

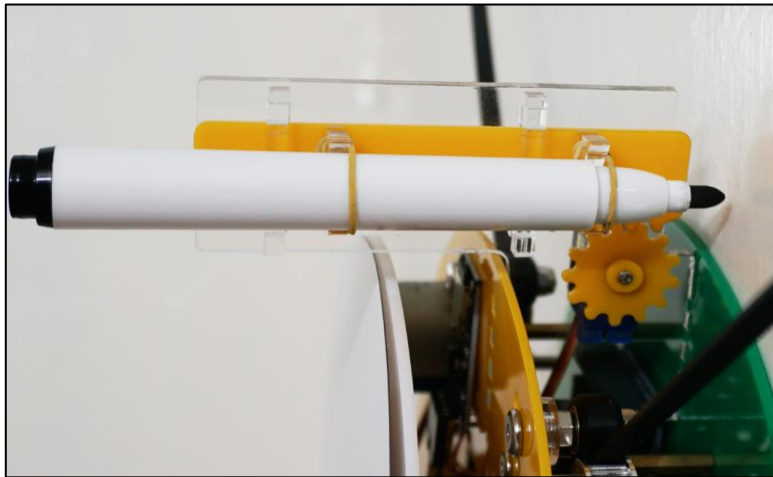
1. HOW TO MAKE DRAWING

WALL DRAWING ROBOT (FUMIK ROBOT)

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Date: 2022/May

Step 1 **Assembly the pen**

Put the pen to pen driver, tight it by rubber band



Step 2

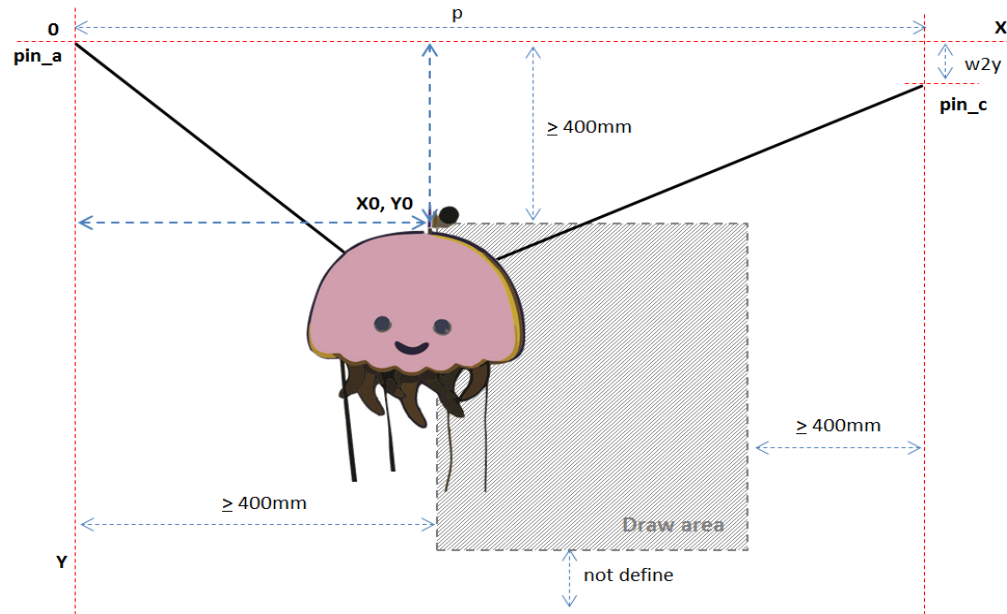
Hang robot on 2 nails pinned on wall

Measure distance 2 nails (horizontal direction): p

Measure distance 2 nails (vertical direction): $w2y$

(Note: if pin_c is higher pin_a , $w2y$ will be minus value)

Measure coordinate of pen: $X0, Y0$



Put those value to Arduino code

```
p = 2170;    //mm, distance pin_a to pin_c (horizontal direction)
w2y = 450;    //mm, distance pin_a to pin_c (vertical direction)

// zero position of pen must be same as in real model
pen_x0 = 400; //mm, computer room: 390-400
pen_y0 = 700; //mm, computer room: 900-700
```

Note: Draw area should keep distance with pin_a , pin_c as above picture ($\geq 400mm$)

