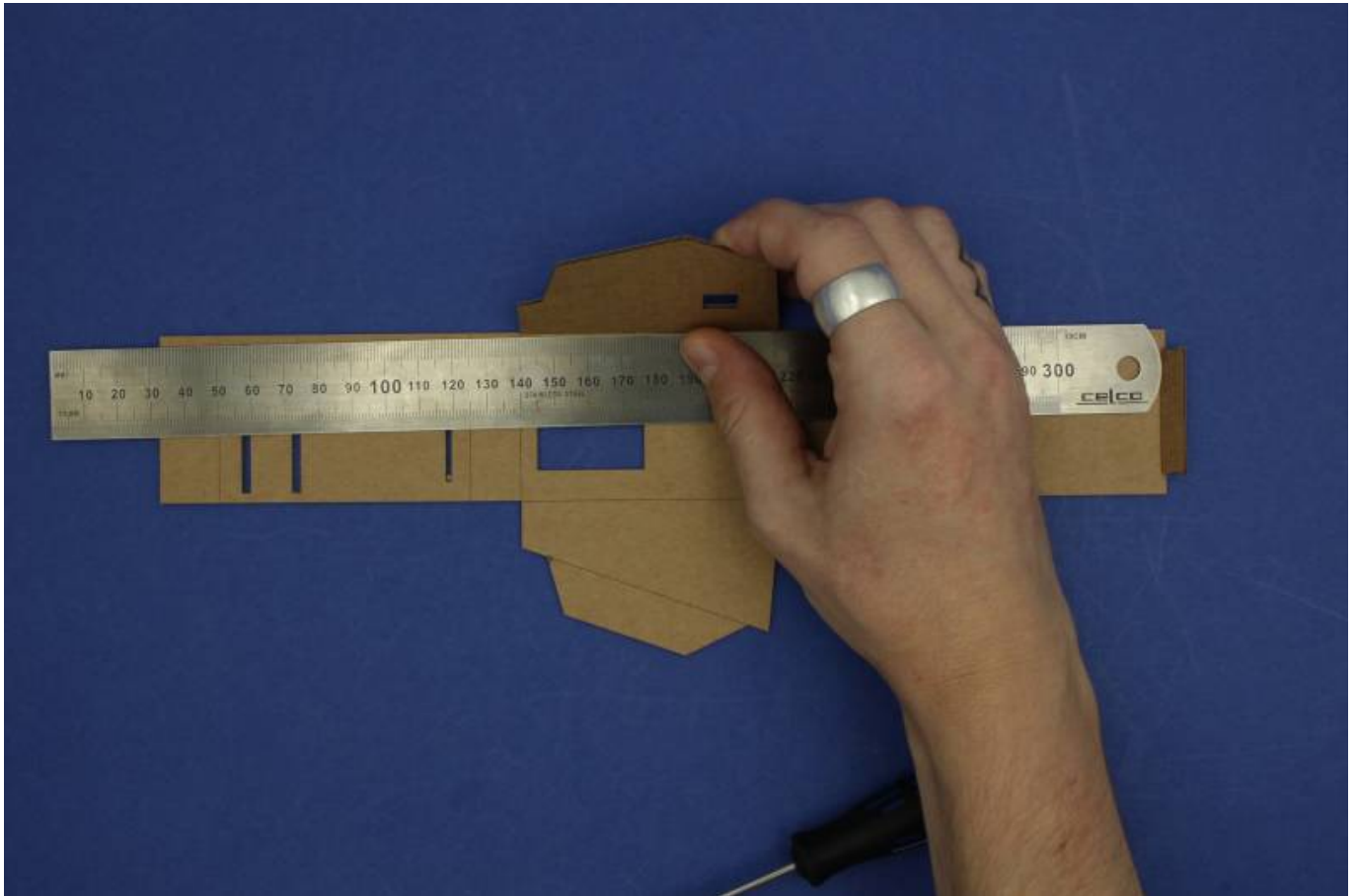




Use the ruler to help you with the next ones

