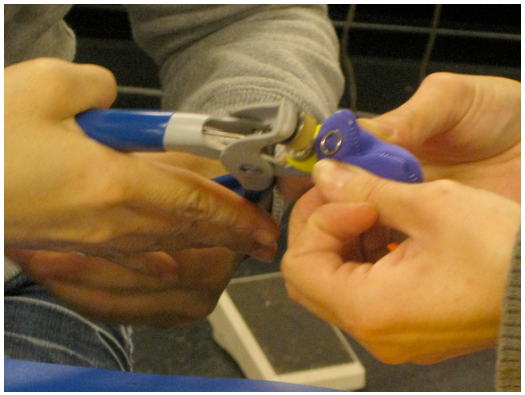
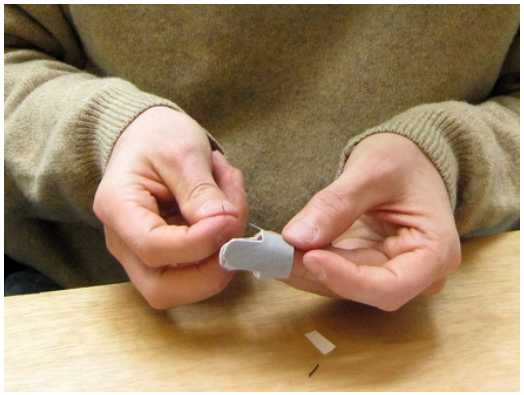
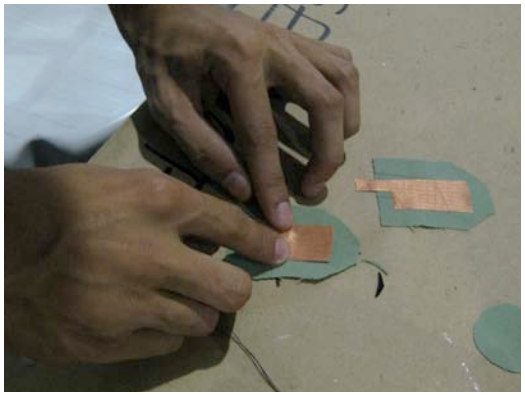




Handcrafting Textile Sensors from Scratch

Materials

Conductive

- Stretch conductive fabric - Silver plated Nylon
- Conductive thread - 117/17 2ply silver plated Nylon
- Conductive thread – 234/34 2ply silver plated Nylon
- Metal beads

Conductive with high resistance (resistive)

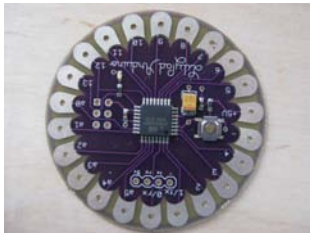
- Resistive thread - 66 Yarn 22+3ply 110 PET
- Resistive yarn – Polyester and Inox steel fiber
- Velostat/Linqstat - Carbon impregnated Polyethylene film

Non-Conductive (isolating)

- Neoprene – 1.5mm with polyester jersey fused to both sides
- Felting wool
- Foam
- Fusible Interfacing – "Iron-on”
- Anti-fray or Fabric glue

Tools

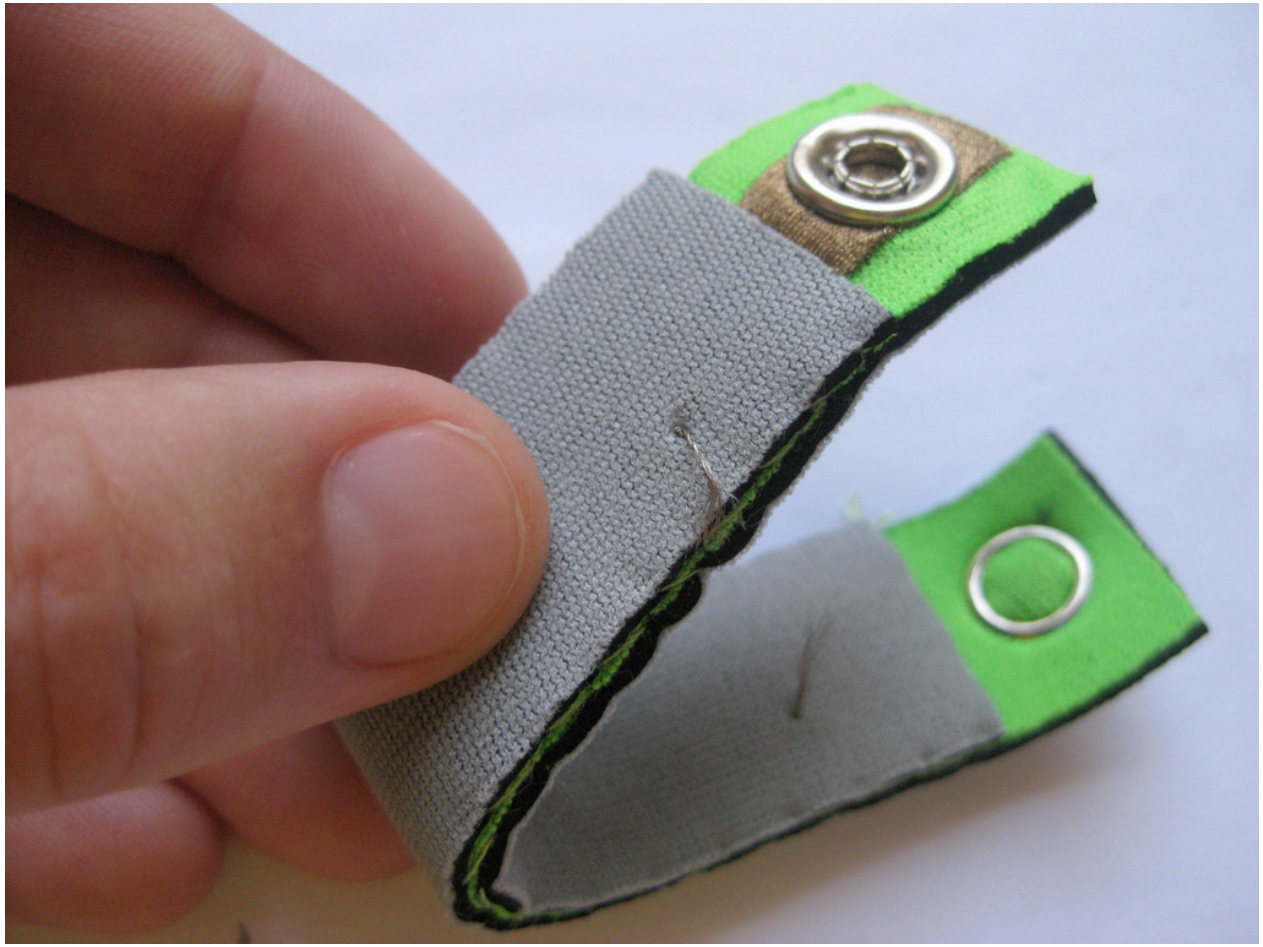
- Sewing needles
- Knitting needles
- Crochet hooks
- Circular knitting machine
- Spool knitter
- Needle felting tool
- Needle felting mat
- Hole maker
- Iron
- Multimeter
- LilyPad Arduino Mainboard
- LilyPad sewable LEDs



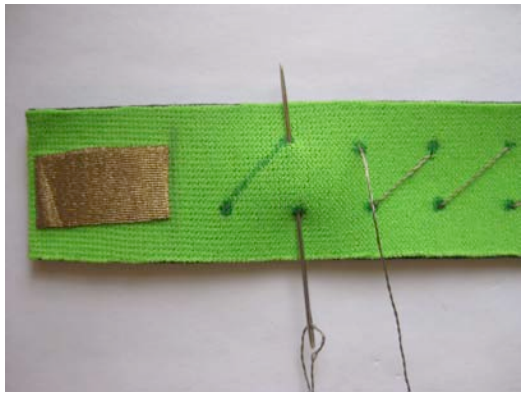
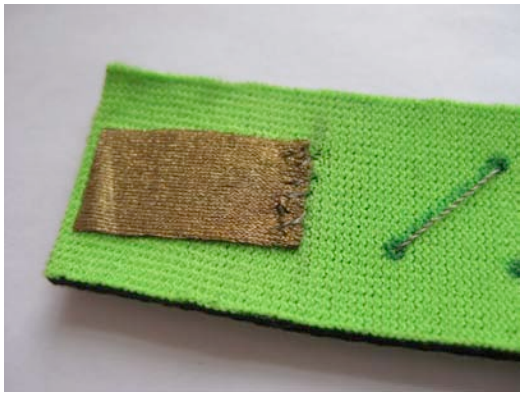
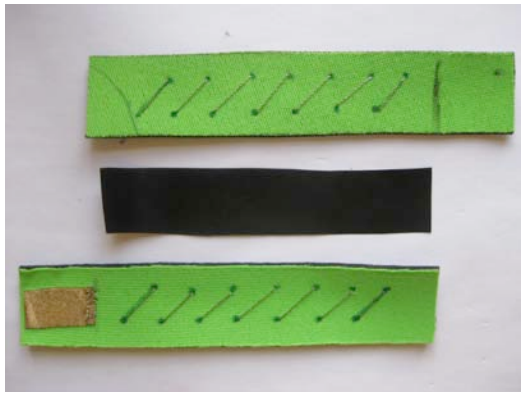
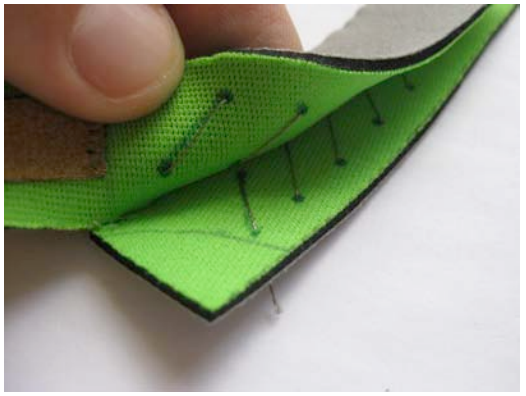
Textile Sensors

- Fabric Button
- Pressure Sensor
- Pressure Sensor Matrix
- Bend Sensor
- Tilt Sensor
- Fabric Potentiometer
- Crochet Potentiometer
- Stroke Sensor
- Knit Stretch Sensor