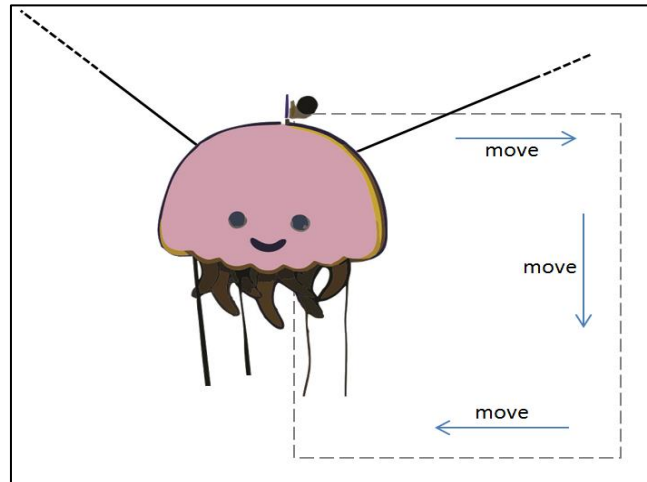
Step 3

Calibration

Turn off power of robot

Pull slowly forward/ backward the belt (left/ right) to adjust pen to X0, Y0 location

Copy file calib to sd card, re-name it to "Draw.txt" -> put sd card to robot and power it to start drawing calib line



Robot will draw a rectangle (dot line)

(after finished drawing, robot will return to home position X0, Y0)

Check if the rectangle has exact dimension (width, height)

If not exact, return step 2, check if parameter p, w2y, x0, y0 is exact

If need, adjust *x_ratio*, *y_ratio* to make drawn rectangle get exact dimension

```
x_ratio = 1.0; //adjust to change ratio of picture in x_axis  
y_ratio = 1.0; //adjust to change ratio of picture in y_axis
```

Check if the rectangle is tilt or not

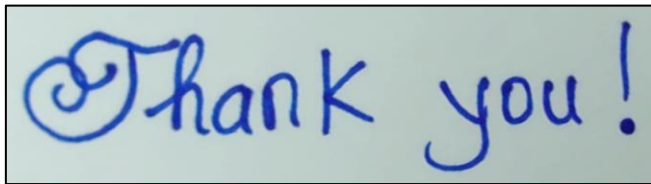
If need, adjust *x_angle*, *y_angle* to make drawn rectangle to be aligned

```
x_angle = -1.43; //degree, effect to rotation of picture in x_axis  
x_angle = radians(x_angle);  
  
y_angle = -0.36; //degree, effect to rotation of picture in y_axis  
y_angle = radians(y_angle);
```