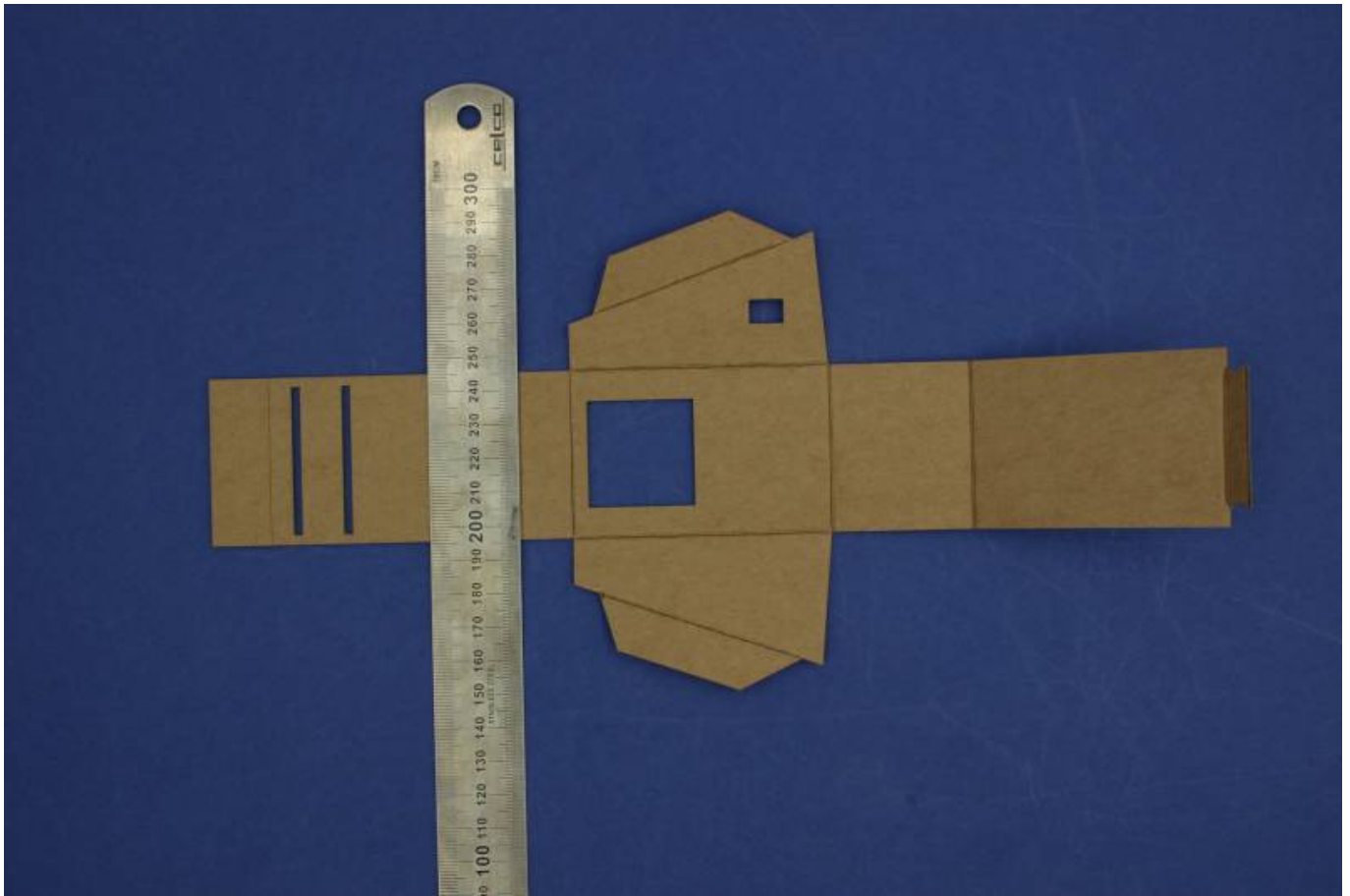


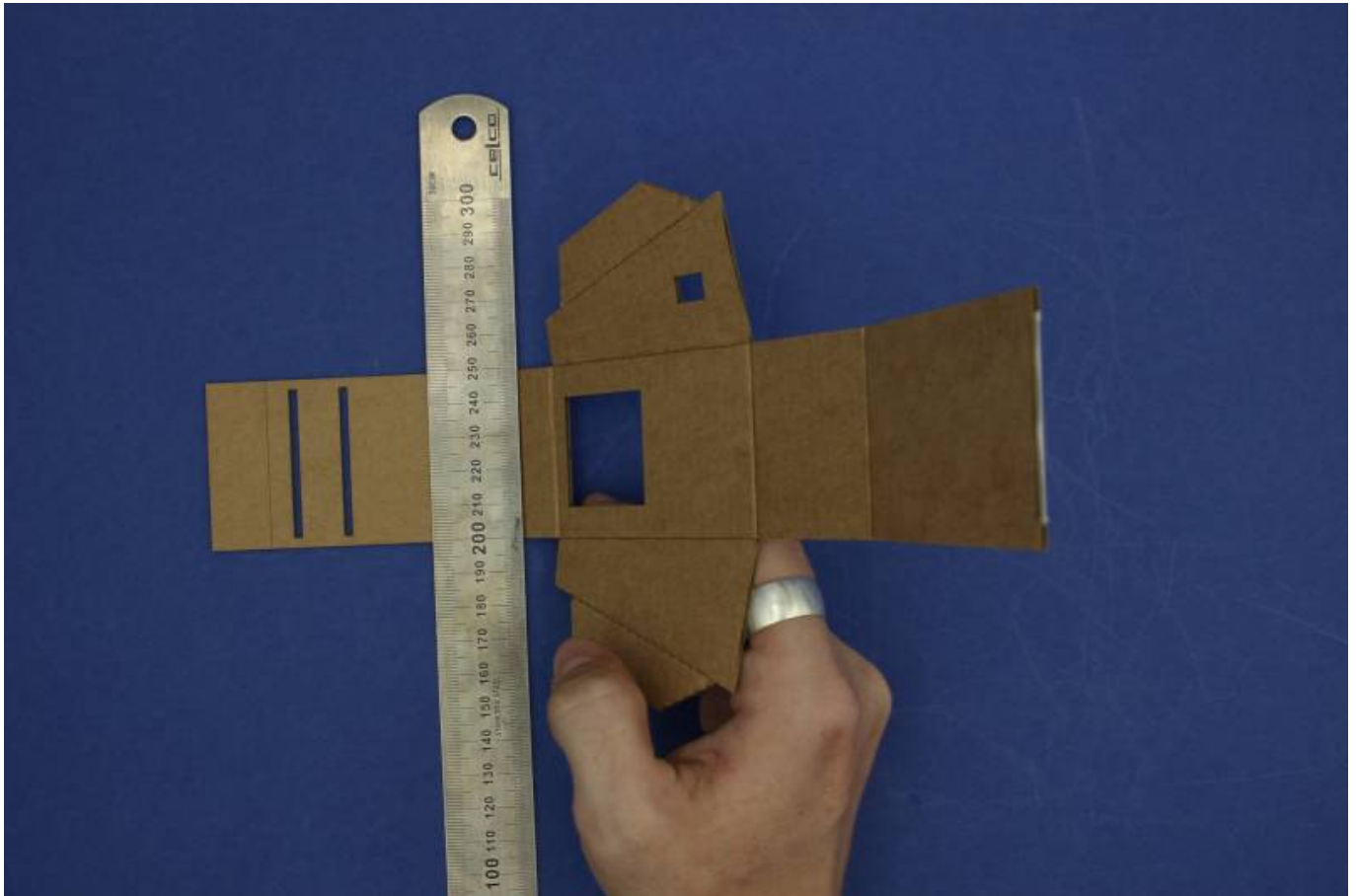




