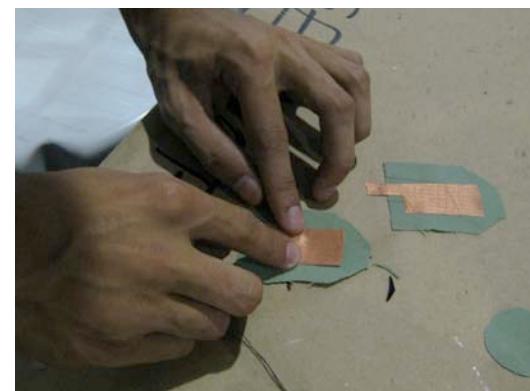




Handcrafting Textile Sensors from Scratch



Materials

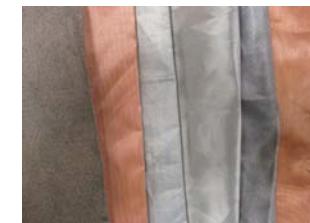
Conductive

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



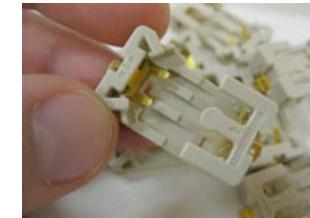
Conductive with high resistance (resistive)

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



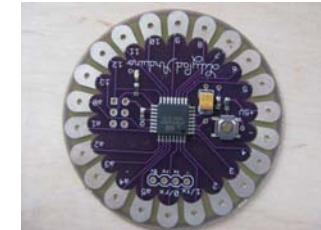
Non-Conductive (isolating)

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



Tools

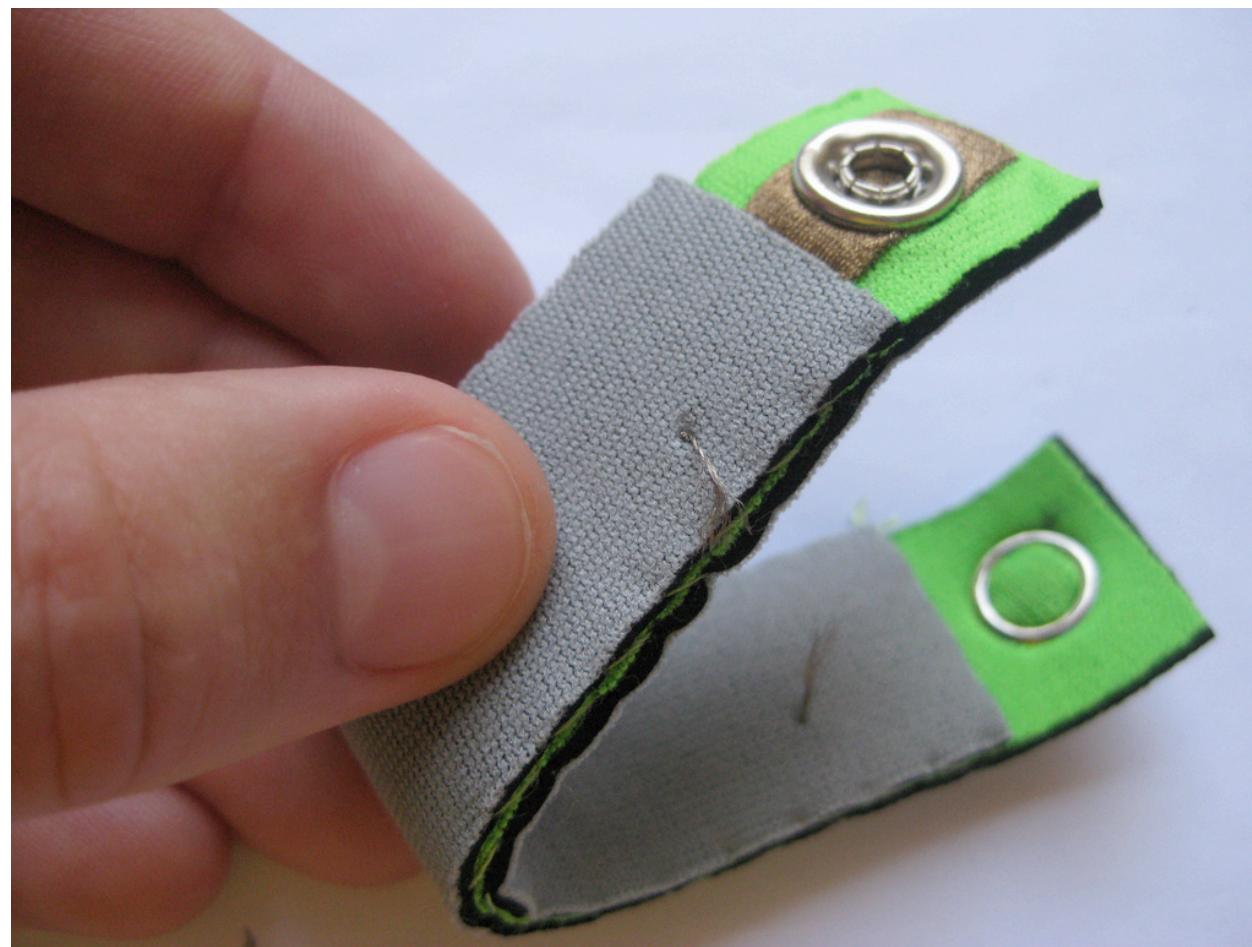
- Sewing needles
- Knitting needles
- Crochet hooks
- Circular knitting machine
- Spool knitter
- Needle felting tool
- Needle felting mat
- Hole maker
- Iron
- Multimeter
- LilyPad Arduino Mainboard
- LilyPad sewable LEDs