When the drawn rectangle is acceptable, then robot is ready for other drawings

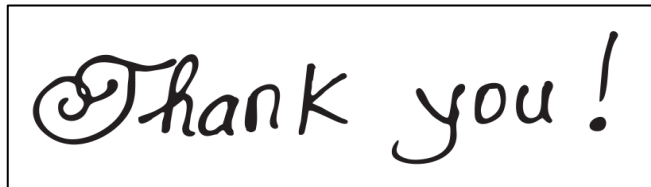
Step 4

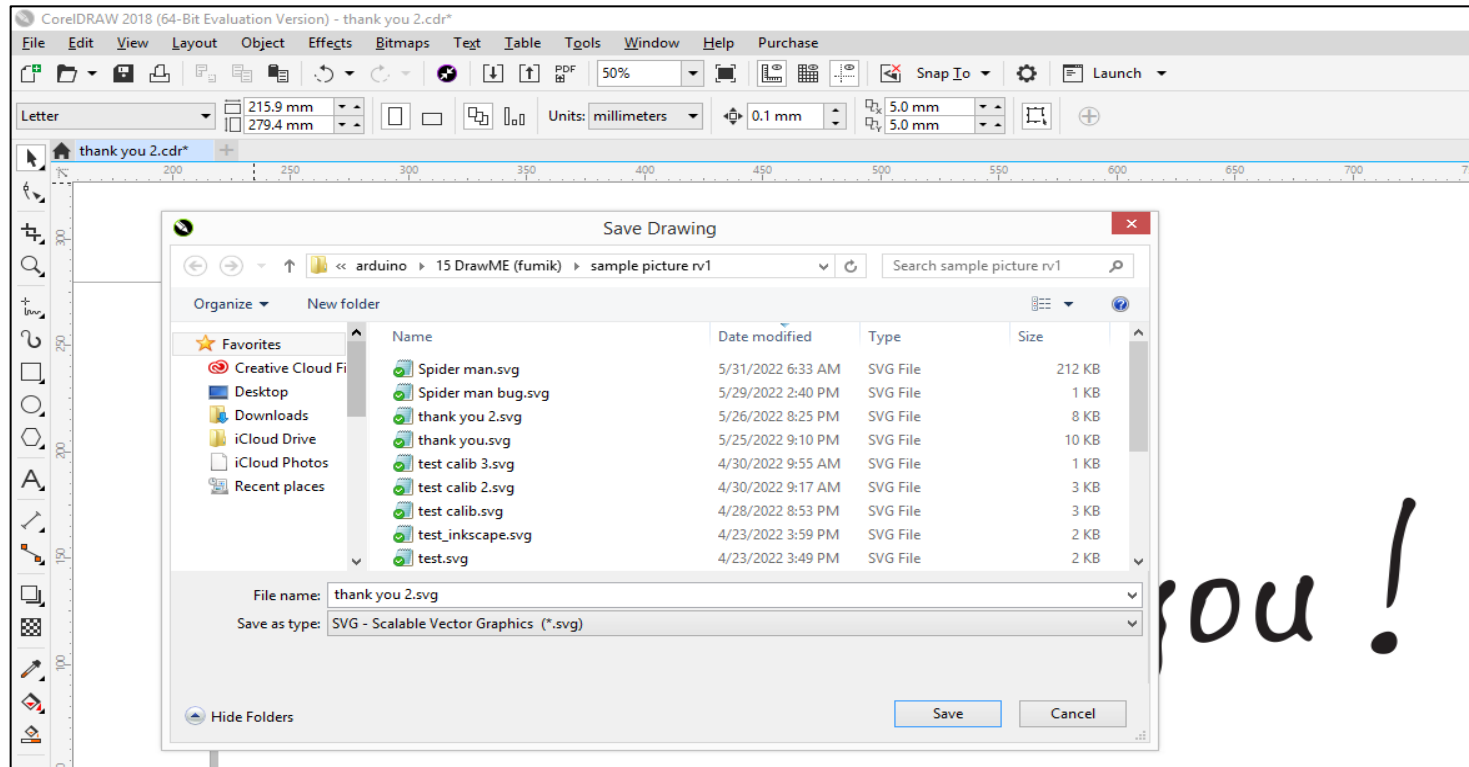
Your Picture need to draw



Step 5

Convert picture to vector (*.svg file) by CorelDraw (or any other software support *.svg file)