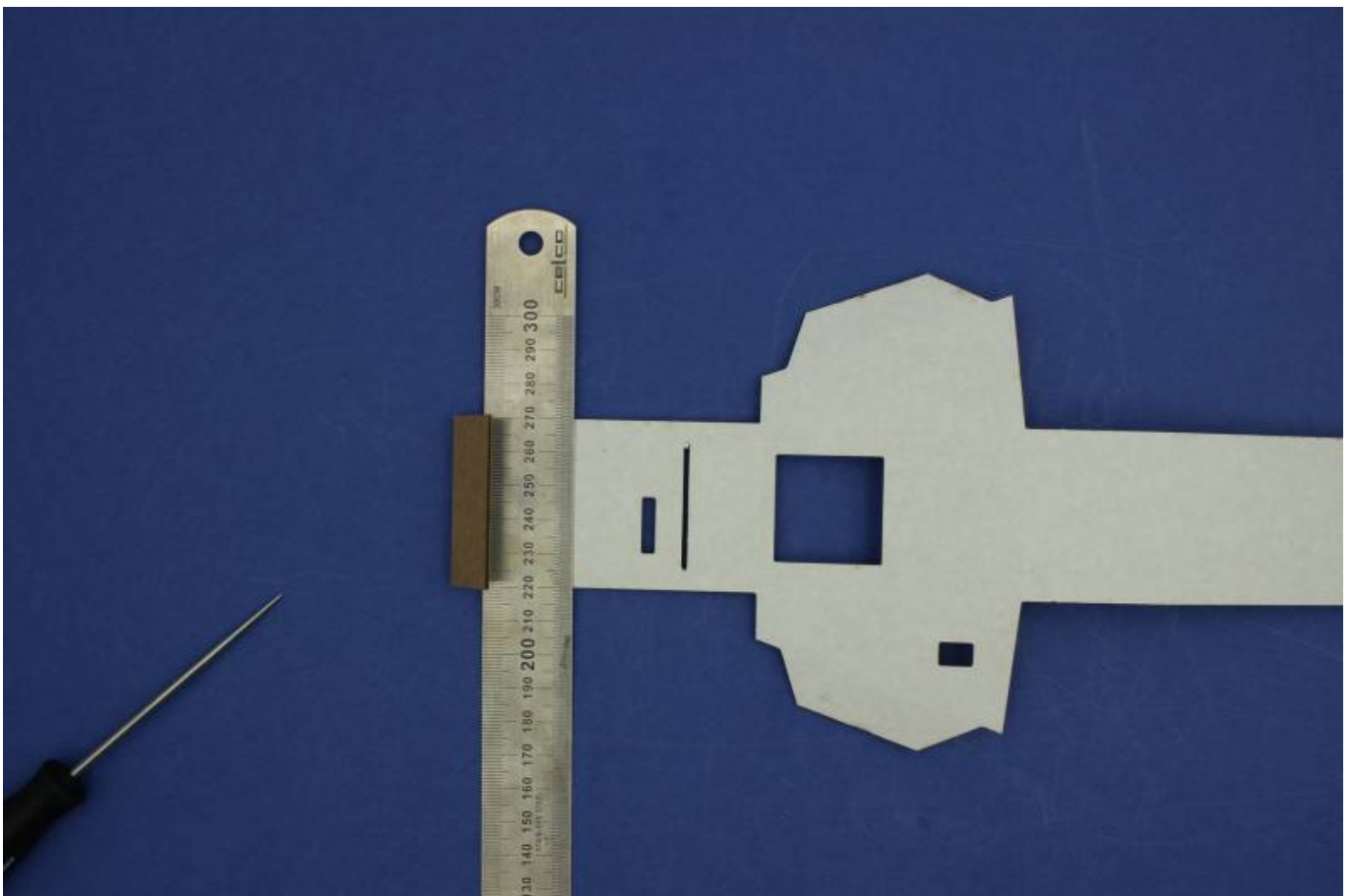
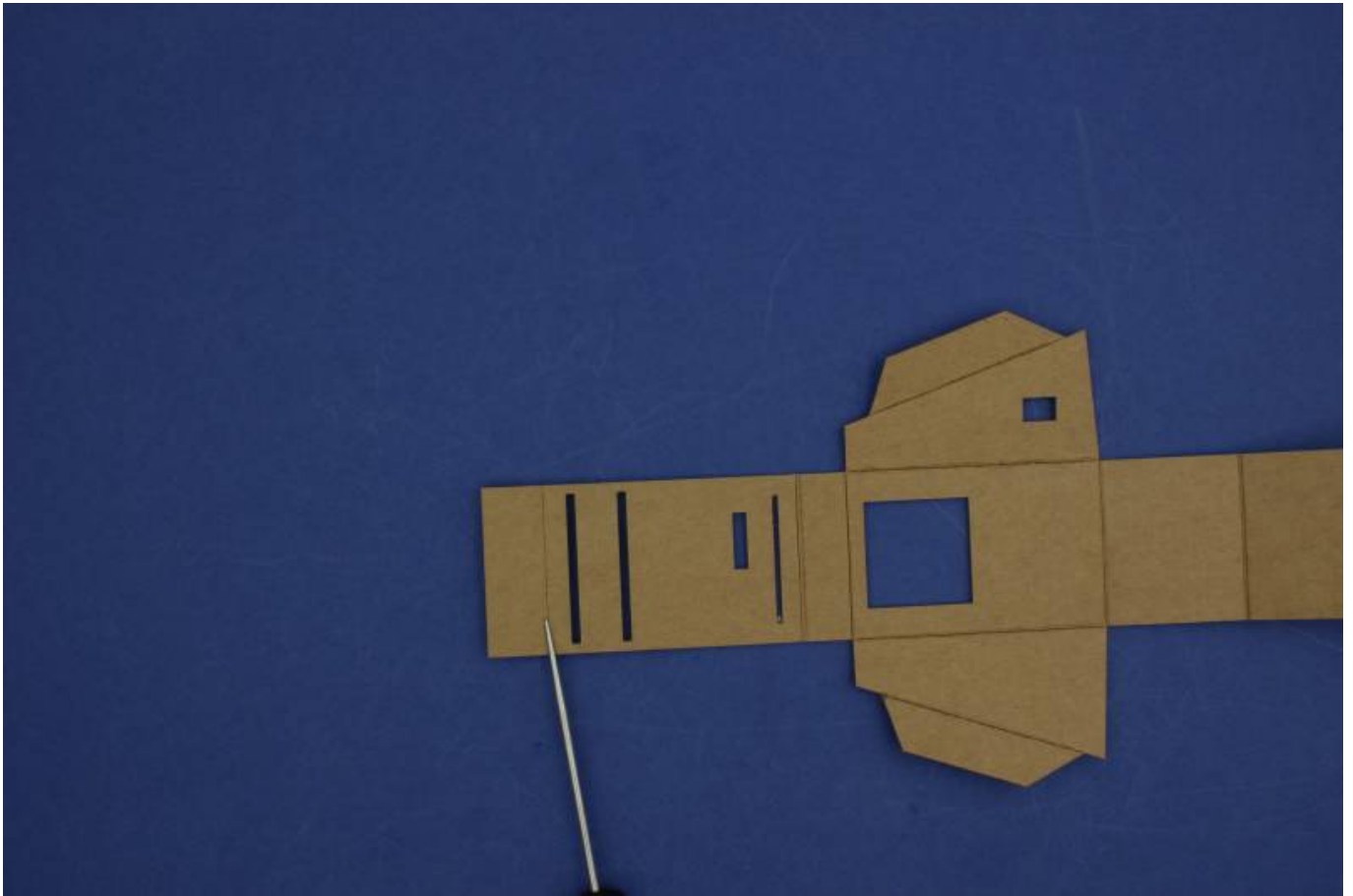