Bend Sensor



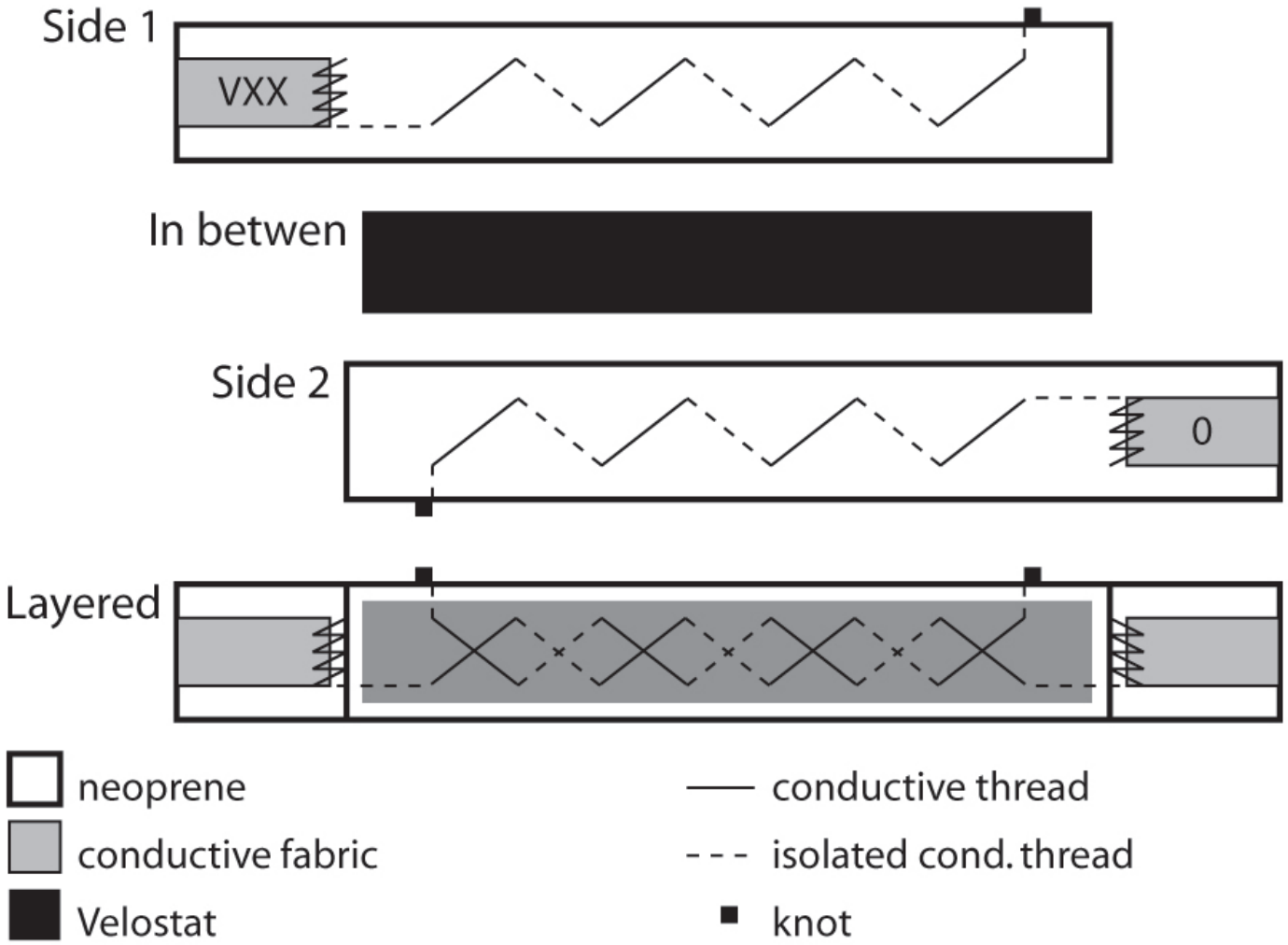
Bend Sensor

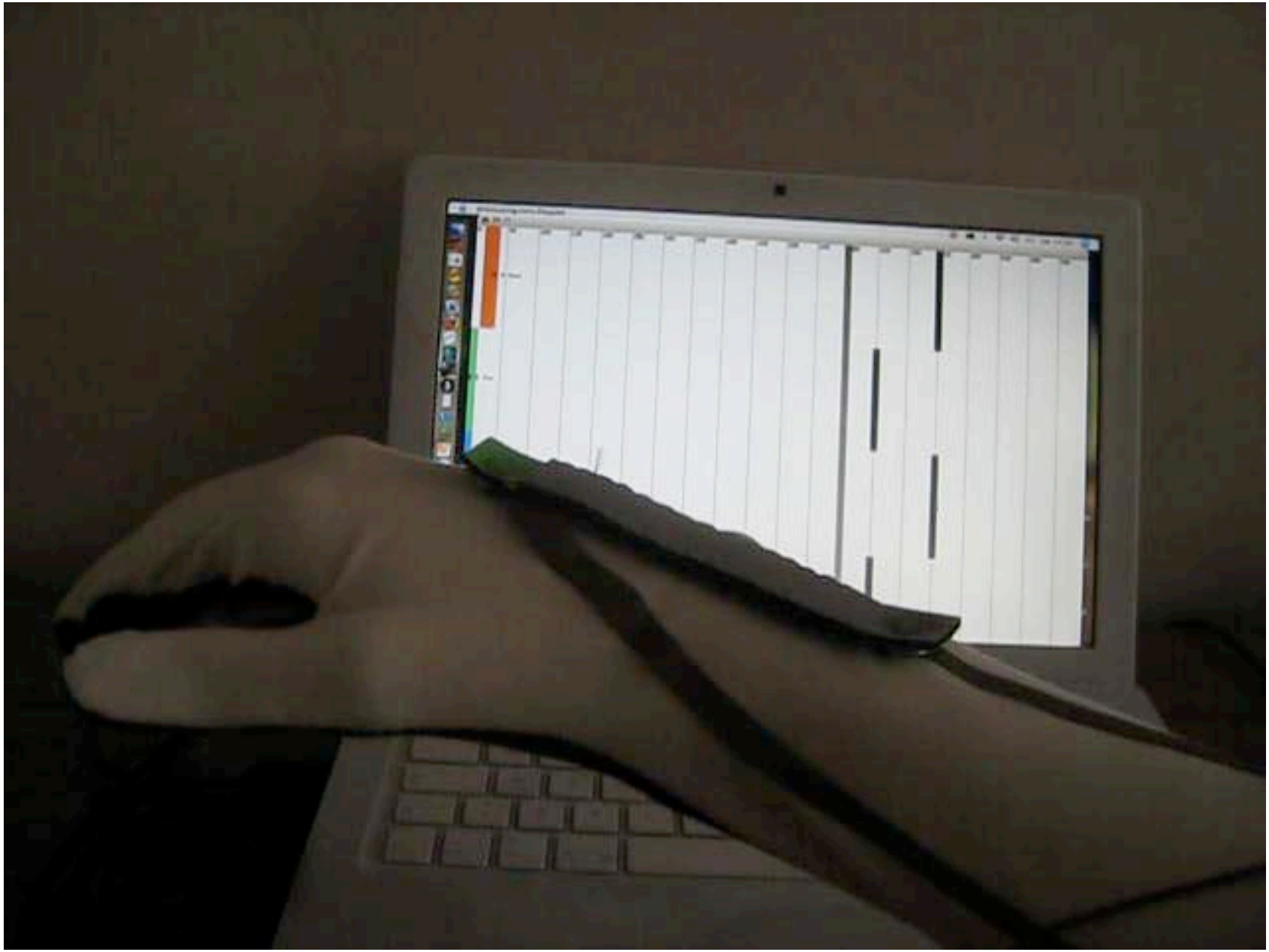





MATERIALS

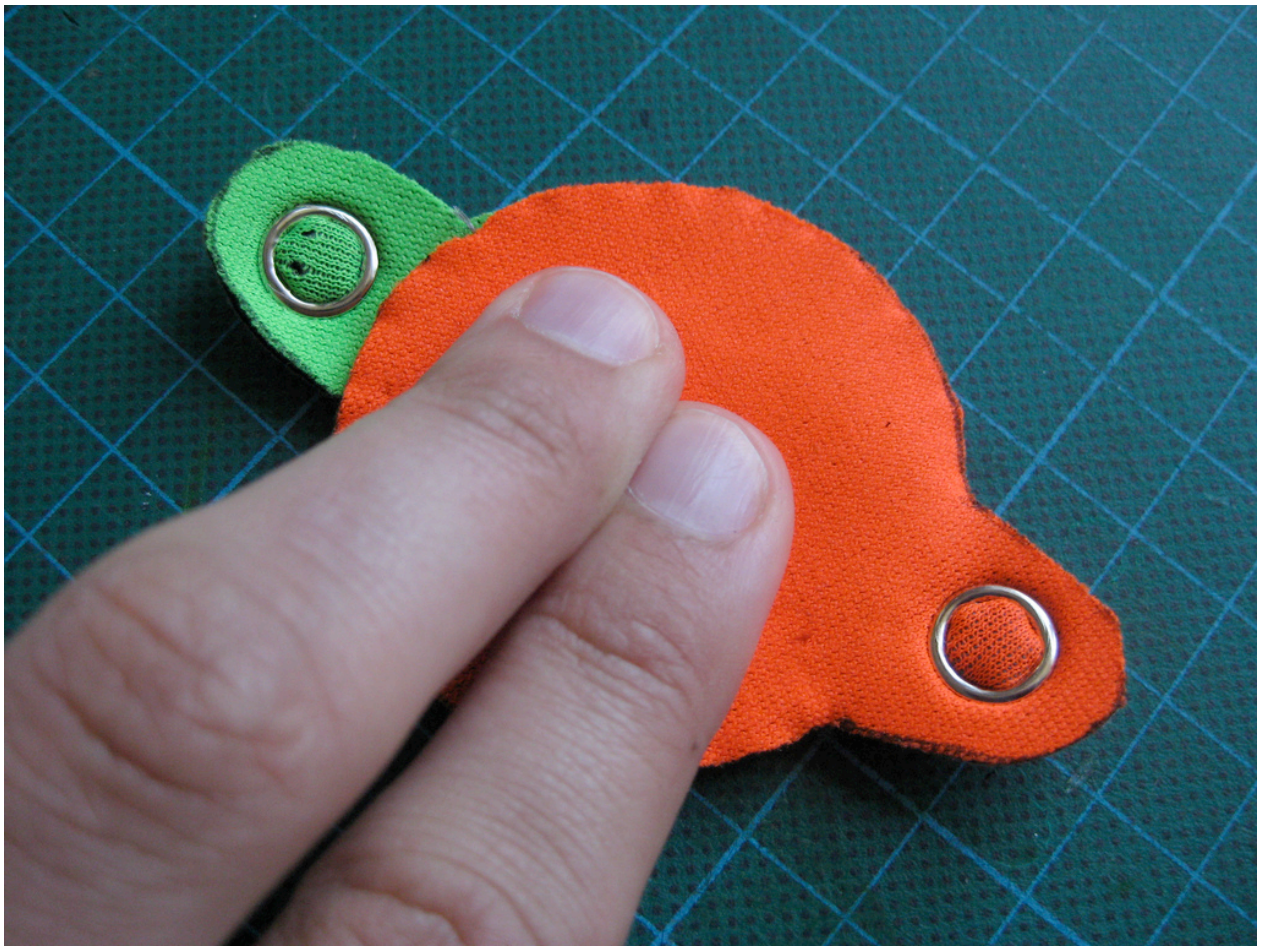
- Neoprene
- Conductive thread
- Stretch conductive fabric
- Fusible interfacing
- Velostat

Bend Sensor

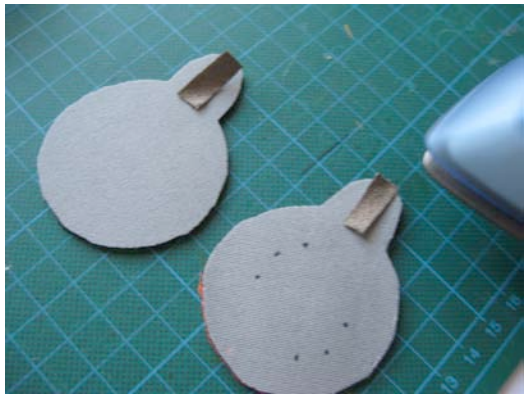

Side 1
VXX
In betwen
Side 2
0
Layered
neoprene
conductive fabric
Velostat
conductive thread
isolated cond. thread
knot

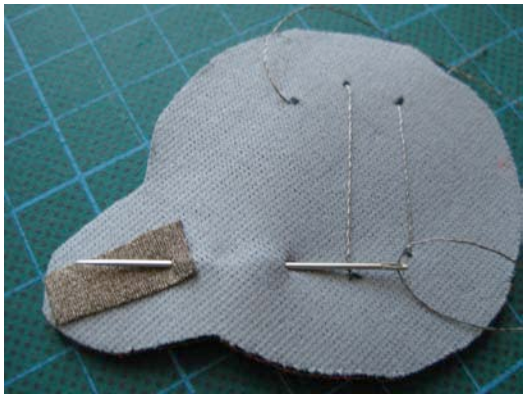


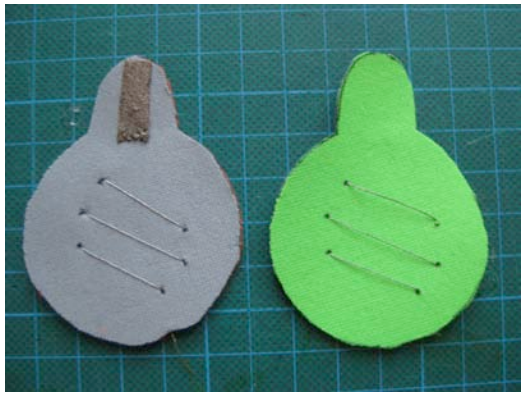
Pressure Sensor

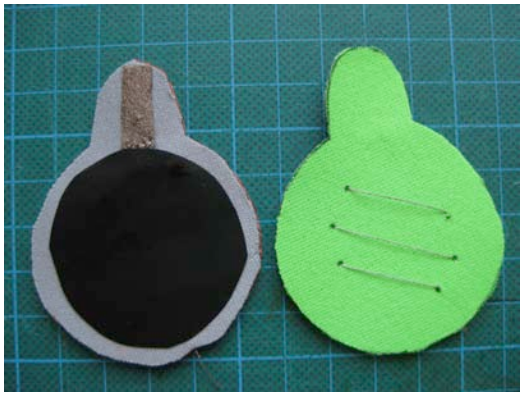


Pressure Sensor



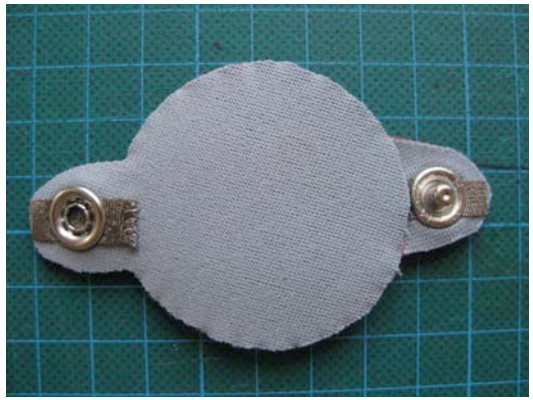




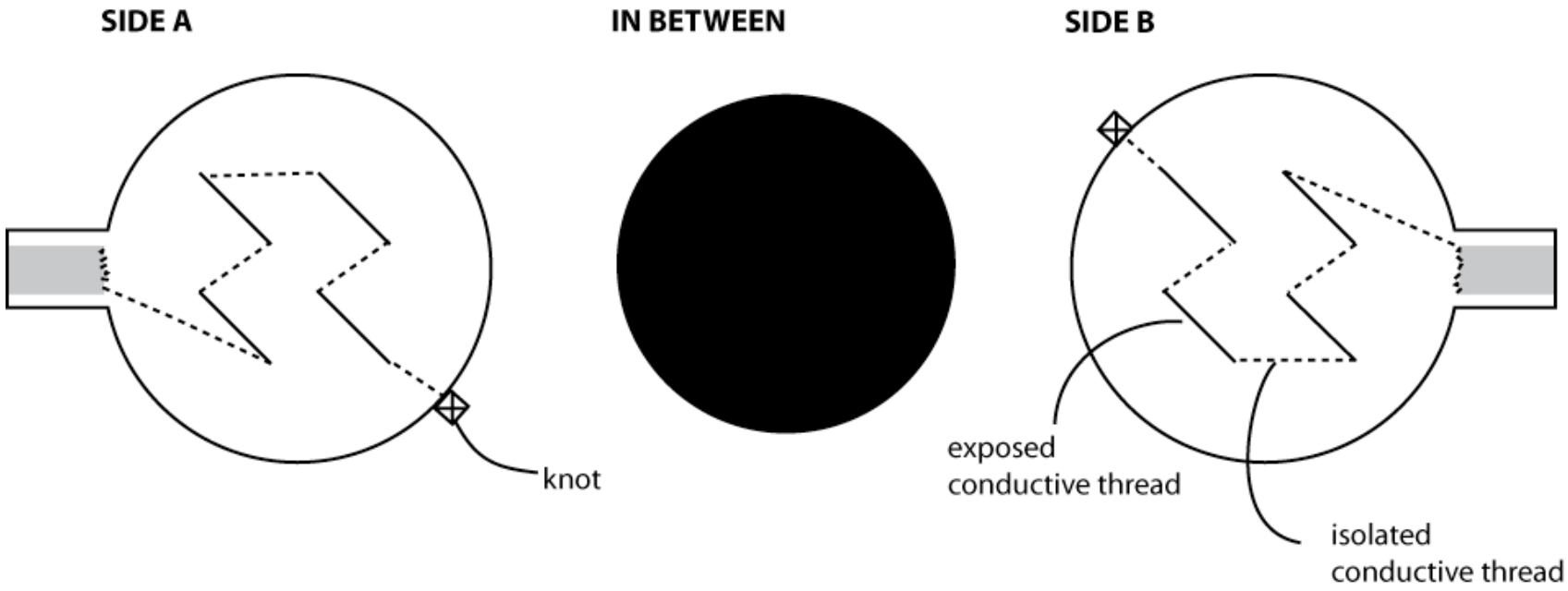


MATERIALS

- Neoprene
- Conductive thread
- Stretch conductive fabric
- Fusible interfacing
- Velostat