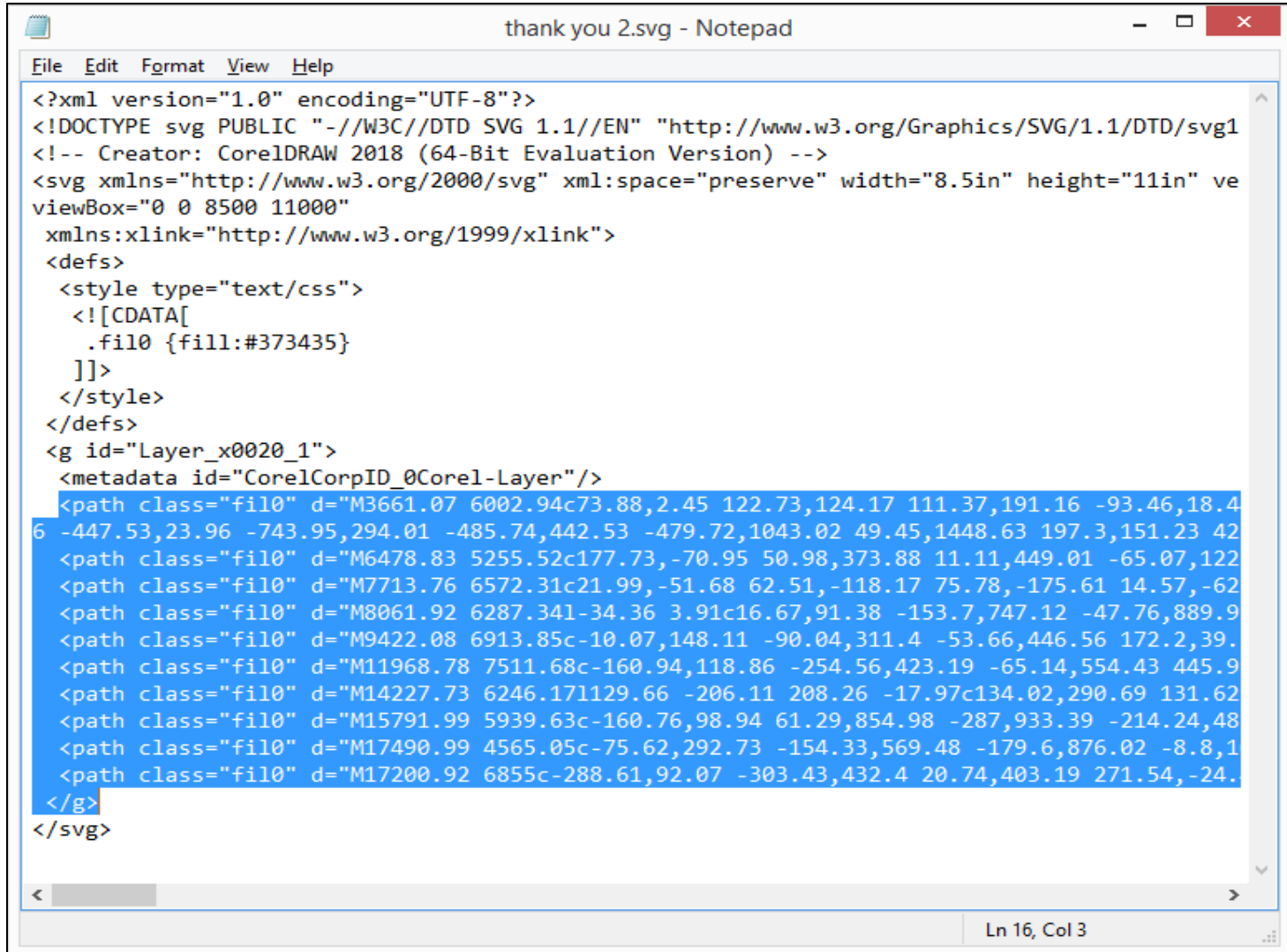


Step 6

Convert vector file to code for Arduino (by MS Excel)

[download here](#)

Copy information of line/ curve in *.svg file



```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN" "http://www.w3.org/Graphics/SVG/1.1/DTD/svg1
<!-- Creator: CorelDRAW 2018 (64-Bit Evaluation Version) -->
<svg xmlns="http://www.w3.org/2000/svg" xml:space="preserve" width="8.5in" height="11in" ve
viewBox="0 0 8500 11000"
xmlns:xlink="http://www.w3.org/1999/xlink">
  <defs>
    <style type="text/css">
      <![CDATA[
        .fil0 {fill:#373435}
      ]]>
    </style>
  </defs>
  <g id="Layer_x0020_1">
    <metadata id="CorelCorpID_0Corel-Layer"/>
    <path class="fil0" d="M3661.07 6002.94c73.88,2.45 122.73,124.17 111.37,191.16 -93.46,18.4
6 -447.53,23.96 -743.95,294.01 -485.74,442.53 -479.72,1043.02 49.45,1448.63 197.3,151.23 42
    <path class="fil0" d="M6478.83 5255.52c177.73,-70.95 50.98,373.88 11.11,449.01 -65.07,122
    <path class="fil0" d="M7713.76 6572.31c21.99,-51.68 62.51,-118.17 75.78,-175.61 14.57,-62
    <path class="fil0" d="M8061.92 6287.341-34.36 3.91c16.67,91.38 -153.7,747.12 -47.76,889.9
    <path class="fil0" d="M9422.08 6913.85c-10.07,148.11 -90.04,311.4 -53.66,446.56 172.2,39.
    <path class="fil0" d="M11968.78 7511.68c-160.94,118.86 -254.56,423.19 -65.14,554.43 445.9
    <path class="fil0" d="M14227.73 6246.171129.66 -206.11 208.26 -17.97c134.02,290.69 131.62
    <path class="fil0" d="M15791.99 5939.63c-160.76,98.94 61.29,854.98 -287,933.39 -214.24,48
    <path class="fil0" d="M17490.99 4565.05c-75.62,292.73 -154.33,569.48 -179.6,876.02 -8.8,1
    <path class="fil0" d="M17200.92 6855c-288.61,92.07 -303.43,432.4 20.74,403.19 271.54,-24.
  </g>
</svg>
```