These next two bends are tricky, make sure to take them slowly

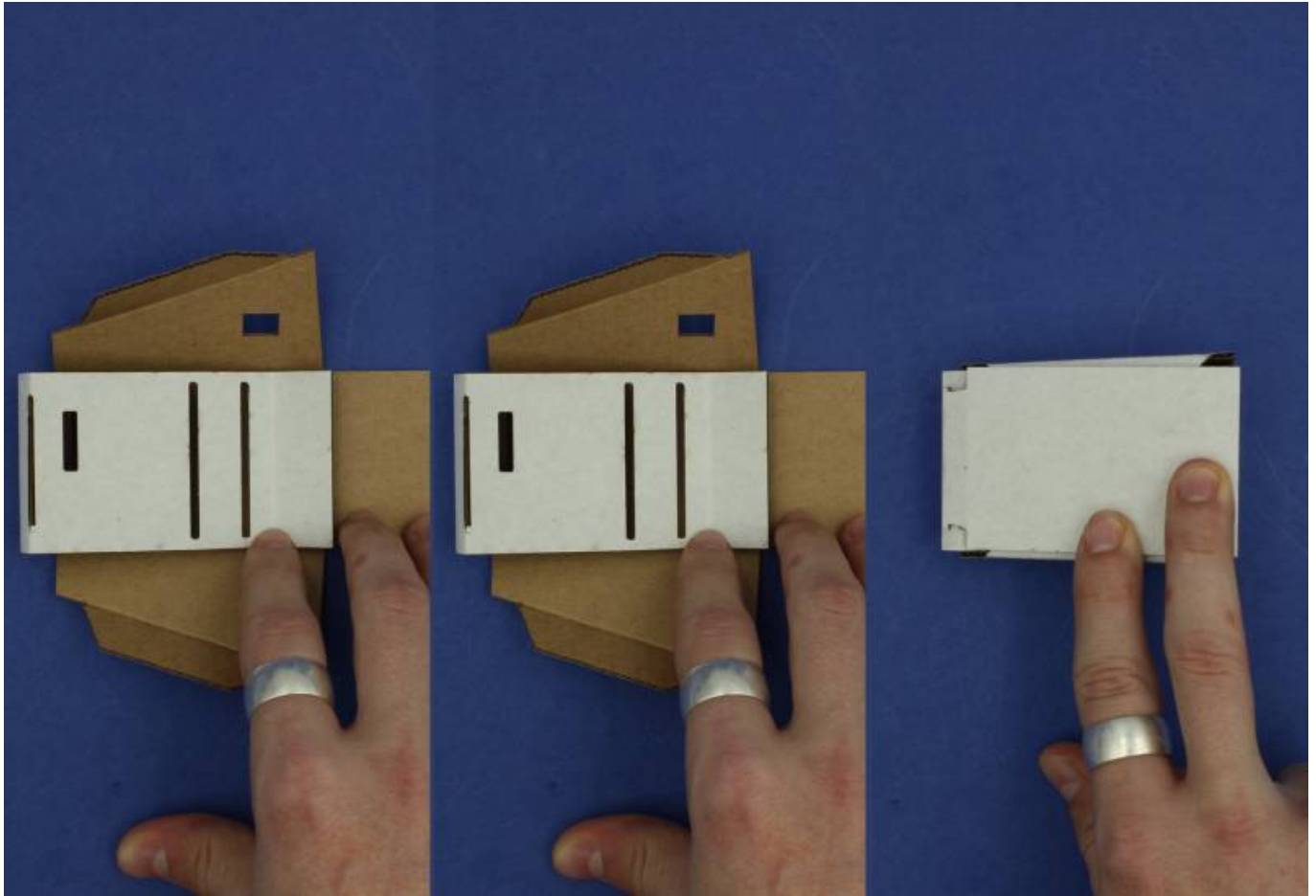




The final bend needs to go the other way! Turn the frame around!



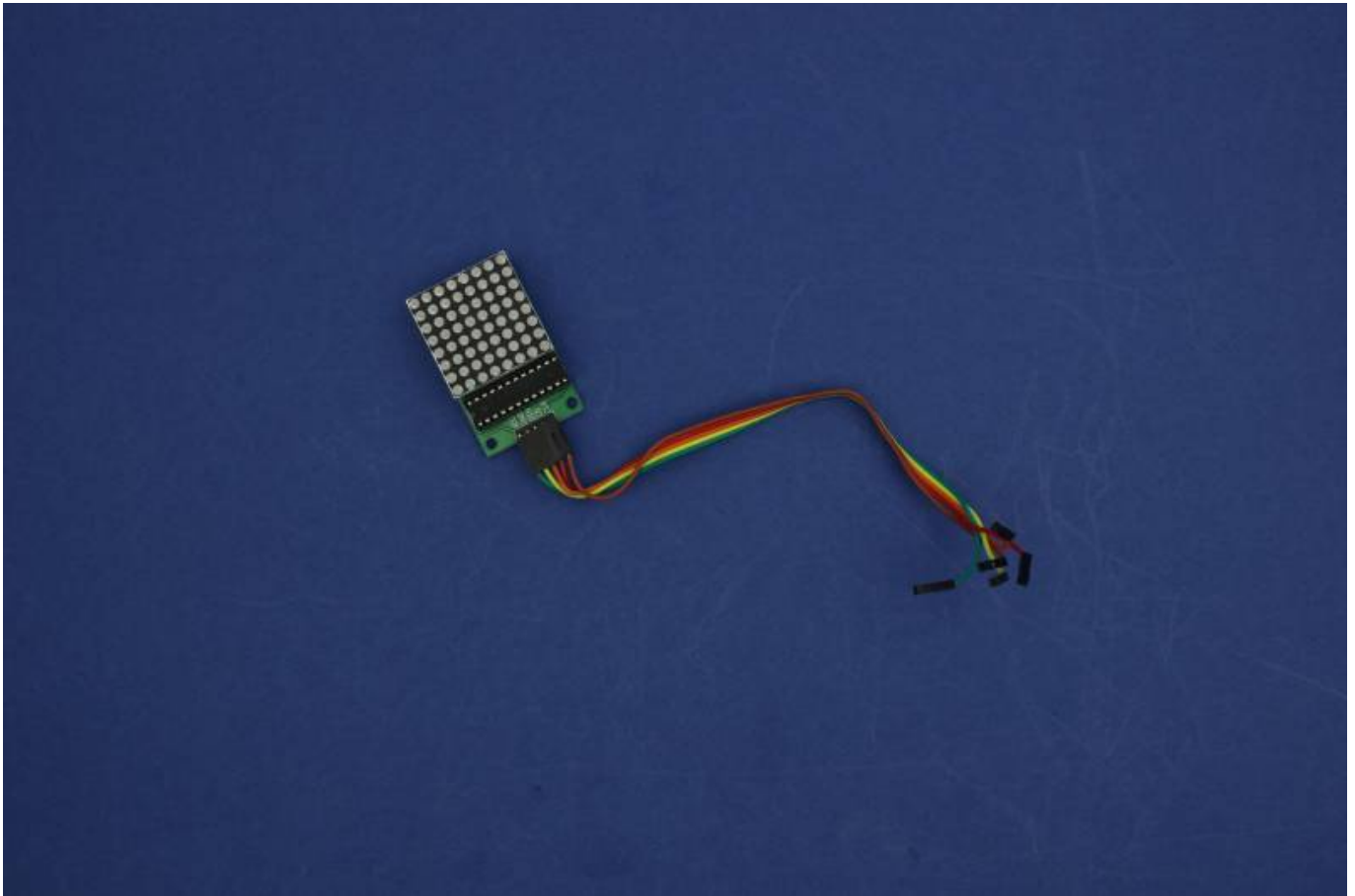
Let's fold it together. Don't slot the tab in yet as it will be difficult to open up again and may end up damaging the frame