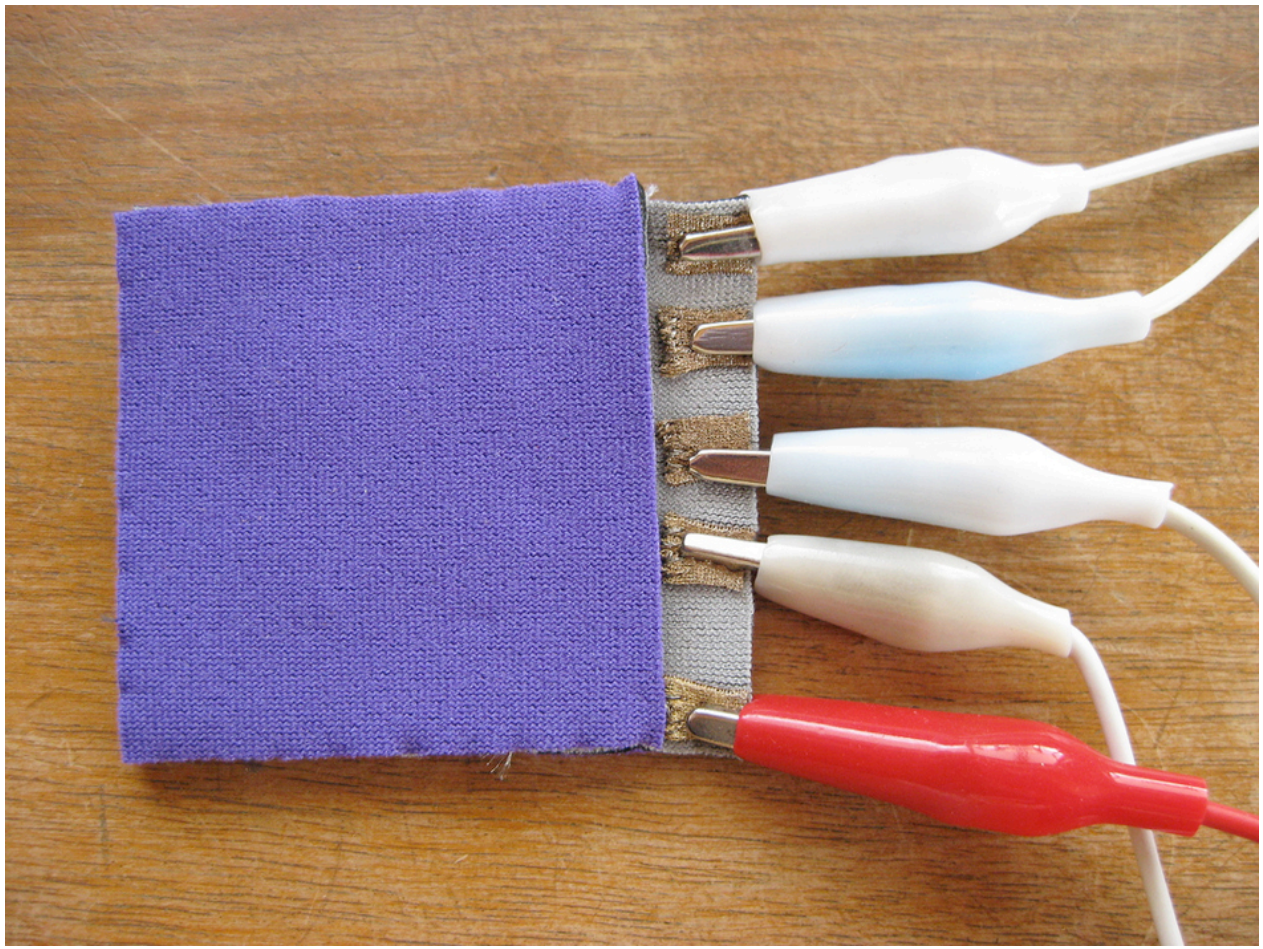


Pressure Sensor

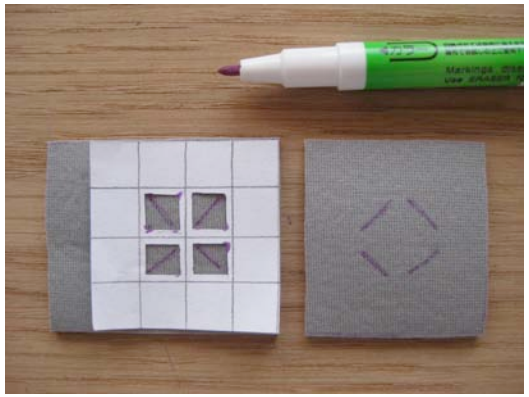


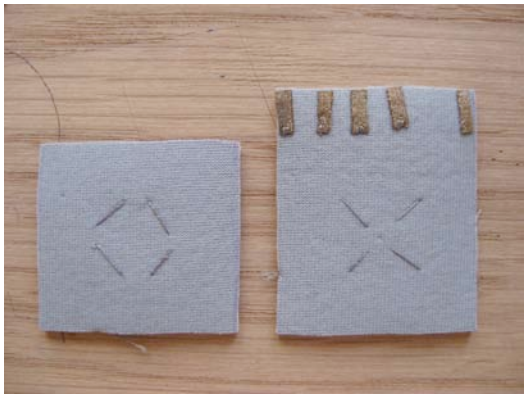

MacBook

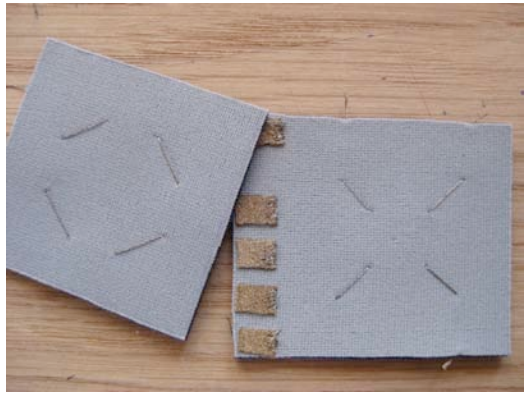
Pressure Sensor Matrix

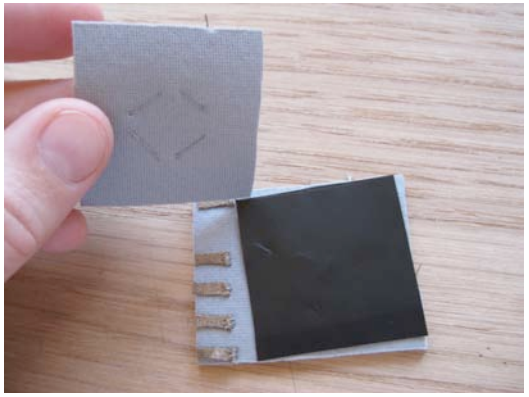


Pressure Sensor Matrix



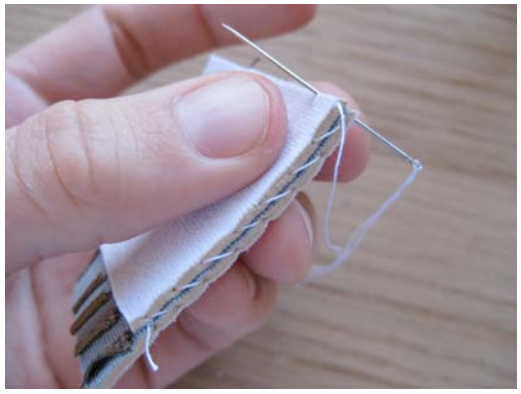




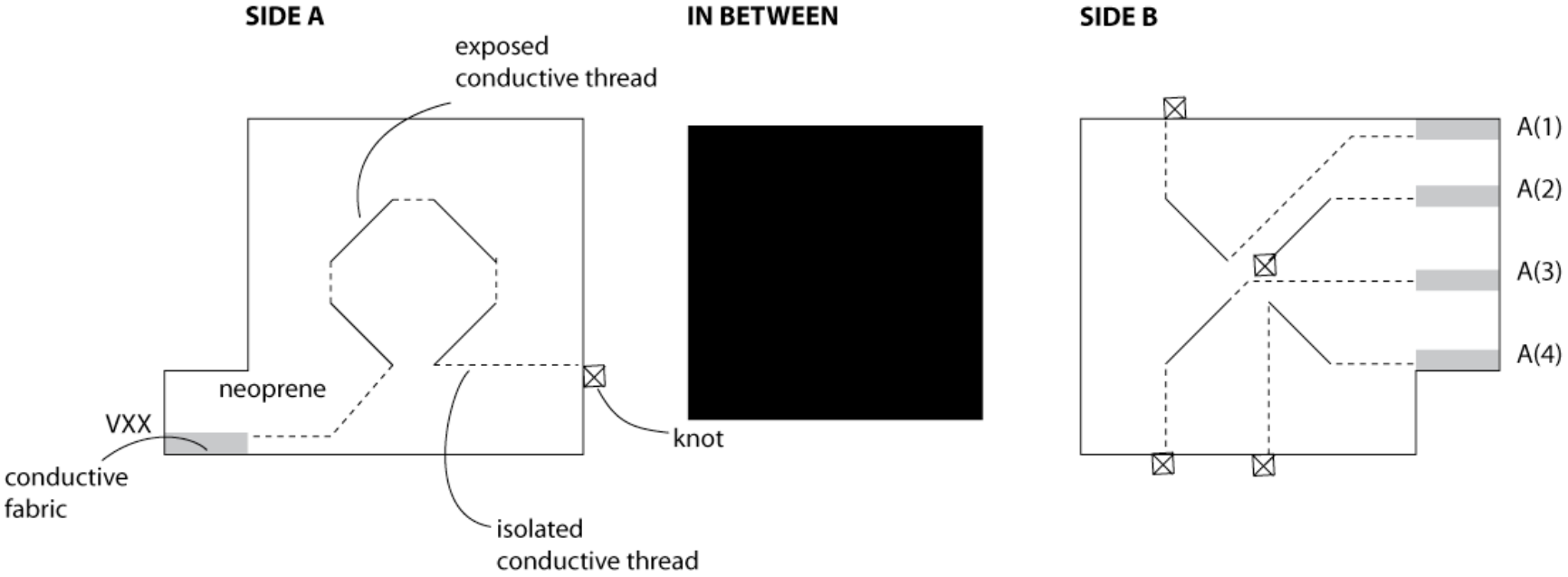


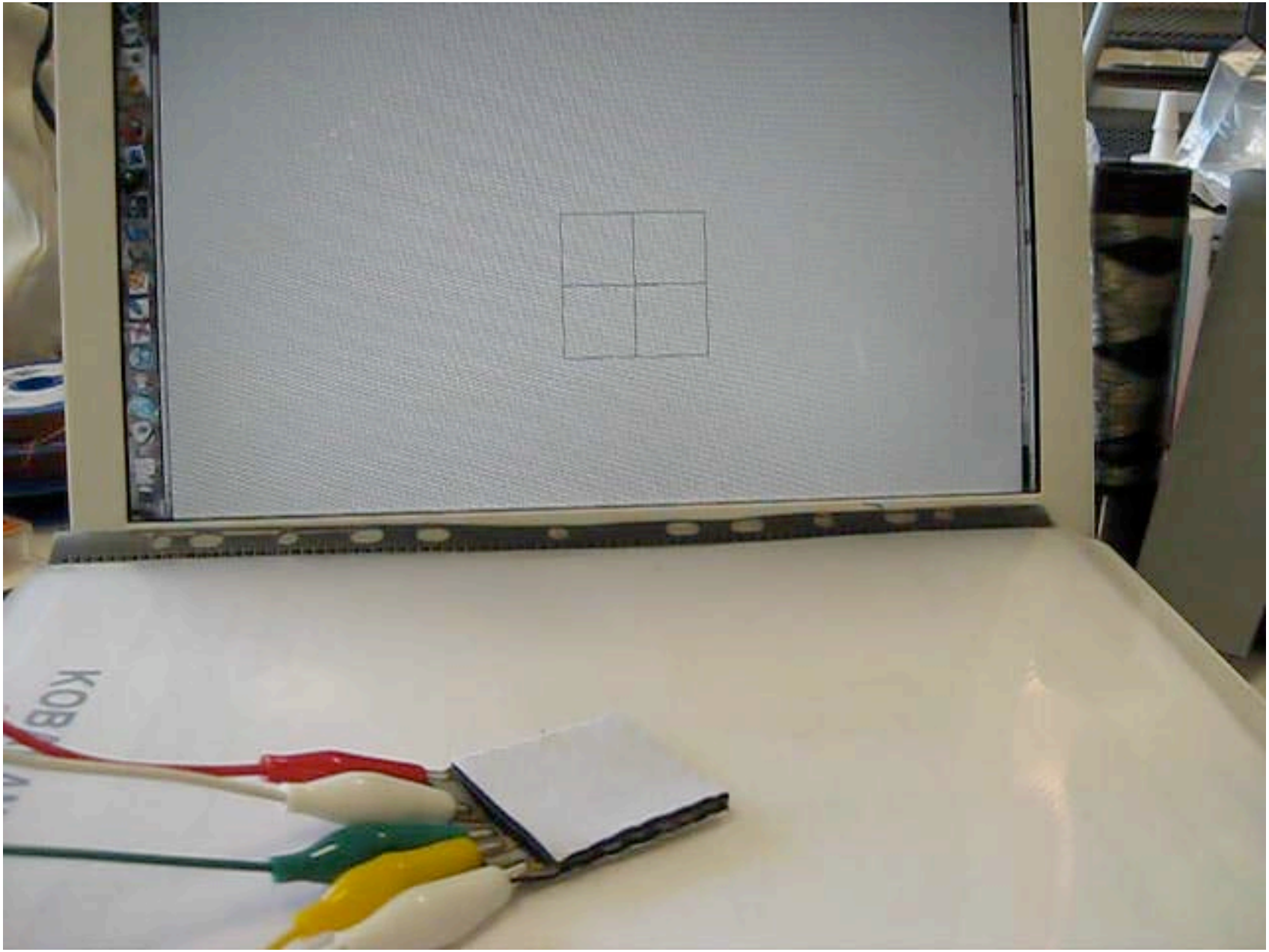
MATERIALS

- Neoprene
- Conductive thread
- Stretch conductive fabric
- Fusible interfacing
- Velostat