Ln 16, Col 3

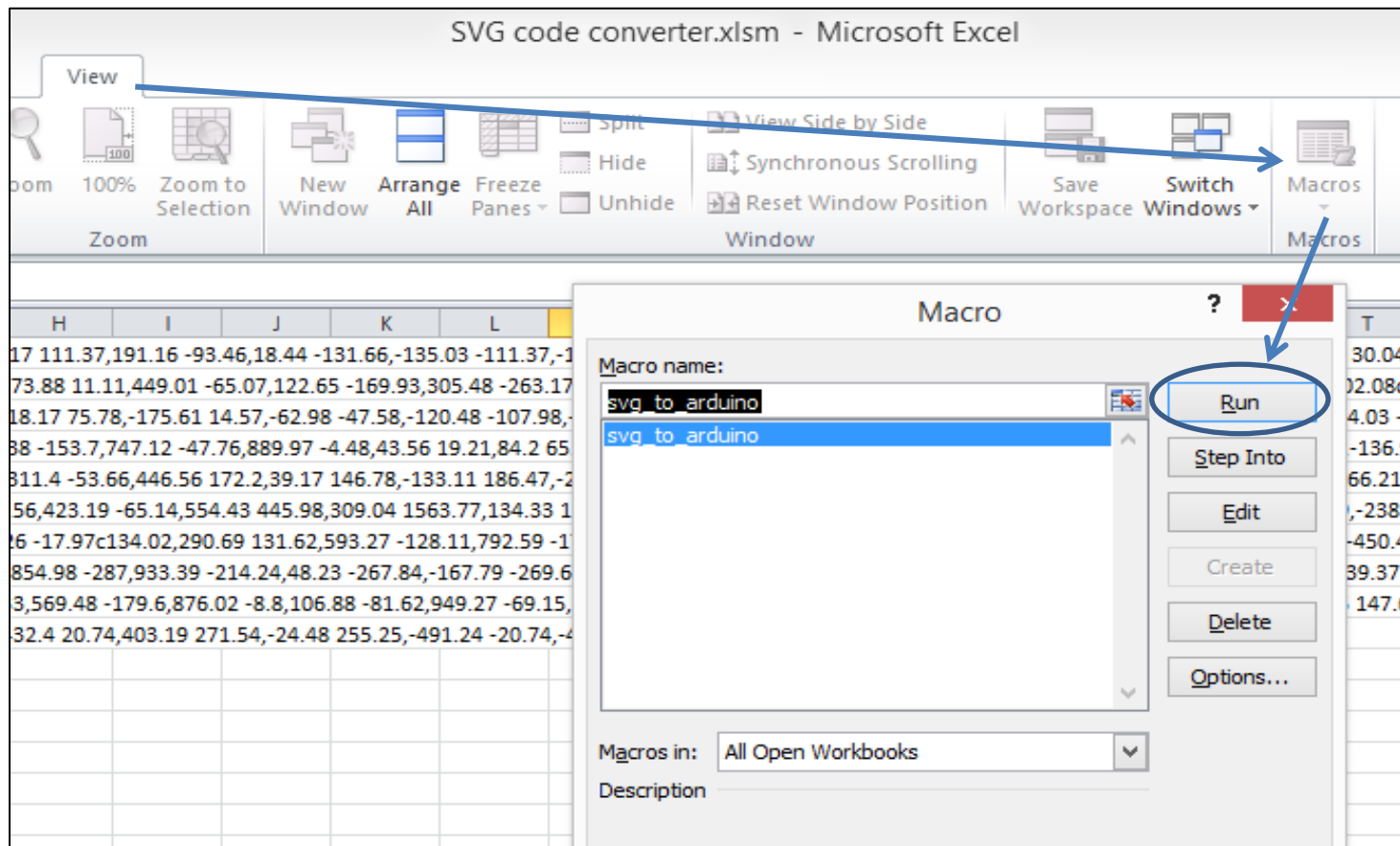
Paste those curve/ line information into converter file "SVG code converter"