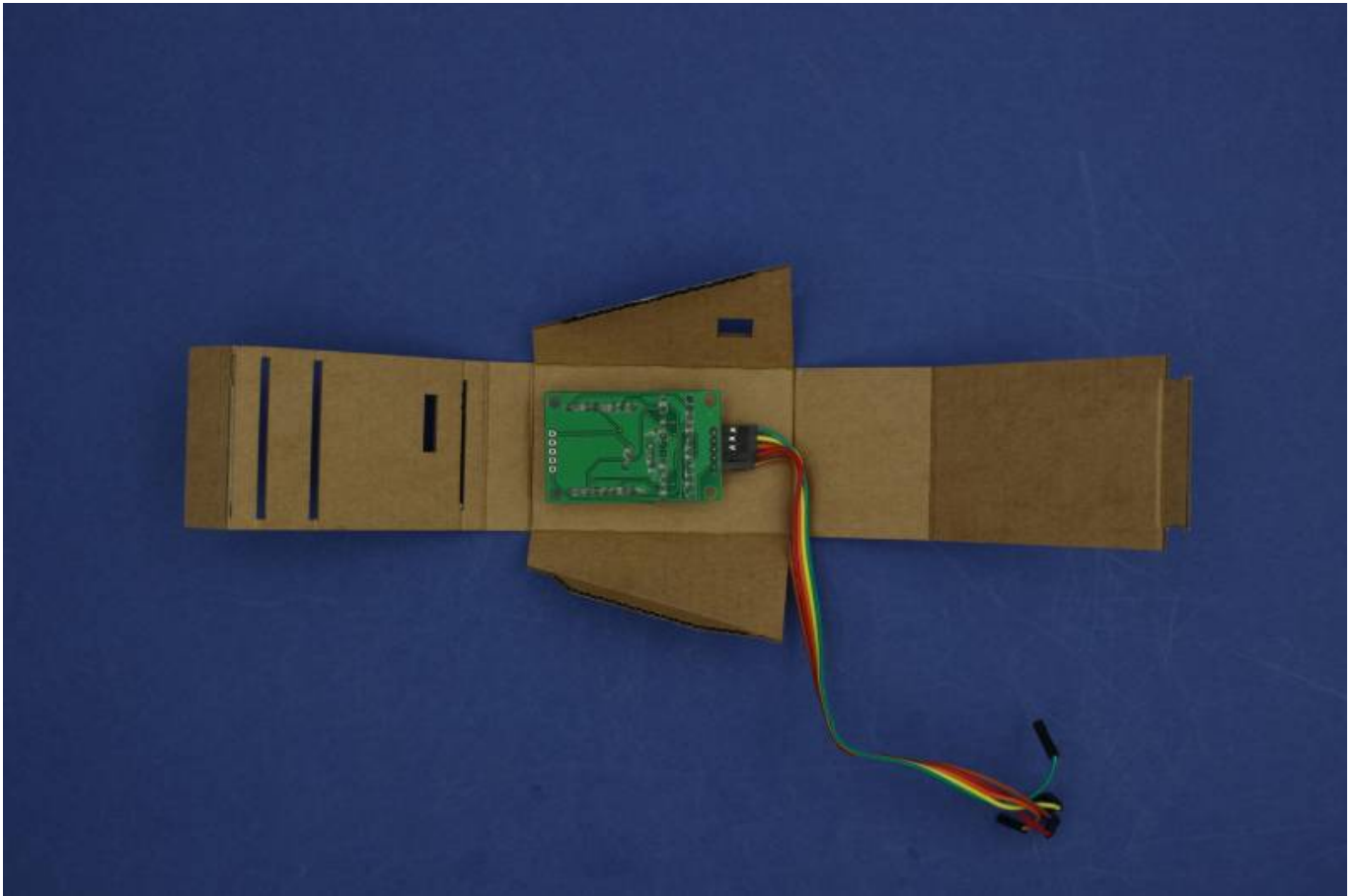
## Step Three - Assembling the Electronics

Now it's time to mount and connect the screen.