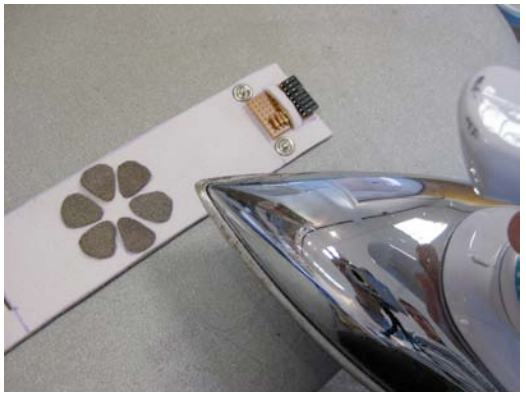
Pressure Sensor Matrix

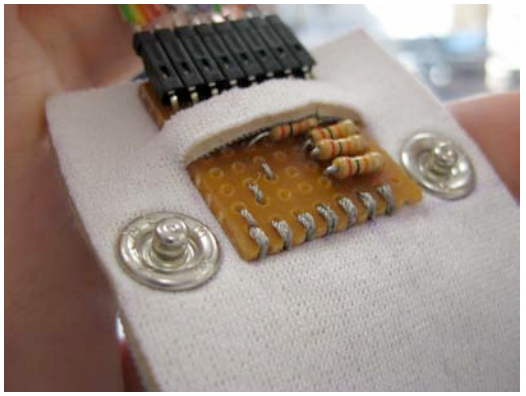




Tilt Sensor

Tilt Sensor

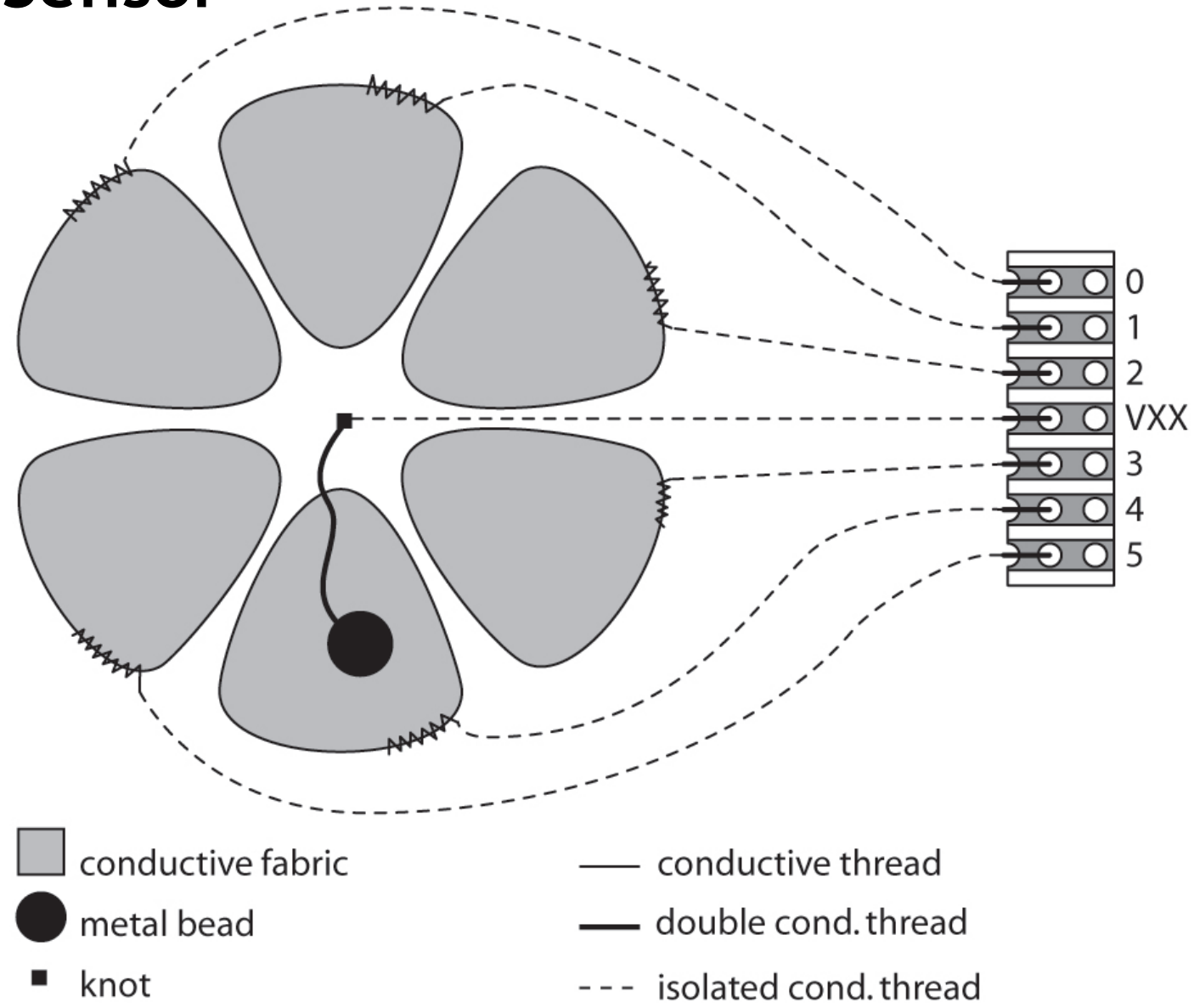




MATERIALS

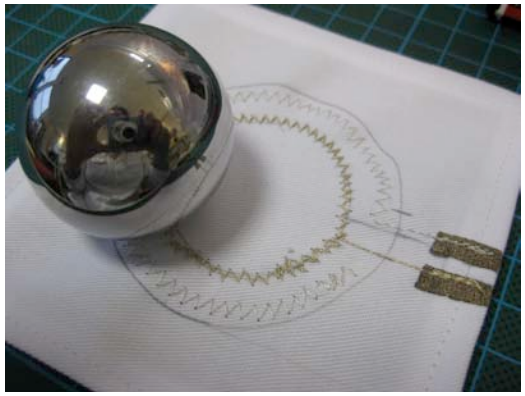
- Neoprene
- Stretch conductive fabric
- Conductive thread
- Metal bead
- Stretchy fabric glue

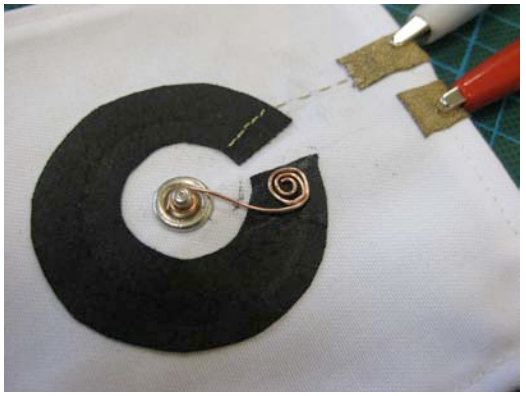
Tilt Sensor

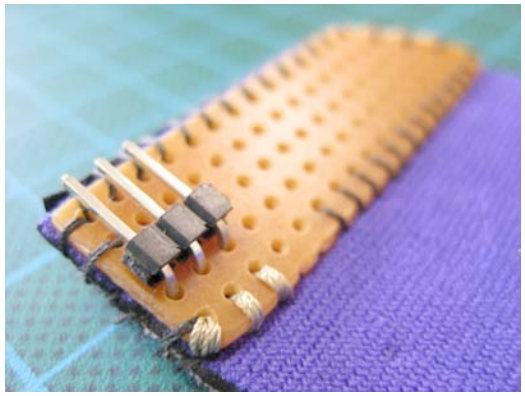

0
1
2
VXX
3
4
5
conductive fabric
metal bead
knot
conductive thread
double cond. thread
isolated cond. thread

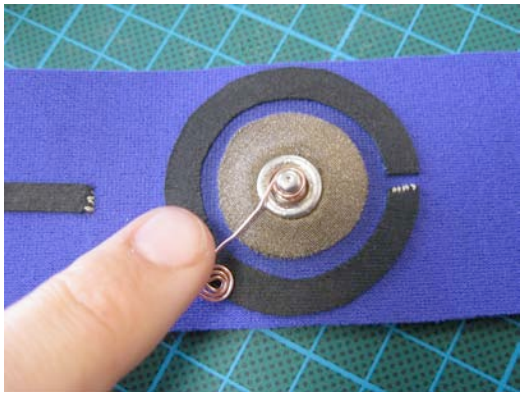
Fabric Potentiometer

Fabric Potentiometer



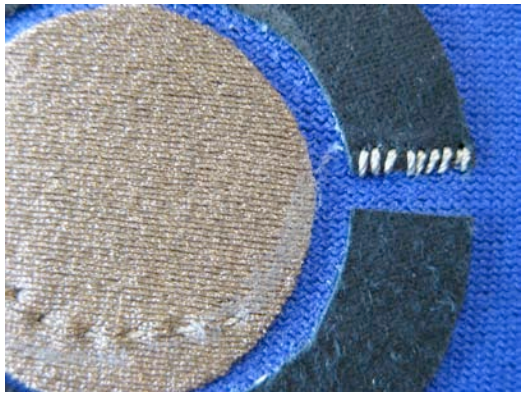




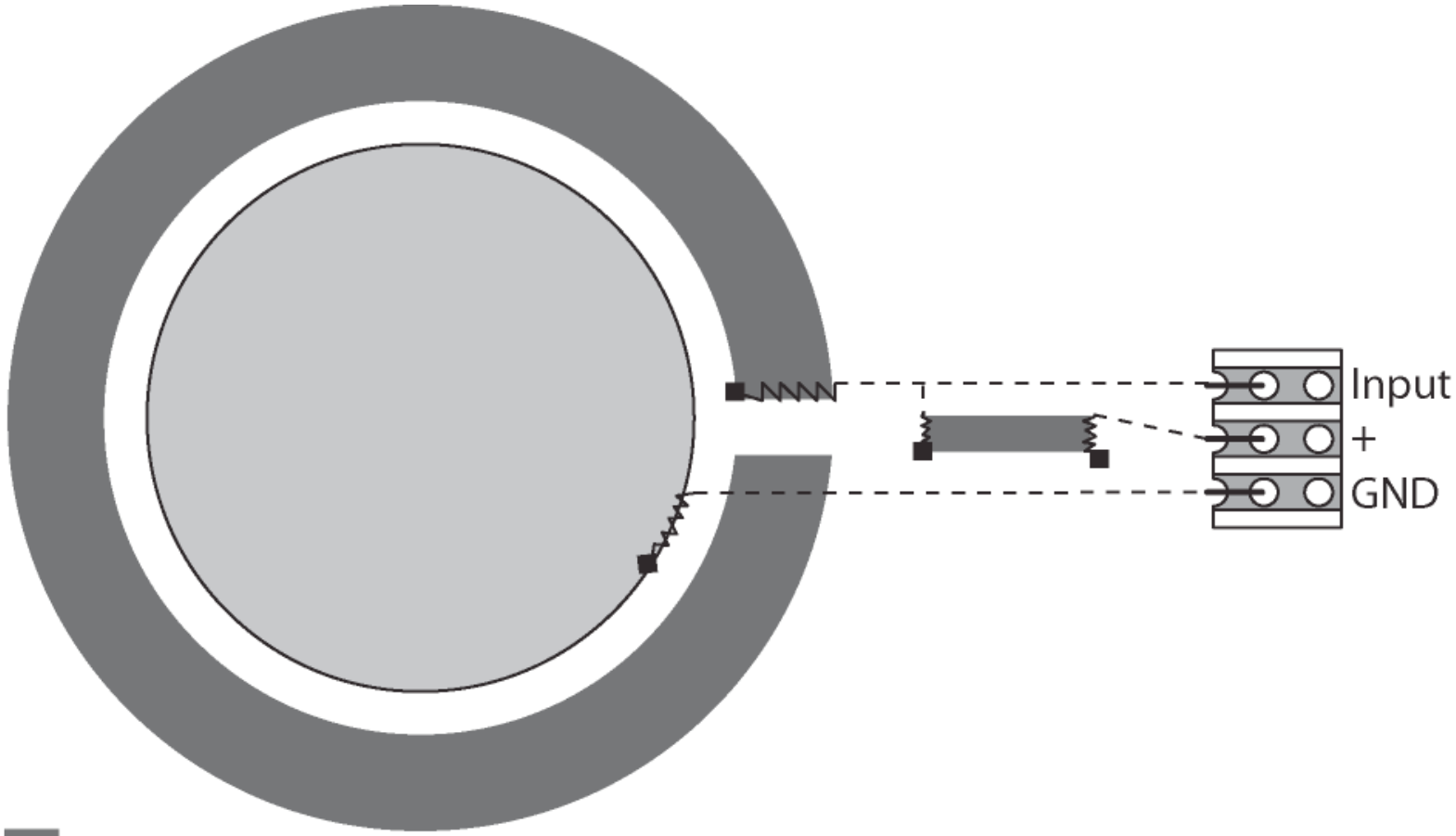


MATERIALS

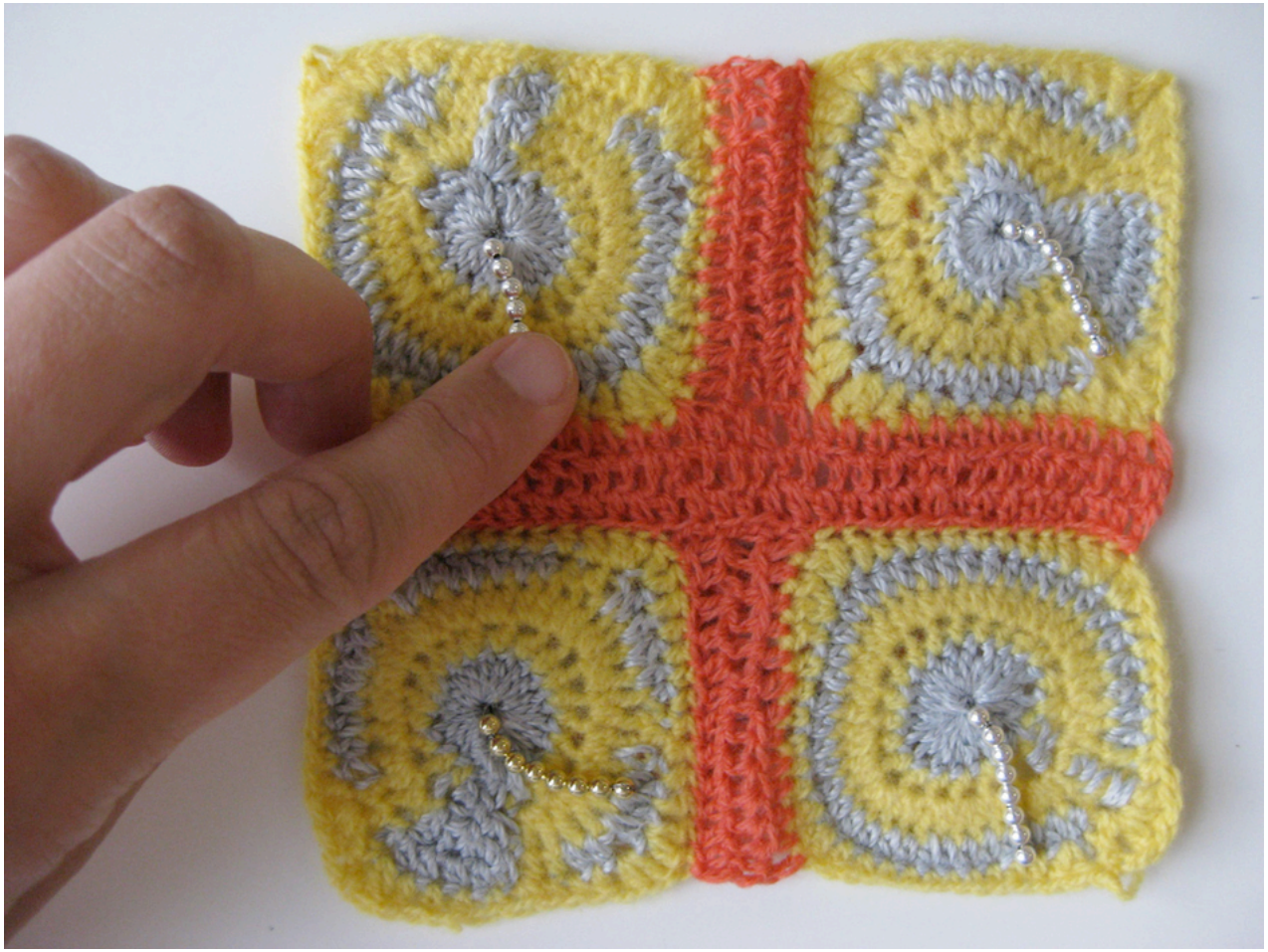
- Neoprene
- Conductive thread
- Stretch conductive fabric
- Resistive fabric
- Fusible interfacing