The screenshot shows a Microsoft Excel spreadsheet titled "SVG code converter.xlsm". The ribbon includes File, Home, Insert, Page Layout, Formulas, Data, Review, and View. The Home ribbon is active, showing options for Clipboard (Paste, Format Painter), Font (Calibri, size 11, bold, italic, underline, text color, background color), Alignment (left, center, right, justified, wrap text, merge & center), Number (general, percentage, currency, decimal, thousands separator), and Styles (Normal, Neutral). The spreadsheet data is as follows:

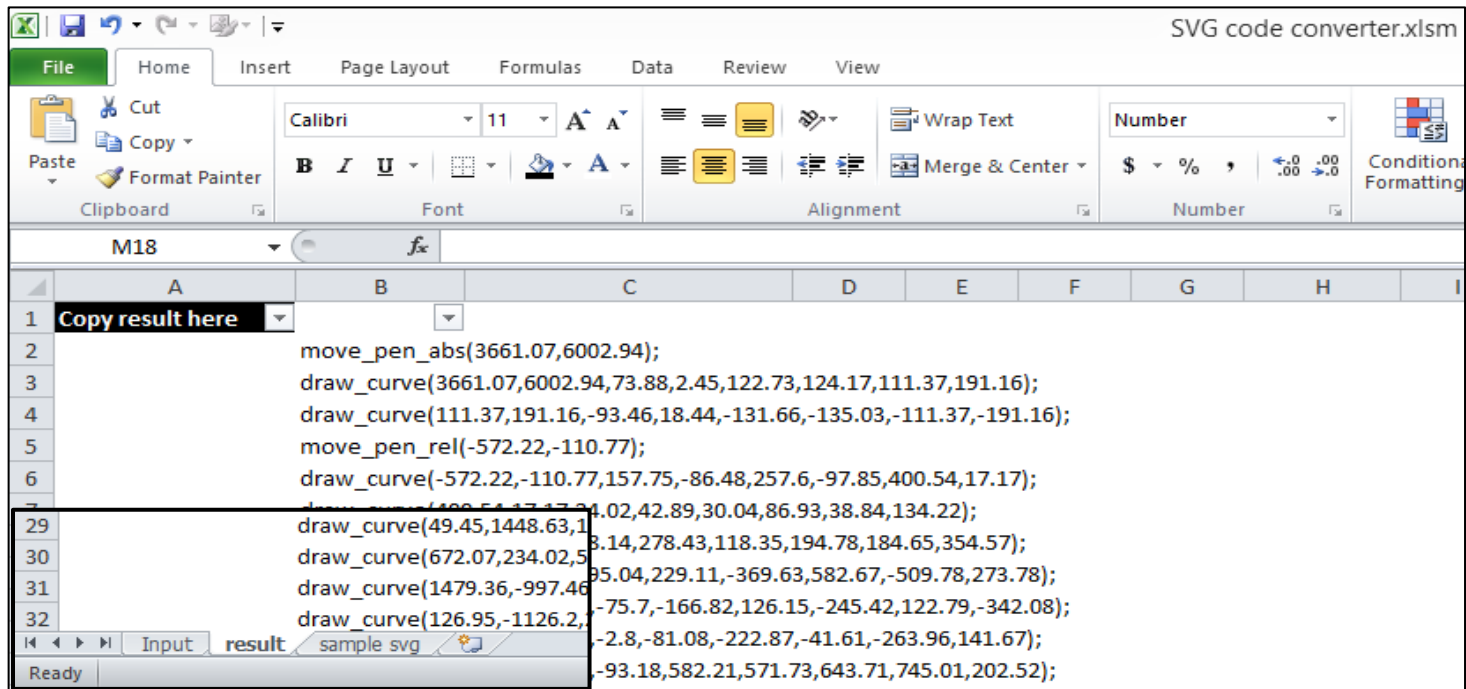
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	paste from here	<path class="fillo" d="M3661.07 6002.94c73.88,2.45 122.73,124.17 111.37,191.16 -93.46,18.44 -131.66,-135.03 -111.37,-191.16zm-572.22 -110.77c157.75,-86.48 257.6,-9															
2		<path class="fillo" d="M6478.83 5255.52c177.73,-70.95 50.98,373.88 11.11,449.01 -65.07,122.65 -169.93,305.48 -263.17,406.16 -218.2,235.63 -2.9,-753.39 252.06,-855.															
3		<path class="fillo" d="M7713.76 6572.31c21.99,-51.68 62.51,-118.17 75.78,-175.61 14.57,-62.98 -47.58,-120.48 -107.98,-124.86 -191.87,-157.21 -358.33,-20.79 -524.36,															
4		<path class="fillo" d="M8061.92 6287.34l-34.36 3.91c16.67,91.38 -153.7,747.12 -47.76,889.97 -4.48,43.56 19.21,84.2 65.54,81.46 28.25,44.95 99.86,24.21 140.82,1.07 5															
5		<path class="fillo" d="M9422.08 6913.85c-10.07,148.11 -90.04,311.4 -53.66,446.56 172.2,39.17 146.78,-133.11 186.47,-294.71 32.43,-132.02 50.19,-350.92 68.98,-398.0															
6		<path class="fillo" d="M11968.78 7511.68c-160.94,118.86 -254.56,423.19 -65.14,554.43 445.98,309.04 1563.77,134.33 1593.98,-662.57 4.96,-130.99 -21.04,-268.85 -2.4															
7		<path class="fillo" d="M14227.73 6246.17l129.66 -206.11 208.26 -17.97c134.02,290.69 131.62,593.27 -128.11,792.59 -178.02,136.61 -276.66,101.61 -301.11,-118.1 -20.															
8		<path class="fillo" d="M15794.89 5939.63 -169.76 88.01 61.38 851.89 -287,933.39 -214.24,48.23 -267.84,-167.79 -269.69,-331.22 -4.21,-370.96 148.68,-319.27 152.11,-															
9		<path class="fillo" d="M179.6,876.02 -8.8,106.88 -81.62,949.27 -69.15,966.05 227.65,8.03 212.58,-982.94 253.5,-1178.															
10		<path class="fillo" d="M4,403.19 271.54,-24.48 255.25,-491.24 -20.74,-403.19z"/>															