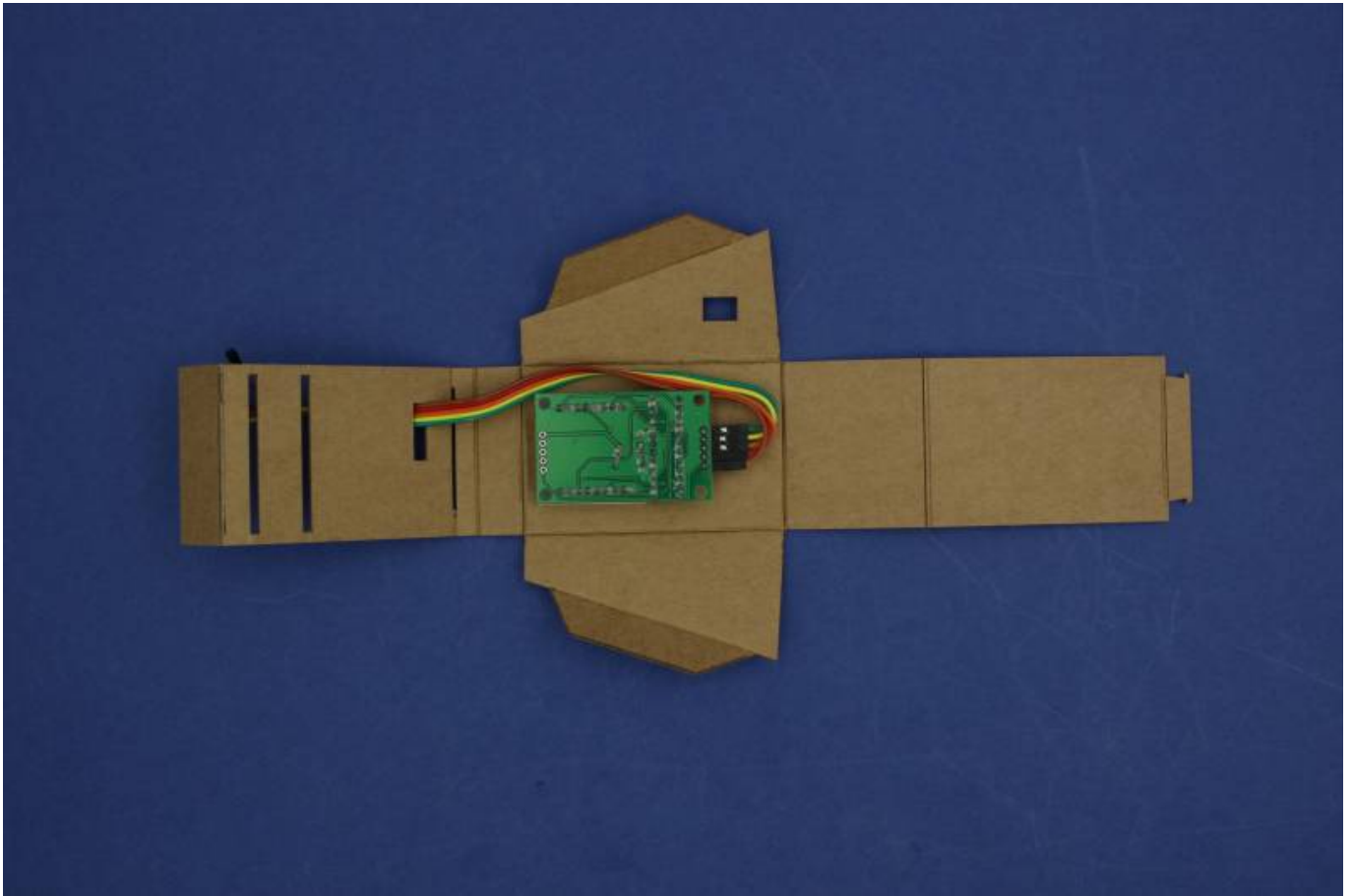
### Mount the screen



Write down what color wire goes to each of the pins (each pin is labeled). This will make it a lot easier to correctly connect the screen to the Arduino later



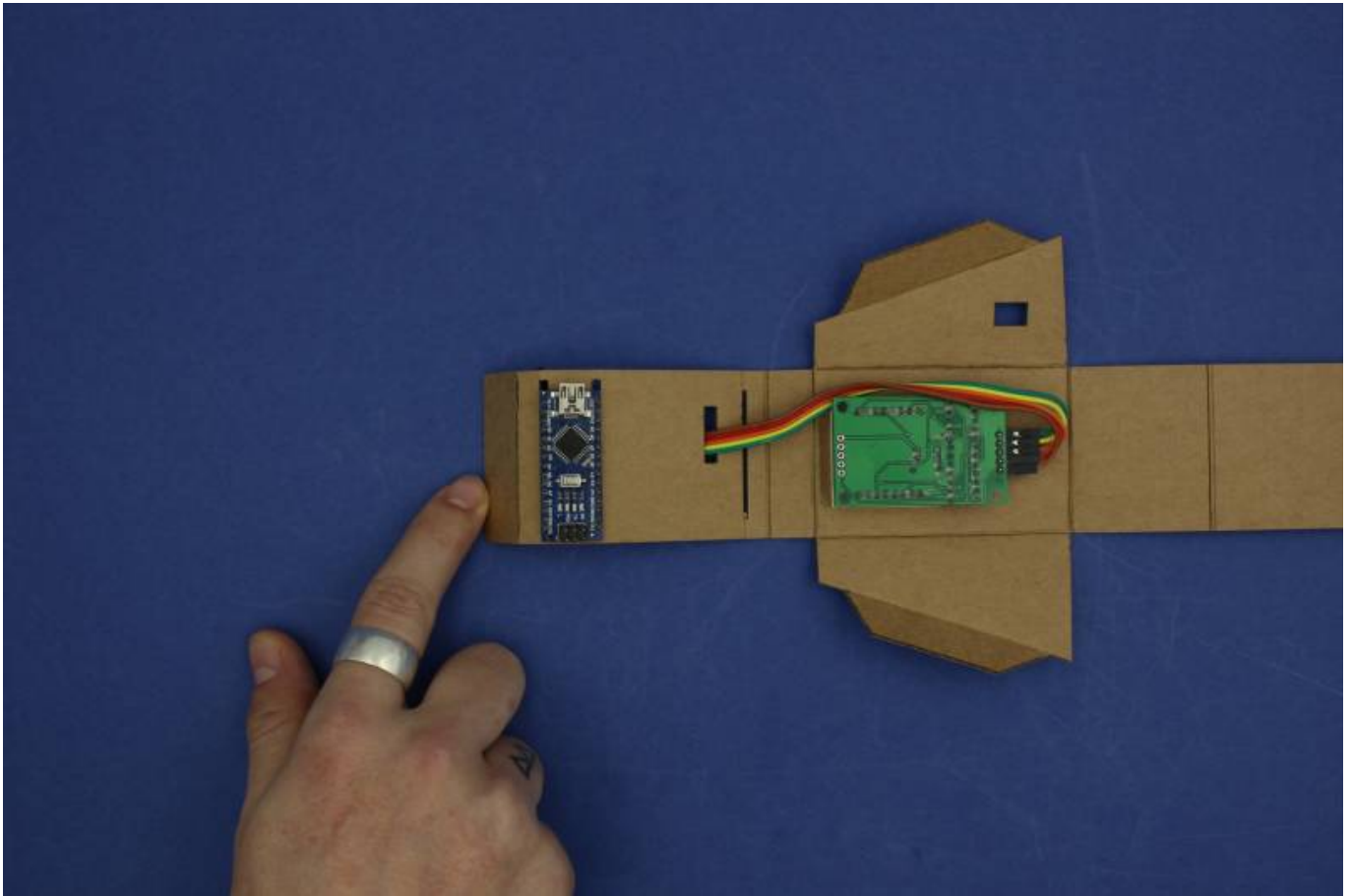
Slot the wires through the dedicated hole. Try to run the wires on one side of the screen to help make everything fit



## Connect the screen

The Arduino fits into the two parallel slots. Make sure you orient the USB connector to match with the slot in the frame