Fabric Potentiometer



Crochet Potentiometer



Crochet Potentiometer

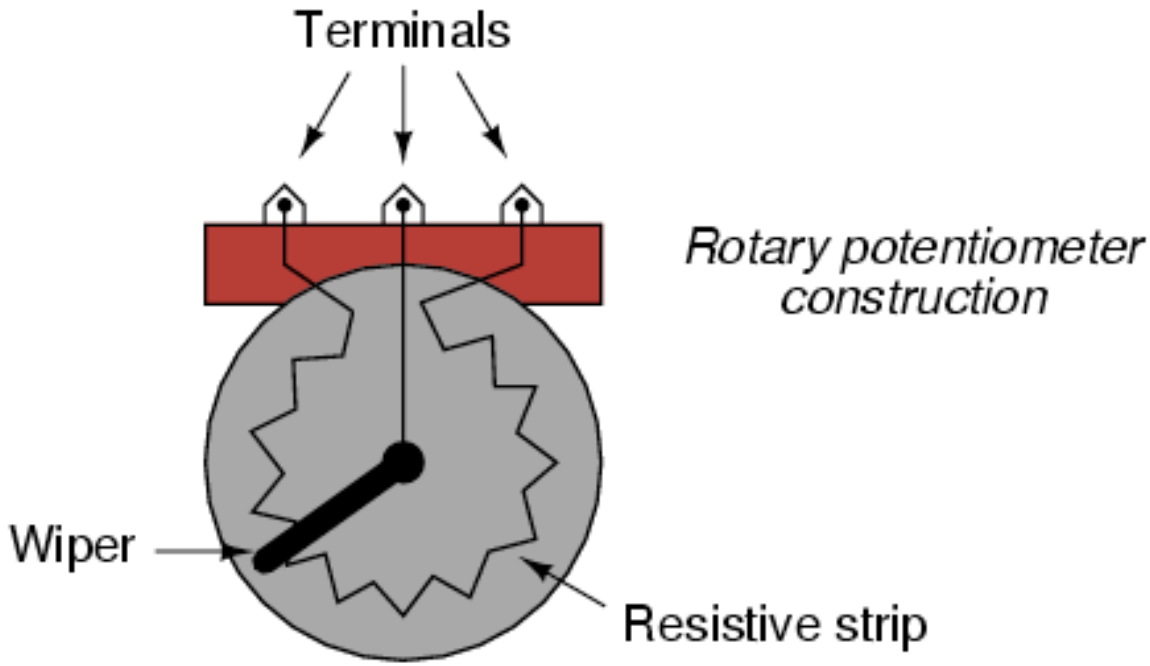


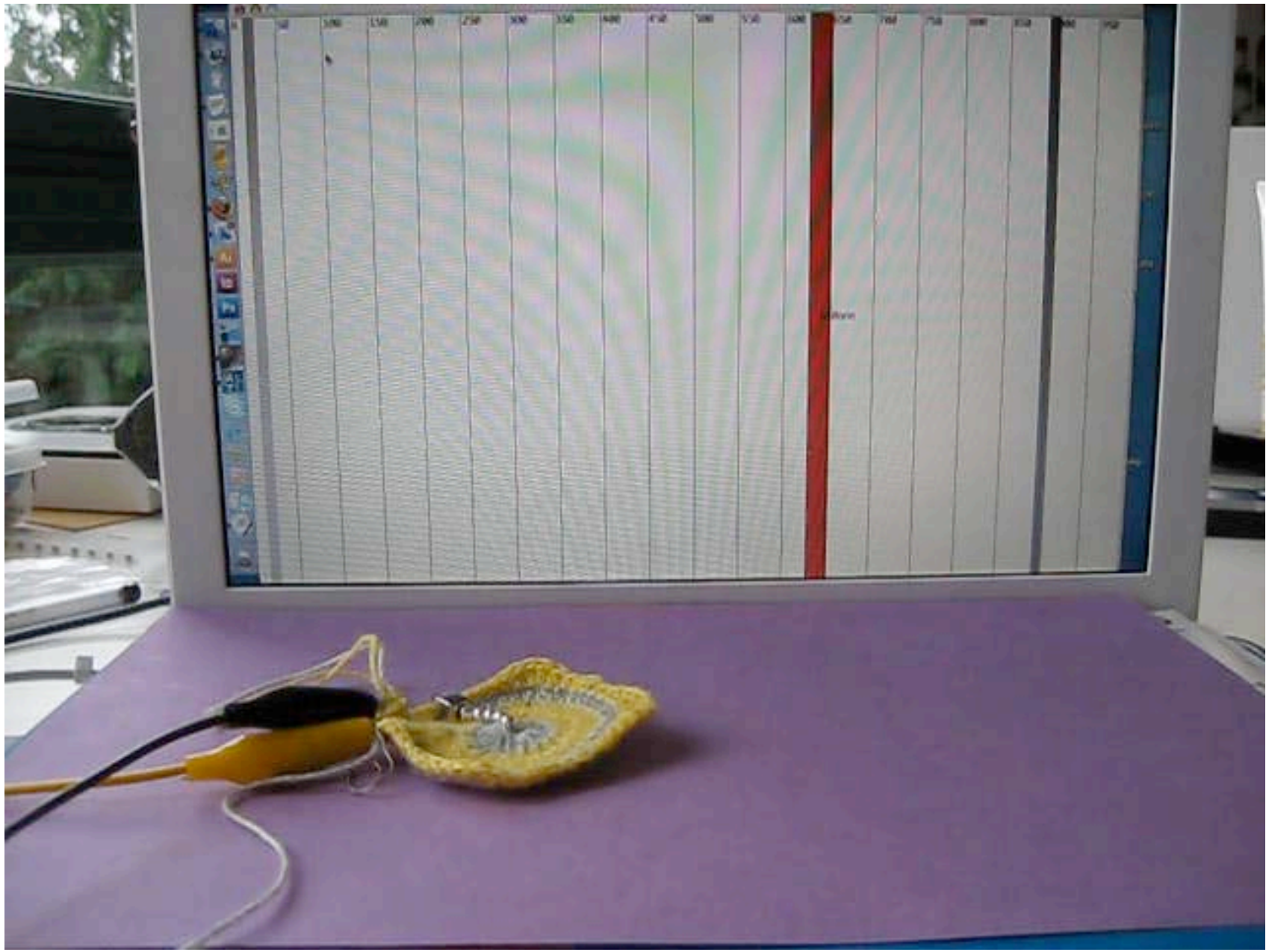



MATERIALS

- Resistive yarn
- Regular yarn
- Conductive thread
- Metal bead

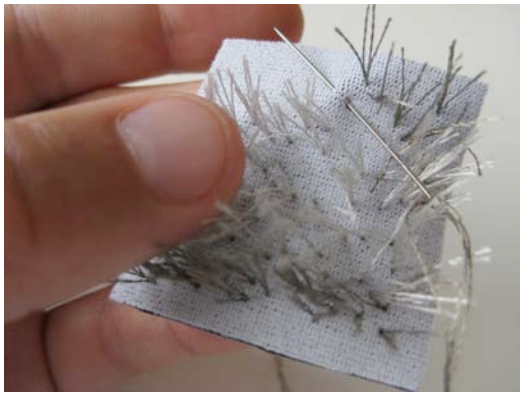
Potentiometer





Stroke Sensor

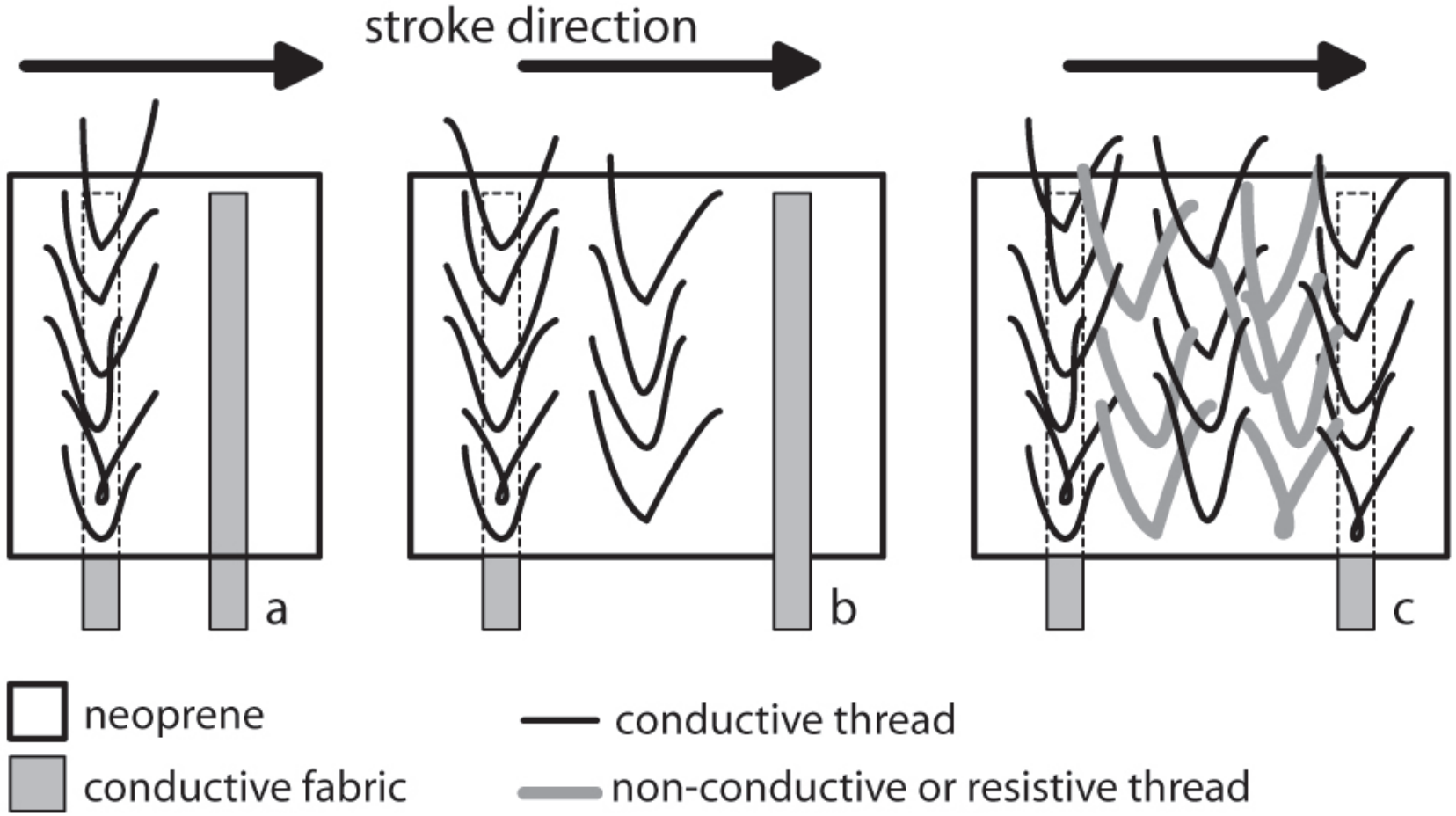
Stroke Sensor



MATERIALS

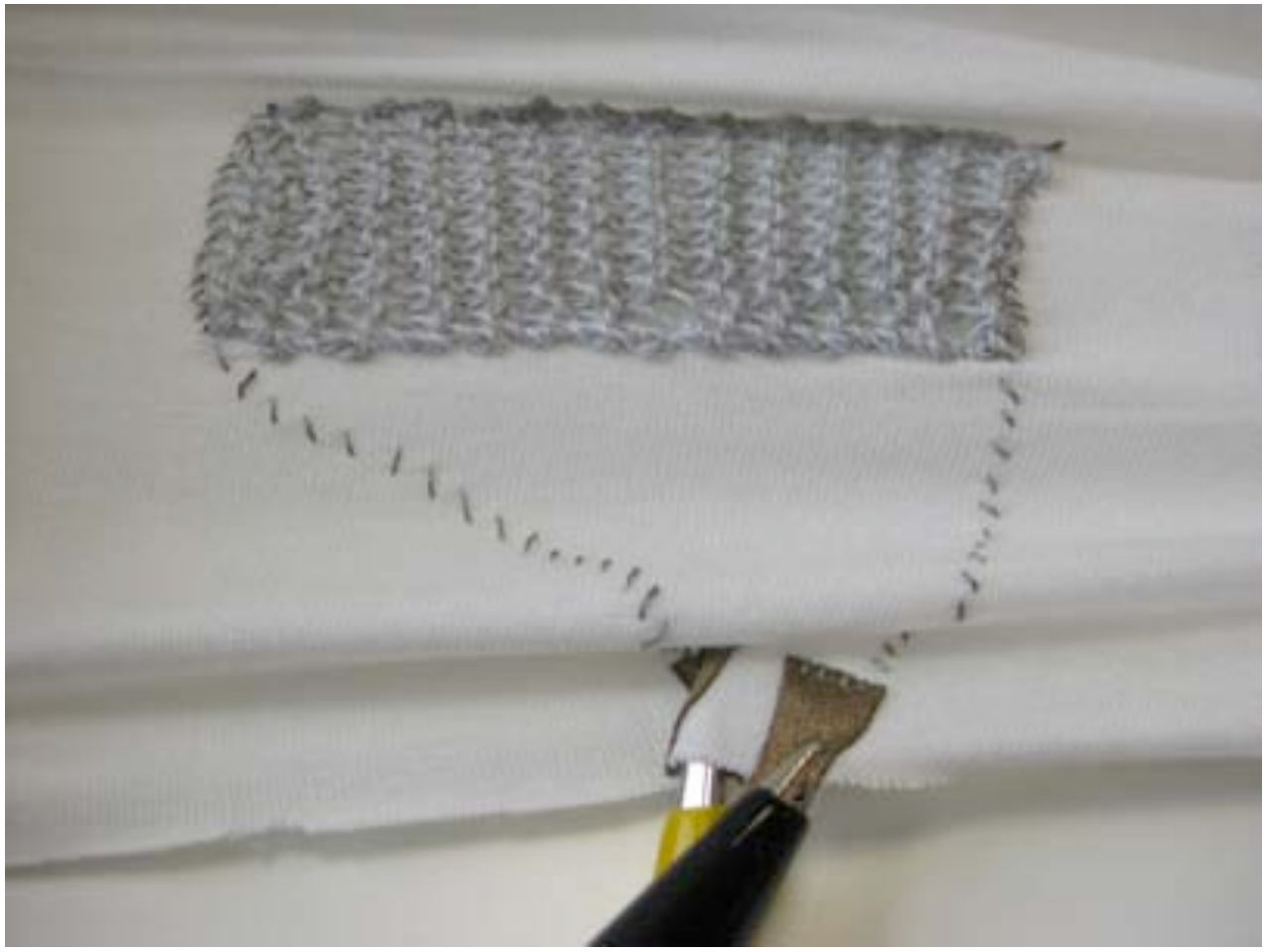
- Neoprene
- Conductive thread
- Resistive thread
- Conductive fabric
- Fusible interfacing