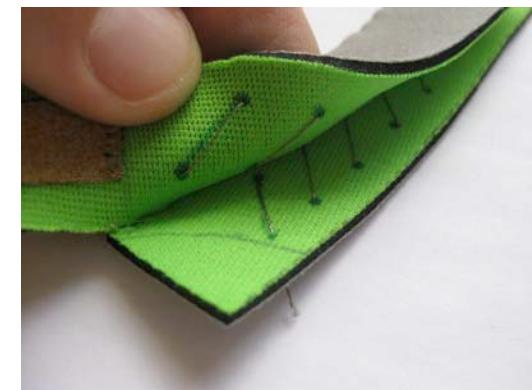
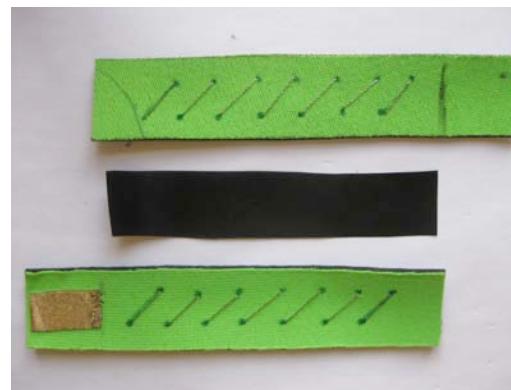
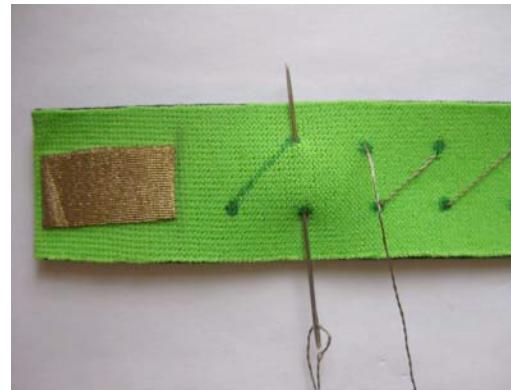
Textile Sensors