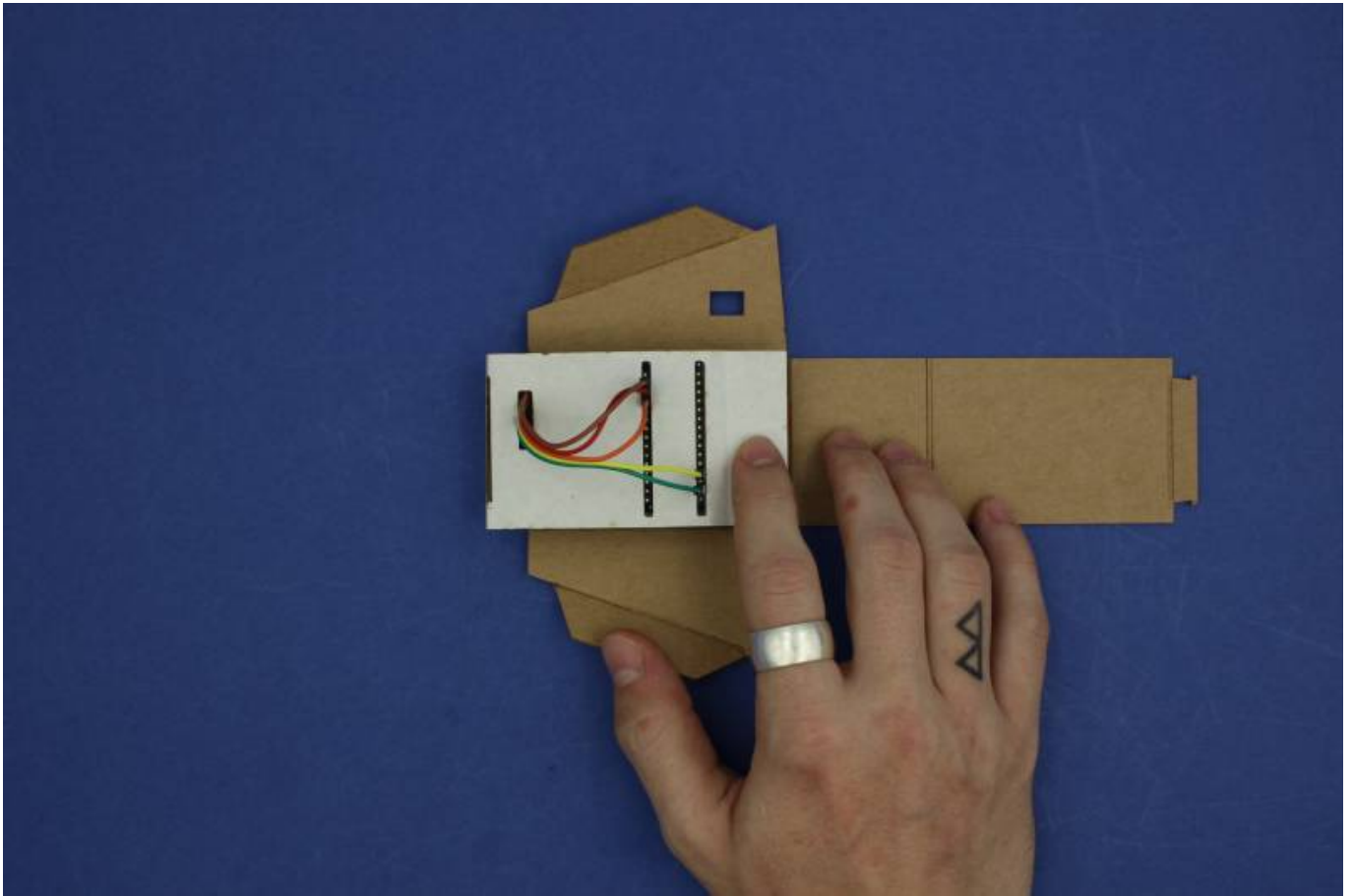
Fold the side of the frame over (with the Arduino still attached) and connect the wires to the correct pins. This is where the notes you took earlier will come in handy. The pins on the Arduino are also labeled.

This is how the wires need to be connected:

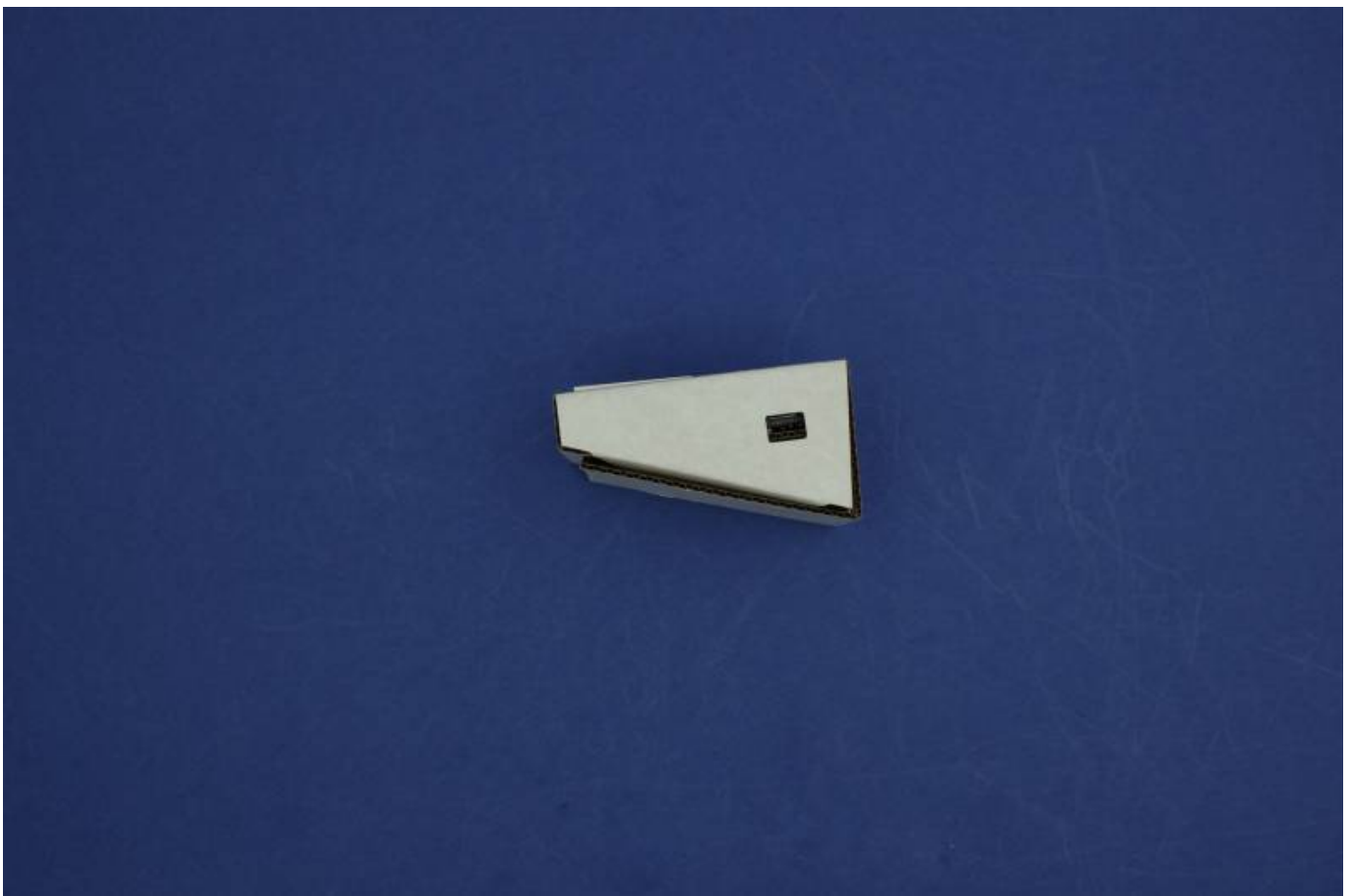
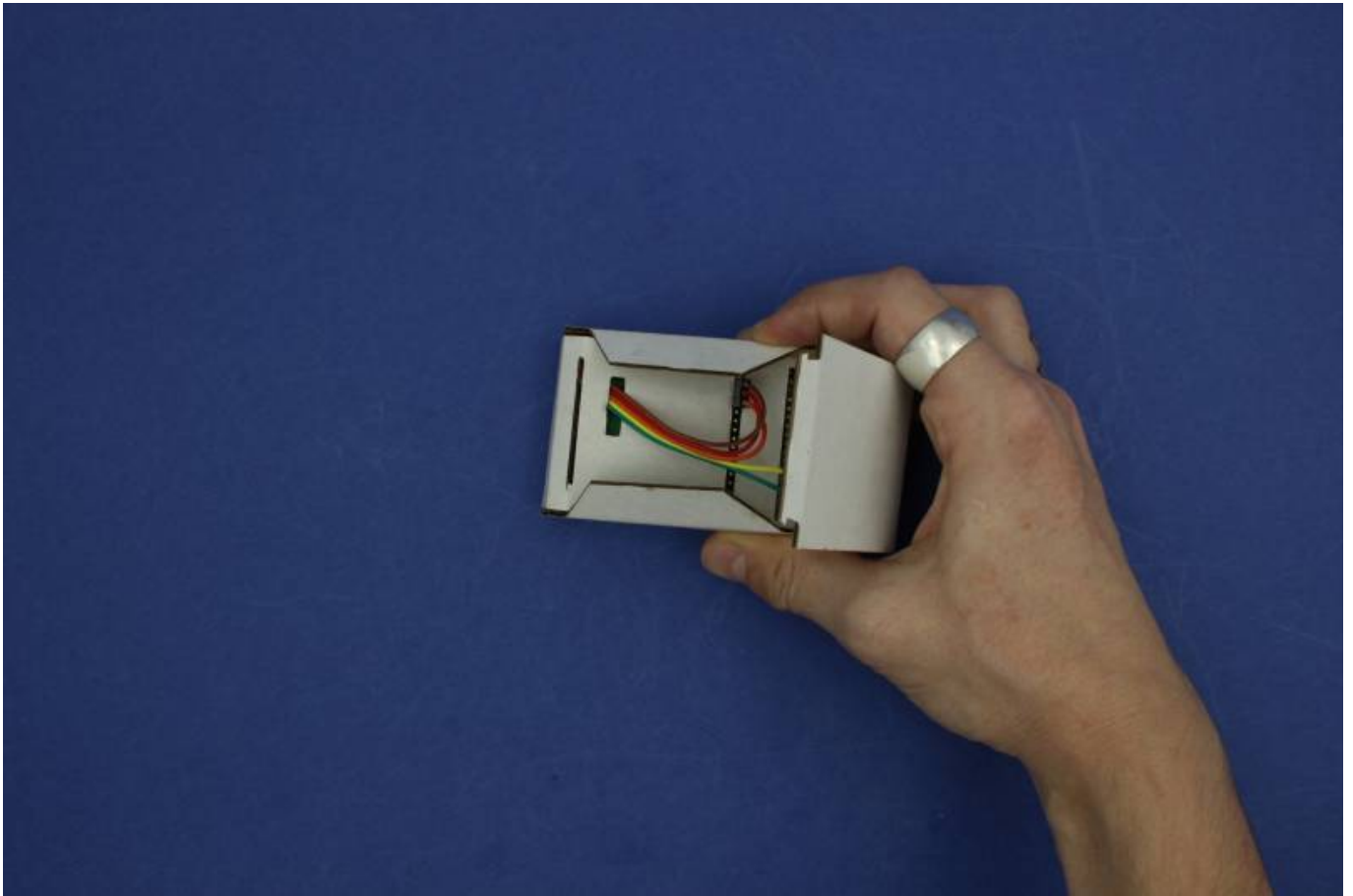
- SCL/CLK (System Clock) → D10
- DIN(Data In) → D8
- CS (Chip Select) → D9
- GND (Ground) → GND
- VCC (Voltage) → 3V3

You should end up with something that looks like this





**Close it all up**



## Step Four - Using the Library and Project

Now it's time to check our Arduino and LED are talking to each other.

### Download and install the Library

In order to make the LED display a *lot* easier to work with we'll need to install a custom version of the MaxMatrix library (found in the [download](#) section below).

- Go to Sketch → Include Library → Add .ZIP Library
- Just find and click the downloaded file and it will be added to your project automatically

### Download and open the project

[Below](#) you will find the project files compressed into a .ZIP file.

- Extract the content wherever you'd like it and open up the *wearables\_matrix\_ino* file
- The .INO file format should be associated with Arduino and launch it automatically
- Alternatively you can open Arduino and select the File → Open option in the menu

Note: You won't be able to run this script unless you have downloaded the library above.

### Upload the Project

It is time to test the project file in your desk Arduino. Upload it the same way as the blink file. Your desk Arduino should say Free Bear Hugs.

### Hacking the Code

While it's beyond the scope of this workshop to teach your how to program your Arduino - here are some tips on:

- Changing the displayed text
- Displaying a symbol
- Changing the speed of the text scrolling

```
void loop()
{
  // displayText(text1, 100); // Send scrolling Text
  displayText(text2, 100); // Send scrolling Text
  //displayCustom(smile01, 1000);
```

```
}
```

Look for the `void loop()` section. This contains what your Arduino will do once it turns on. In this case it will:

- `ignore displayText(text1, 100);` as it has been commented out with two backslashes
- `displayText(text2, 100)`
- `ignore displayCustom(smile01, 1000)`

Want to change the displayed text?

- Look for `text2`

```
char text2[] = " FREE BEAR HUGS!!! "; // Scrolling Text
```

- and change it

```
char text2[] = " I Have Changed!! "; // Scrolling Text
```

## References

- [MaxMatrix Github](#)

## Downloads

### Arduino

- [Project Files](#)
- [MaxMatrix Library](#)

### Laser Cutter Files

These files are for cutting on The Edge Rayjet. Settings are:

| Colour | Power | Speed | Description |
|--------|-------|-------|-------------|
| Black  | 25    | 12    | Bend lines  |
| Red    | 50    | 8     | Cut lines   |

- Deskduino v1 Final (.cdr)

<sup>1)</sup>

<https://en.wikipedia.org/wiki/Arduino>