Stroke Sensor

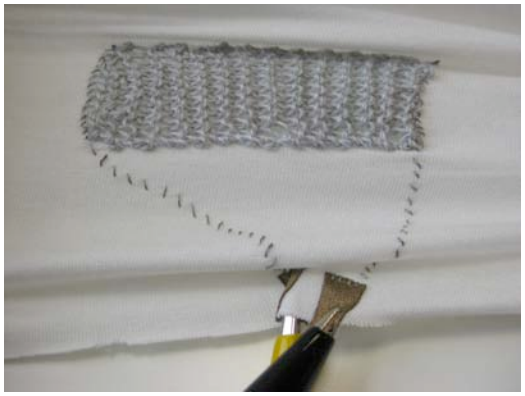


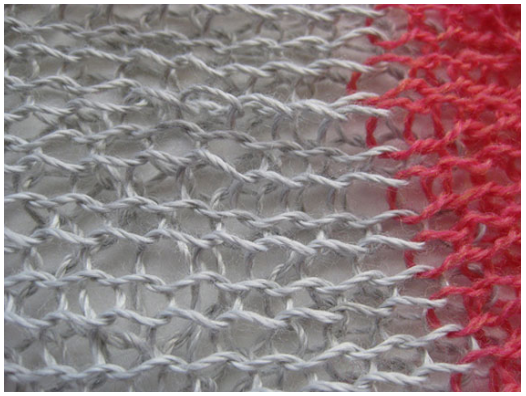
Stroke Sensor - VIDEO

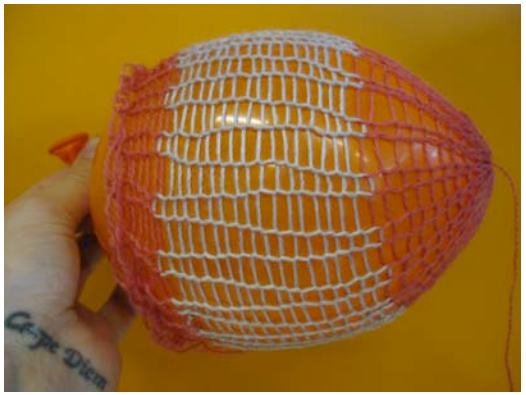
Knit Stretch Sensor



Knit Stretch Sensor



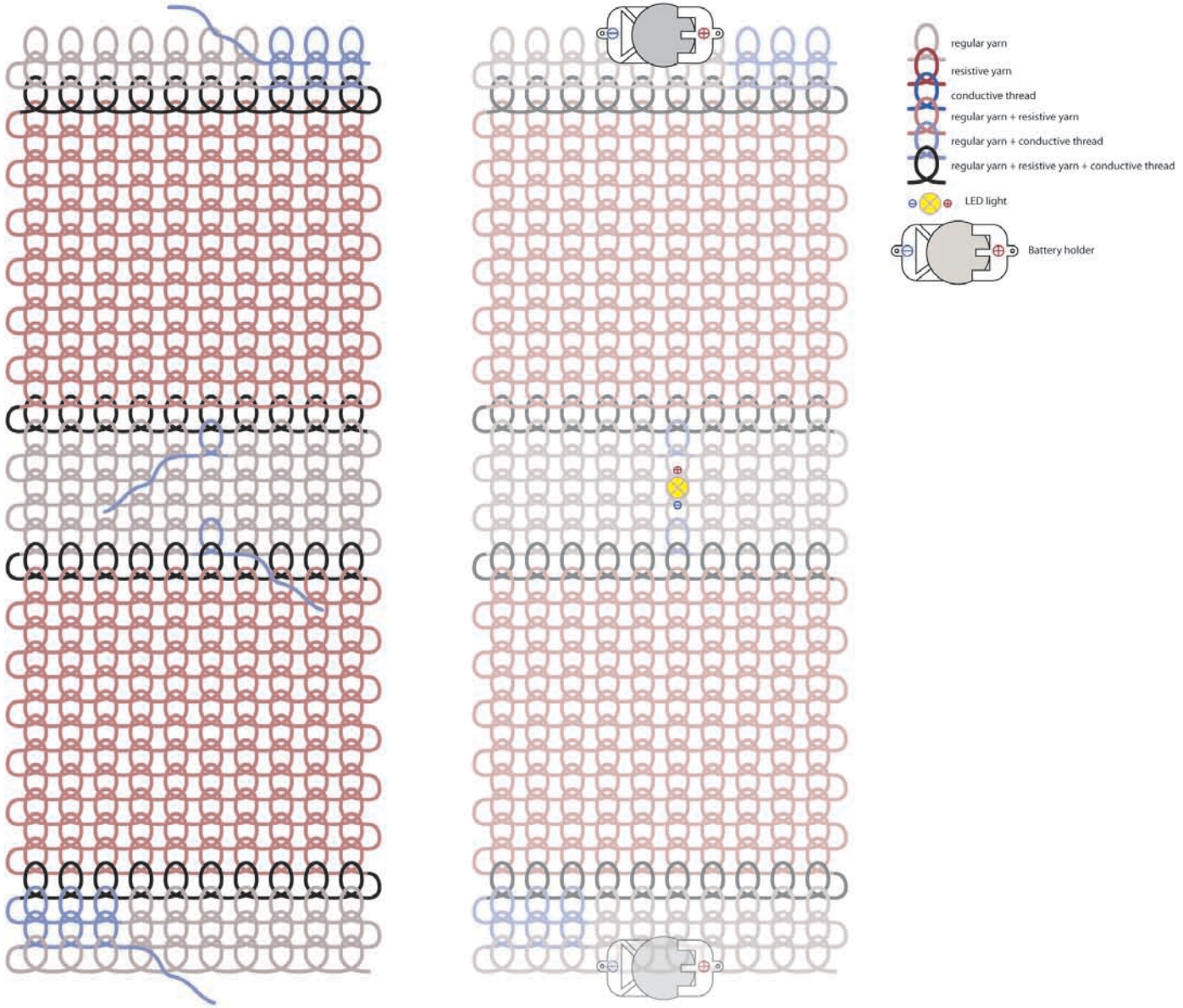


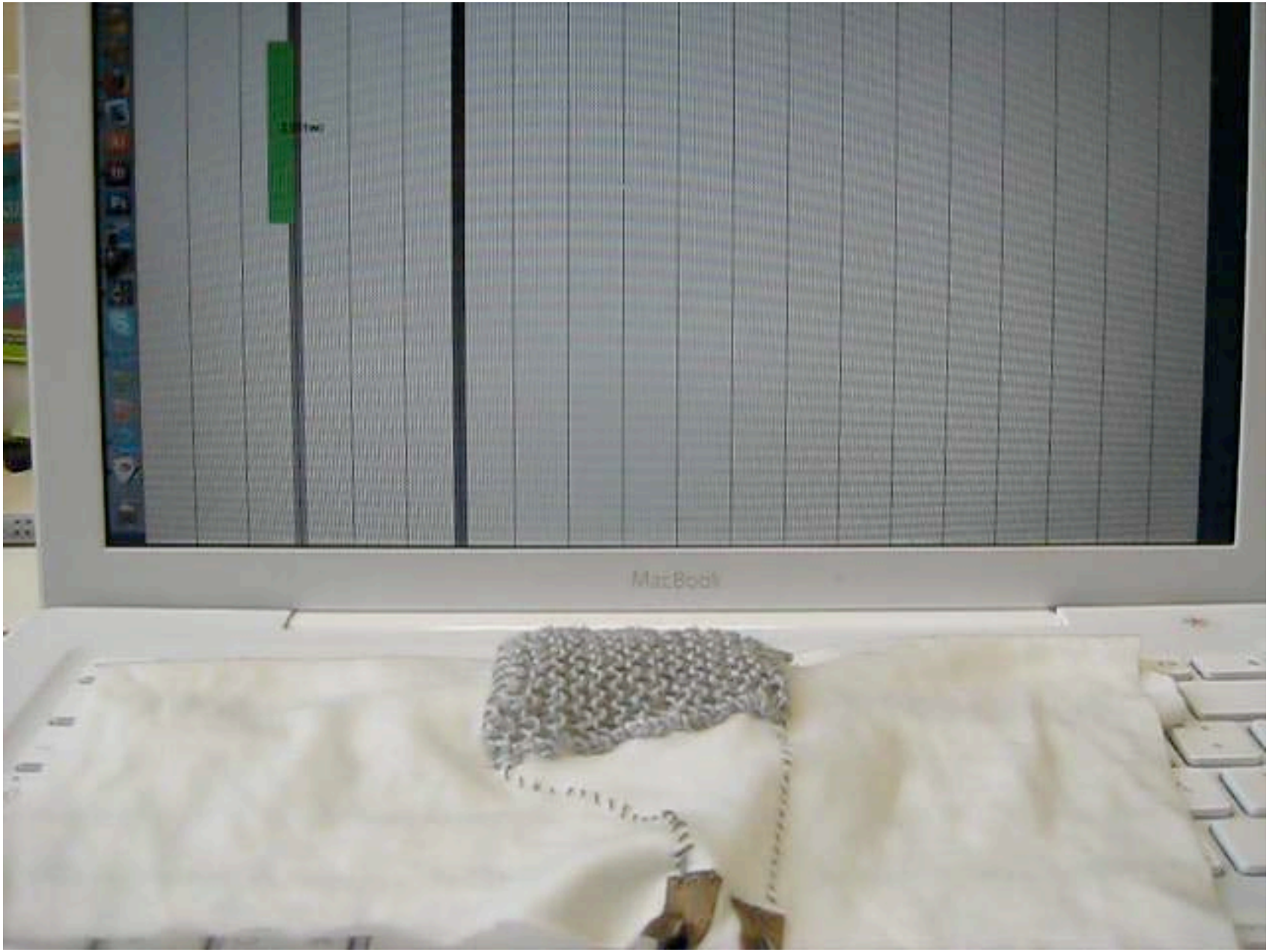


MATERIALS

- Resistive yarn
- Regular yarn

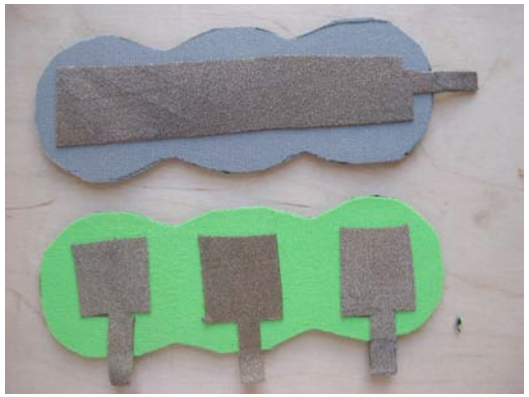
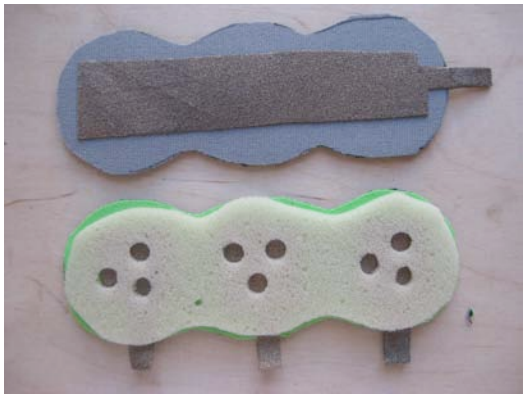
Knit Stretch Sensing Bracelet