A task pane is open at the bottom left, showing a "Ready" status and navigation buttons (back, forward, search, etc.). The task pane has tabs for "Input", "result", and "sample svg".

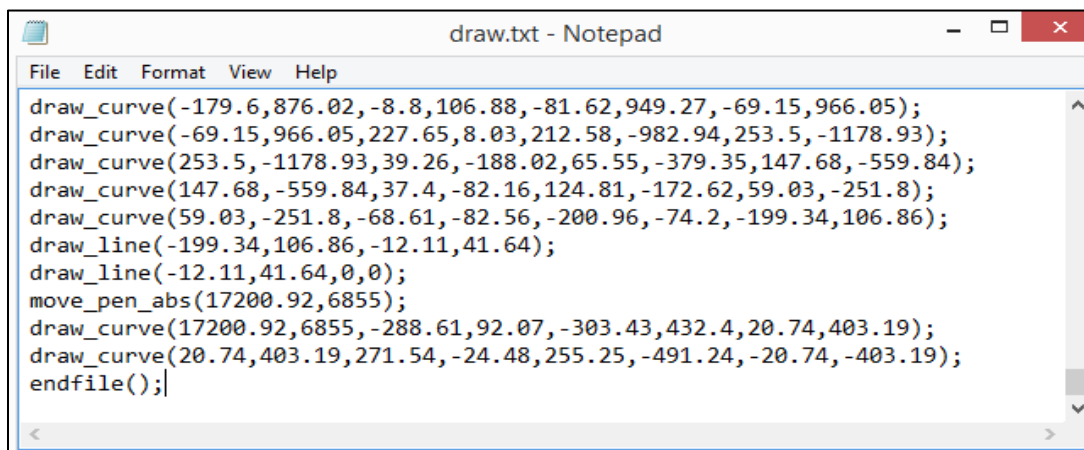
Run "Macro" to convert svg to arduino code



Copy all generated code to text file



At end file, type "endfile();" to inform Arduino about end of file



Step 7 Copy code file "draw.txt" to SD card

Step 8 Plug in SD card to robot and start drawing