MacBook

Fabric Button

Fabric Button

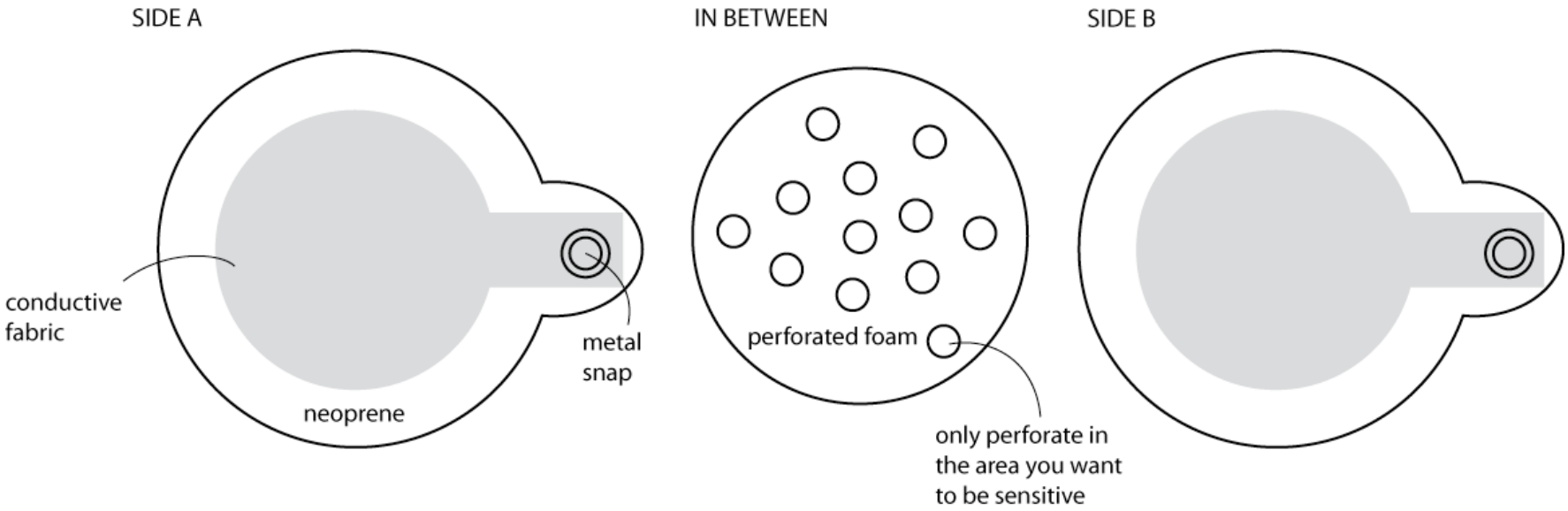



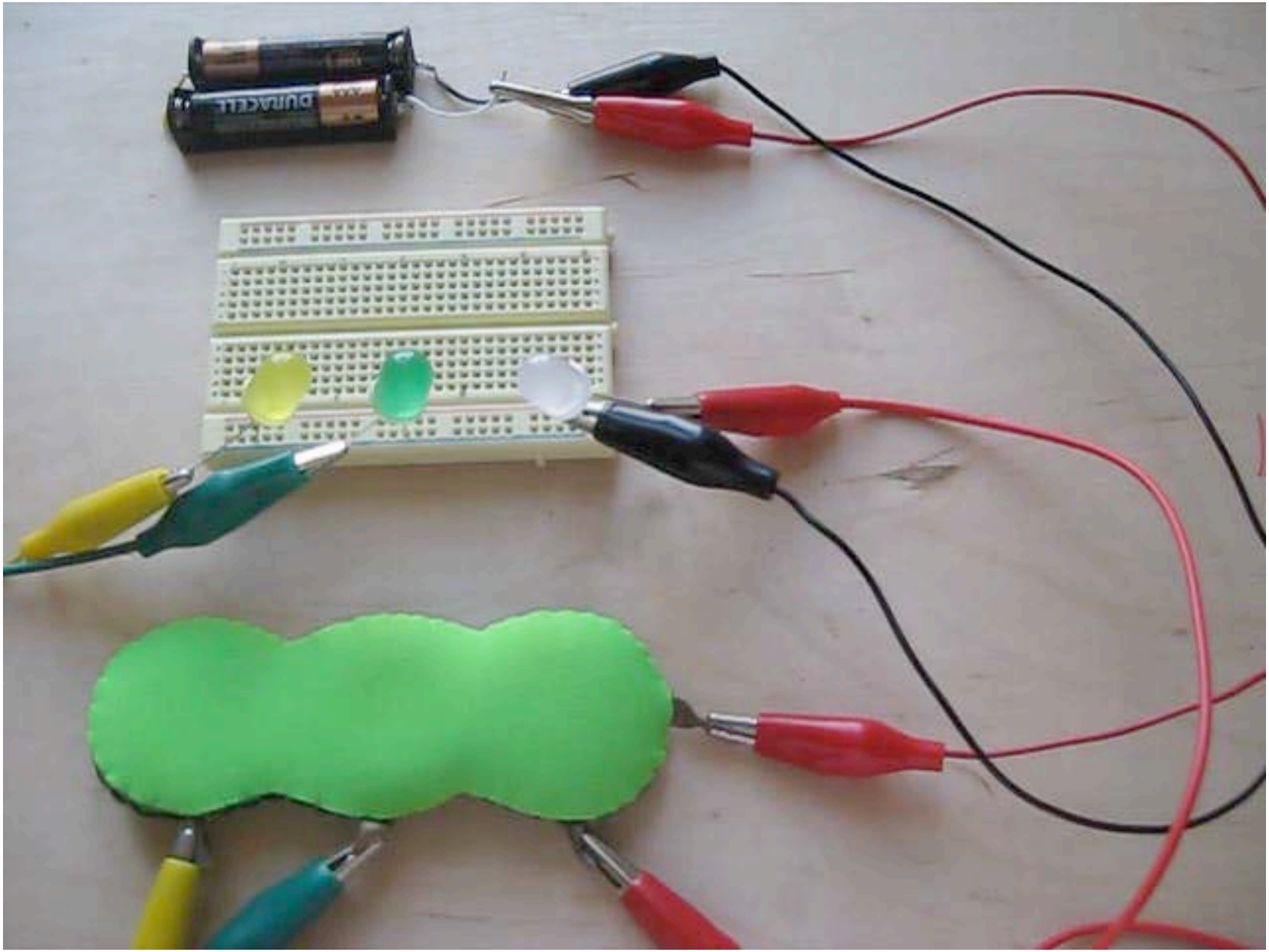


MATERIALS

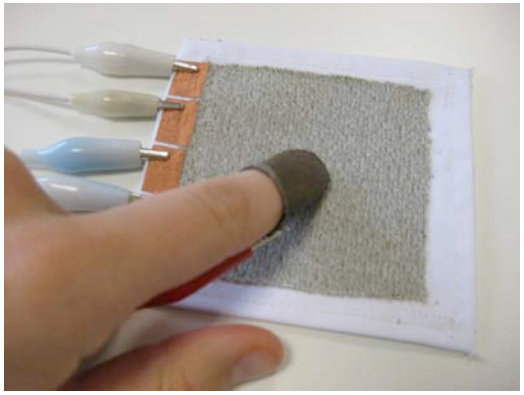
- Neoprene
- Stretch conductive fabric
- Fusible interfacing
- Foam

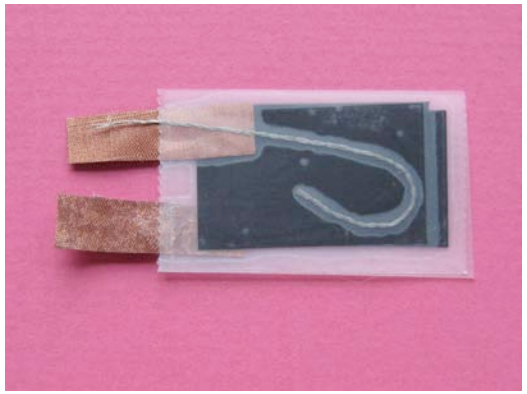
Fabric Button




DURACELL

More Sensors…





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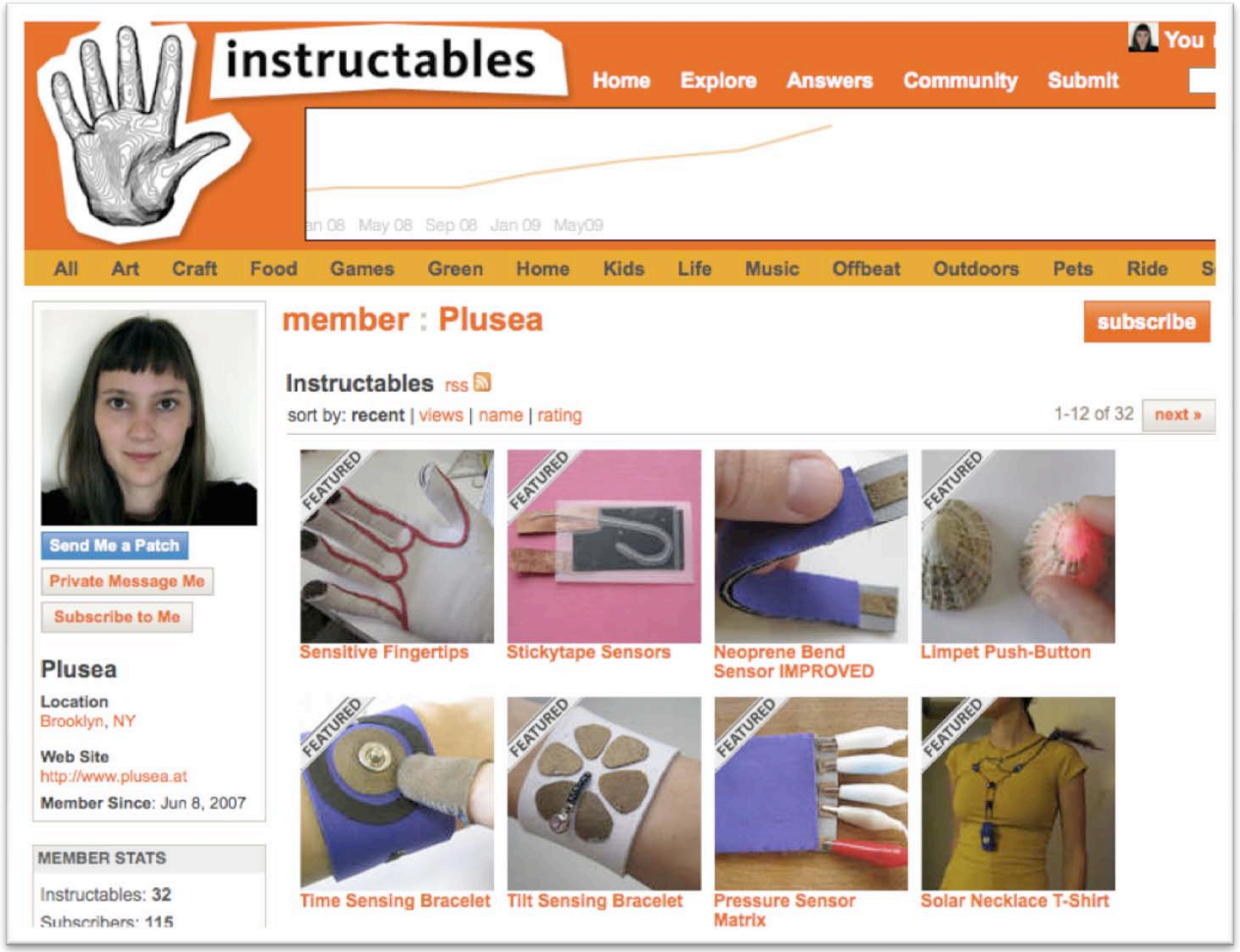
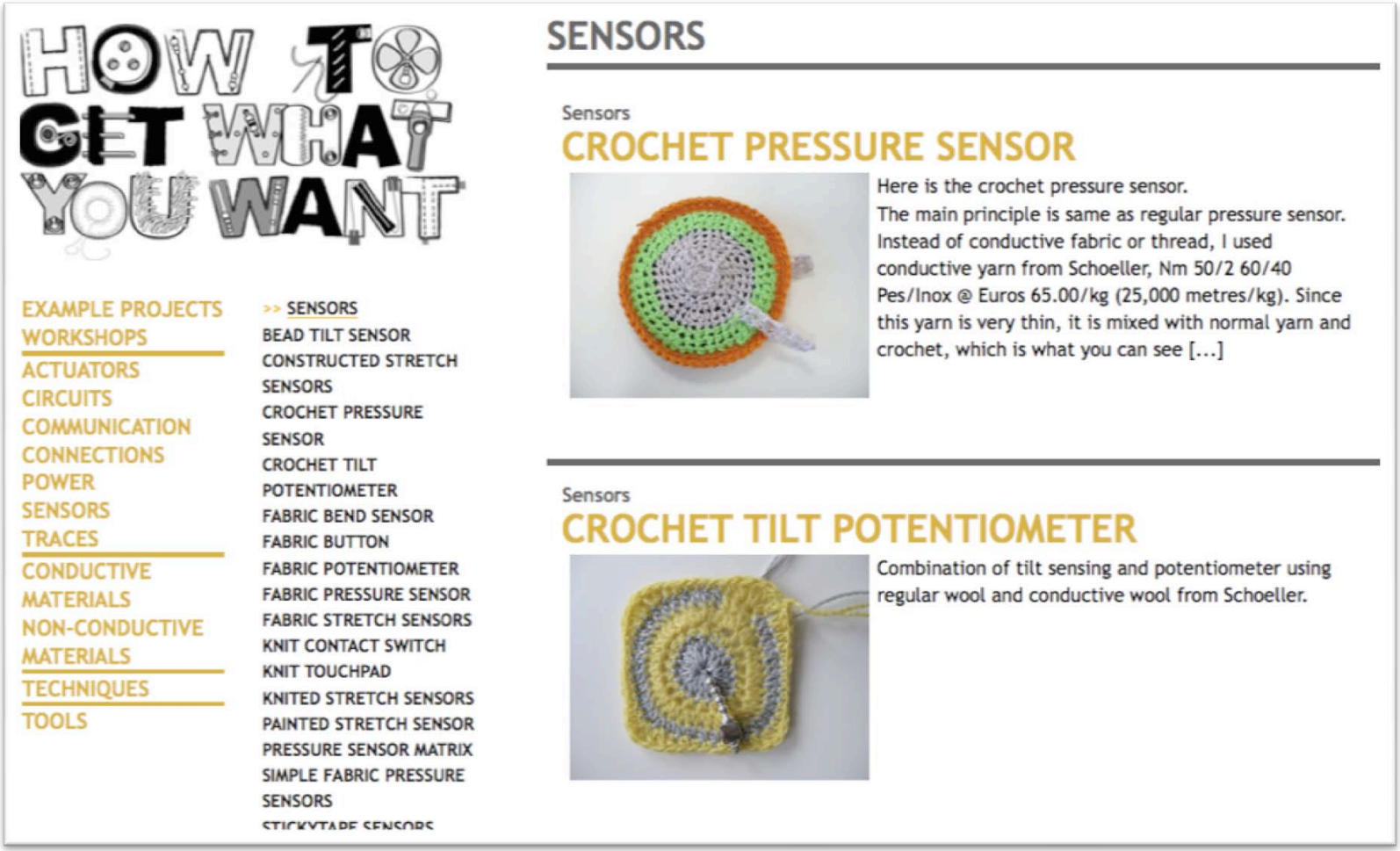
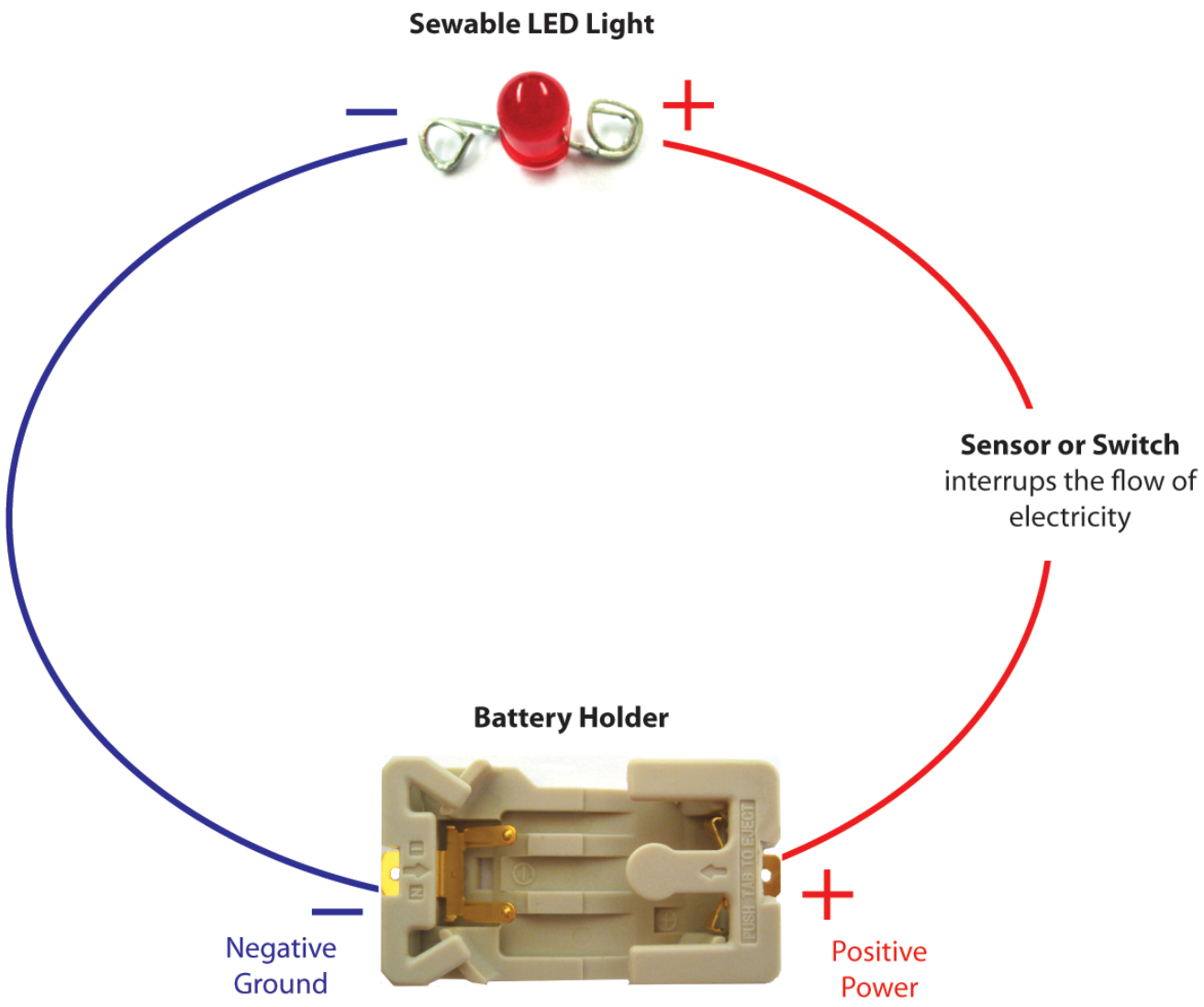
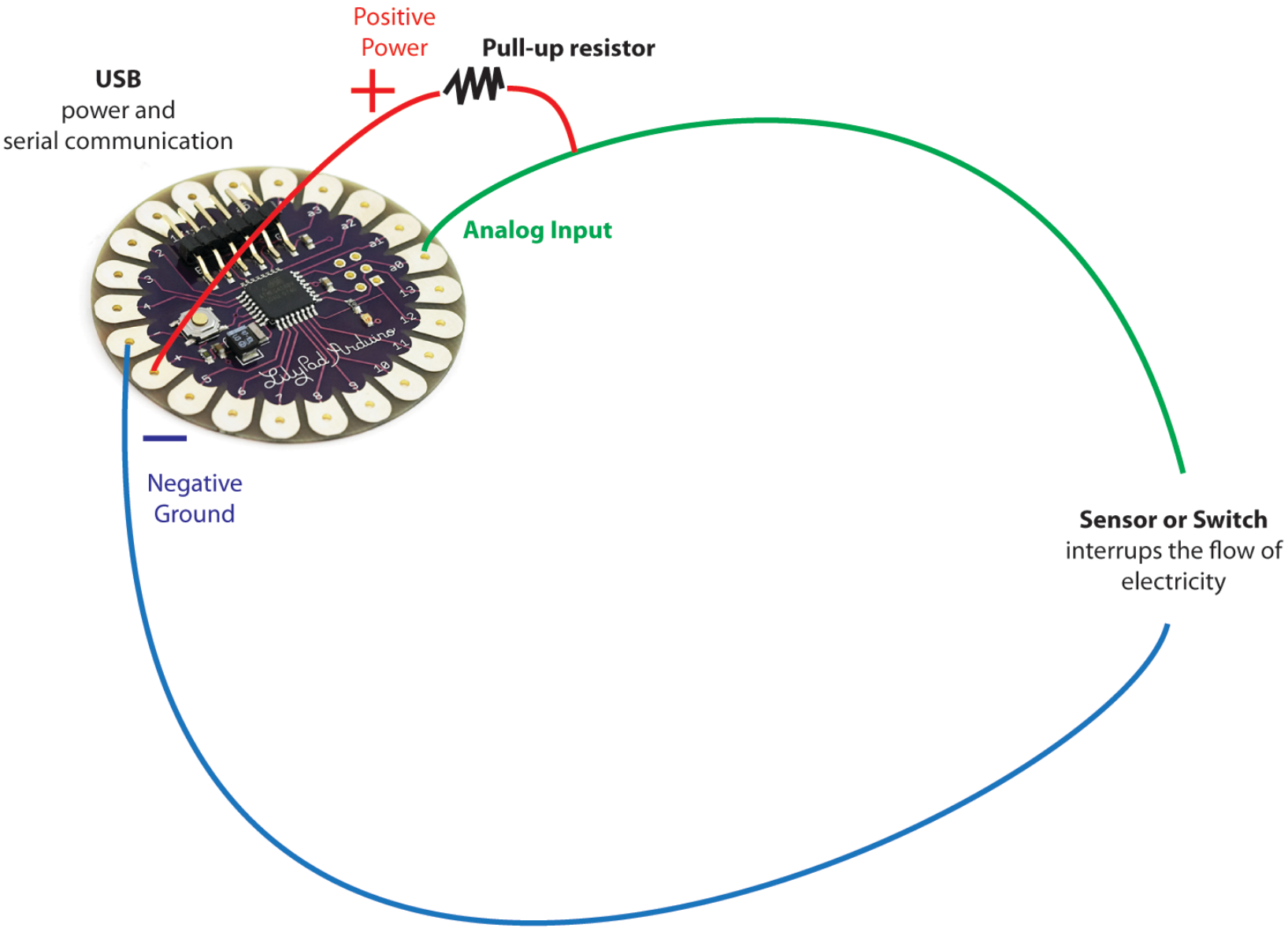
www.instructables.com/member/Plusea

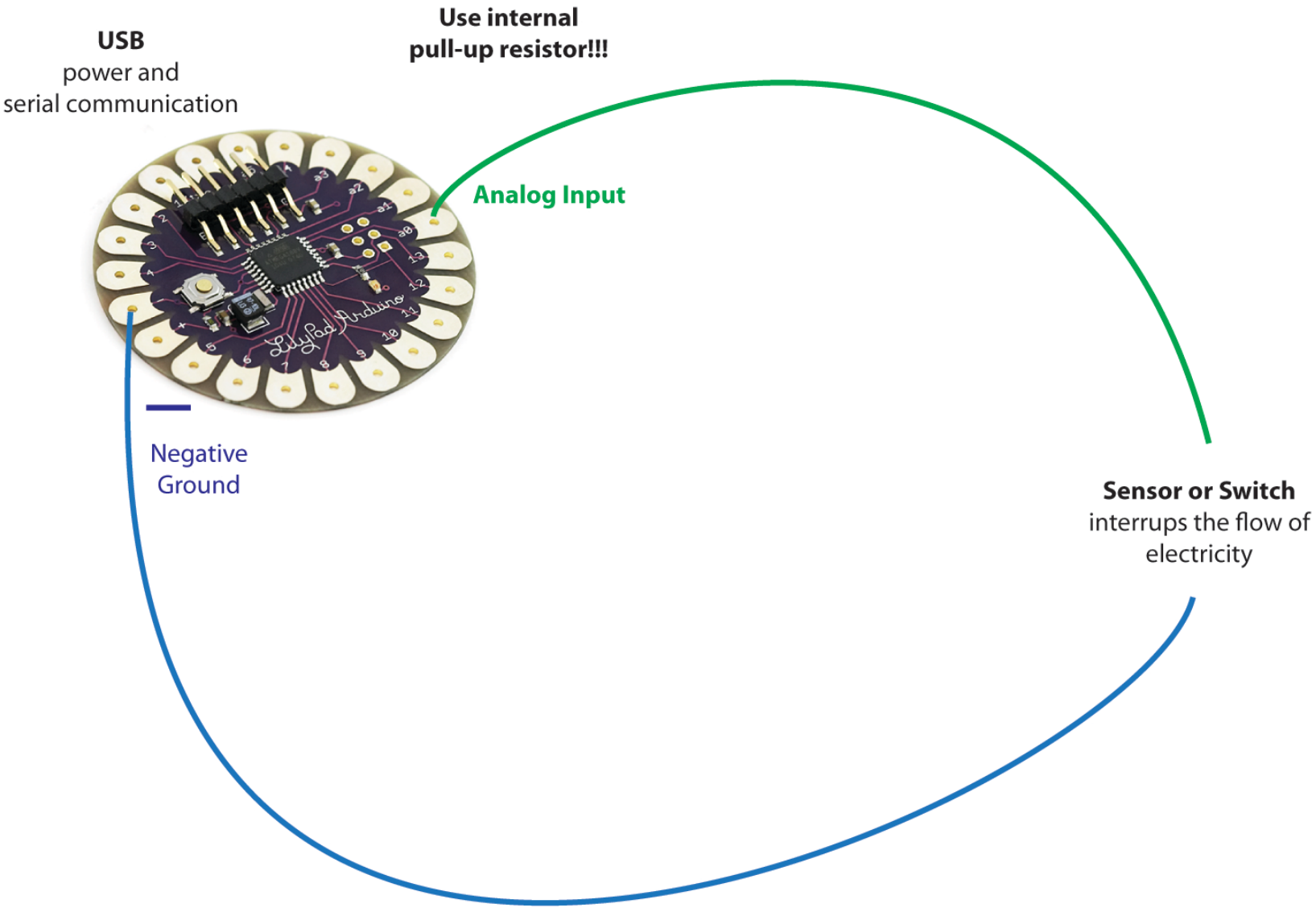


www.KOBAKANT.at/DIY




Sewable LED Light
−
+
Sensor or Switch
interrupts the flow of
electricity
Battery Holder
Negative
Ground
Positive
Power


Positive
Power
Pull-up resistor
USB
power and
serial communication
Analog Input
Negative
Ground
Sensor or Switch
interrups the flow of
electricity


USB
power and
serial communication
Use internal
pull-up resistor!!!
Analog Input
Negative
Ground
Sensor or Switch
interrups the flow of
electricity

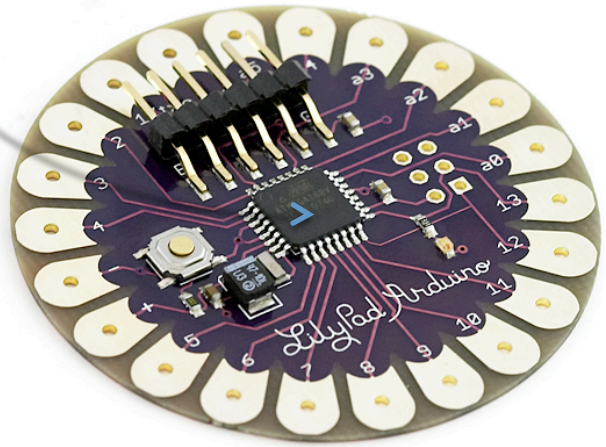
Arduino LilyPad

Blink | Arduino 0017

Blink §

```
int ledPin =  13;    // LED connected to digital pin 13

// The setup() method runs once, when the sketch starts

void setup()   {
  // initialize the digital pin as an output:
  pinMode(ledPin, OUTPUT);
}

// the loop() method runs over and over again,
// as long as the Arduino has power

void loop()
{
  digitalWrite(ledPin, HIGH);   // set the LED on
  delay(1000);                  // wait for a second
  digitalWrite(ledPin, LOW);    // set the LED off
  delay(1000);                  // wait for a second
}
```

1



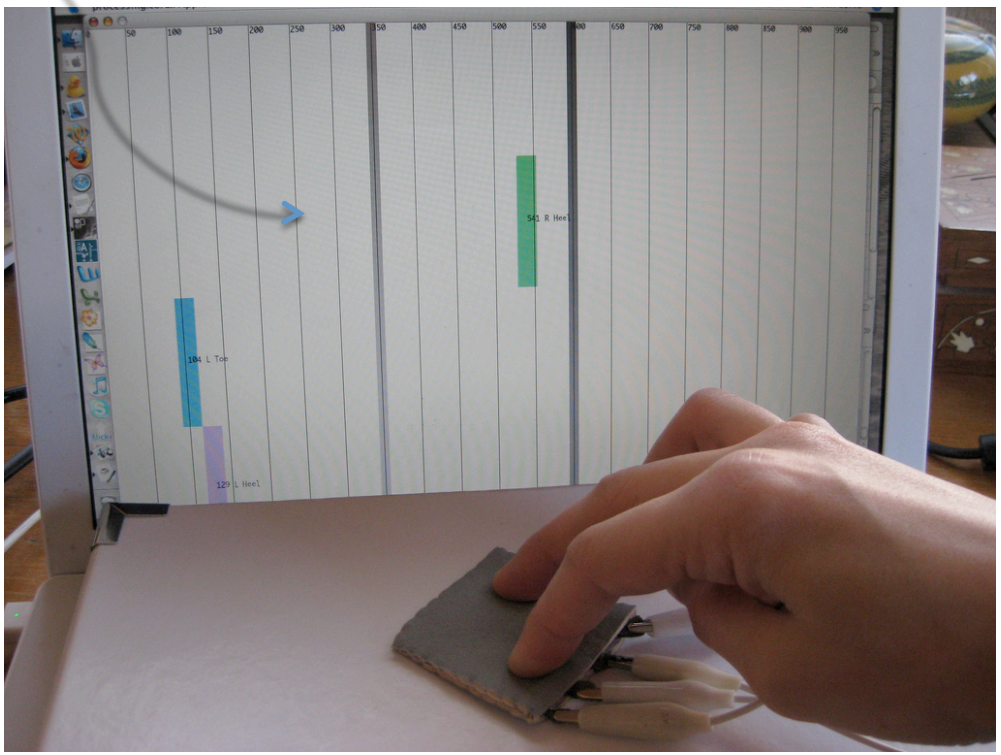
Processing

Graph_1AnIN | Processing 1.0.9

Graph_1AnIN | serialEvent | thresHolding | thresholdGraph

```
/*
*  By Hannah Perner-Wilson, www.plusea.at
*
*  IMPORTANT: Scroll down to set your thresholds!
*/

import processing.serial.*;

// definition of window size
// you can change the size of the window as you like
// the thresholdGraph will be scaled to fit
// the optimal size for the thresholdGraph is 1000 x 400
int xWidth = 1200;
int yHeight = 800;

// xPos input array, using prefix
int[] xPosArr= {0};

//
int[] messageArr= {0};

// Arrays for threshholding
int[] threshMax= {0};
int[] threshMin= {0};

// variables for serial connection. portname and baudrate are user specific
Serial port1;

//Set your serial port here (look at list printed when you run the applicati
String V3 = Serial.list()[0];
String portname1 = V3;
int baudrate = 9600;
```

1



Links

Download Arduino programming environment from:

>> www.arduino.cc

(Install FTDI drivers, included in download)

Download Processing programming environment from:

>> www.processing.org

Download Arduino and Processing code for Graph:

>> www.arduino.cc/en/Tutorial/Graph

Thank you

plusea@mit.edu

www.plusea.at

www.hlt.media.mit.edu

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