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

Bend Sensor



Bend Sensor

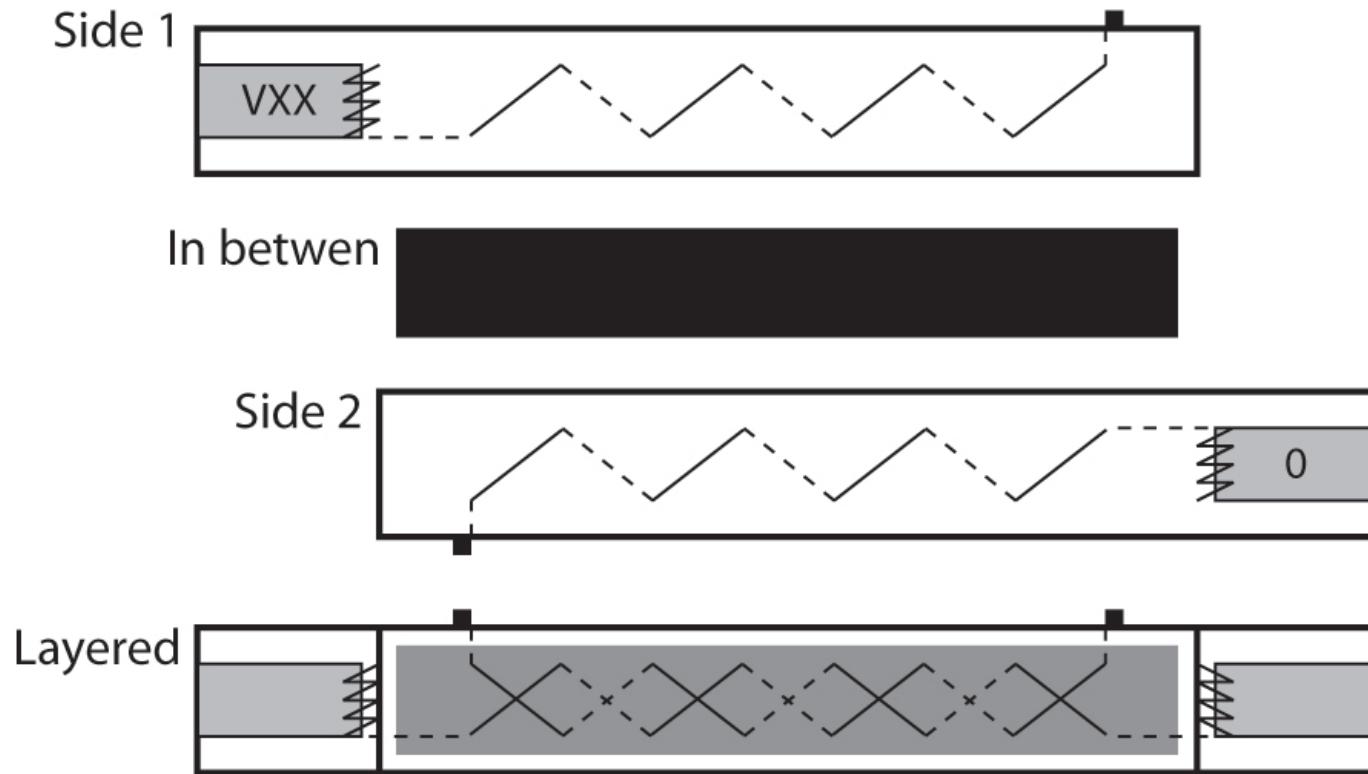


MATERIALS

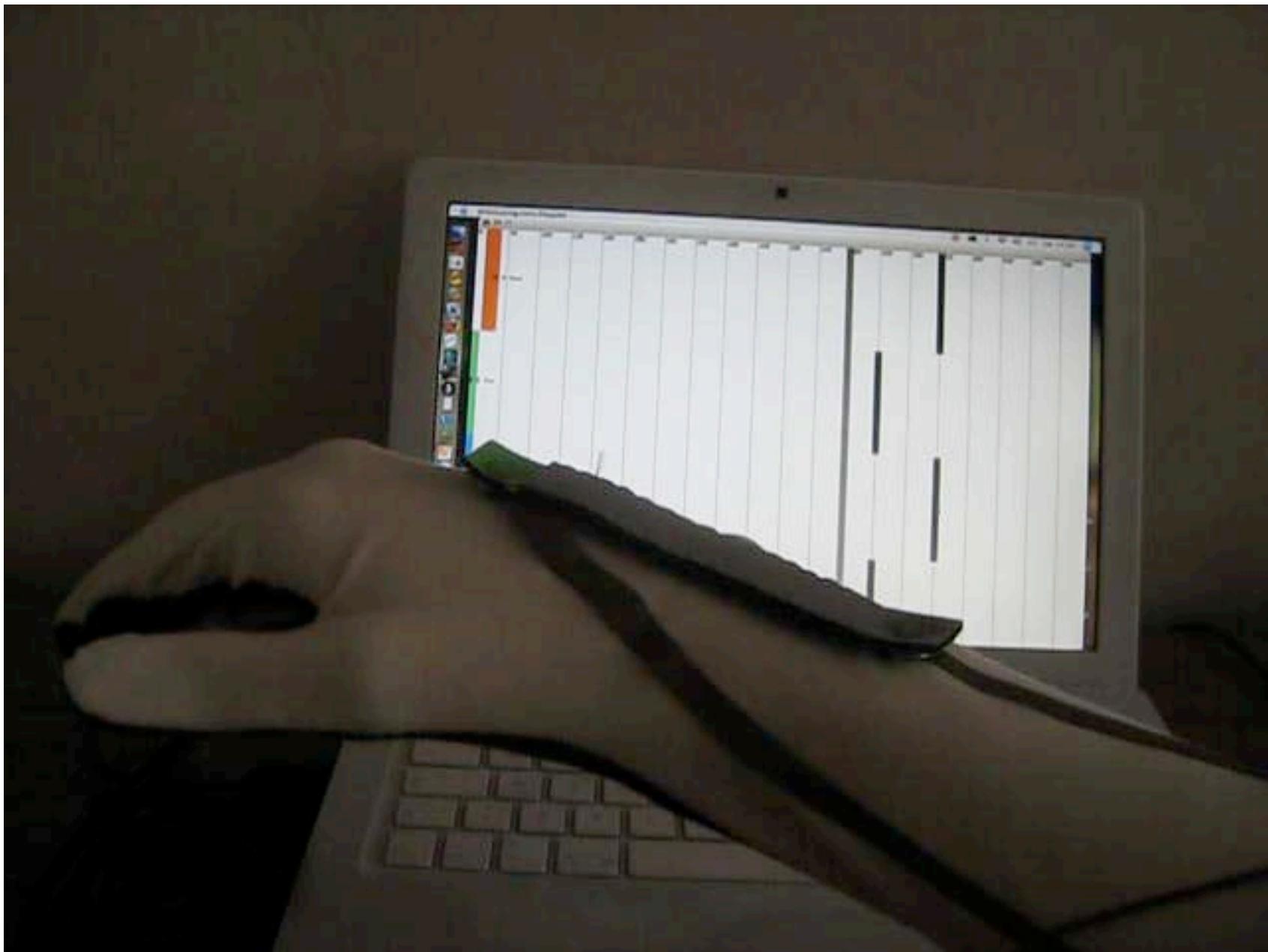
- Neoprene
- Conductive thread
- Stretch conductive fabric
- Fusible interfacing
- Velostat



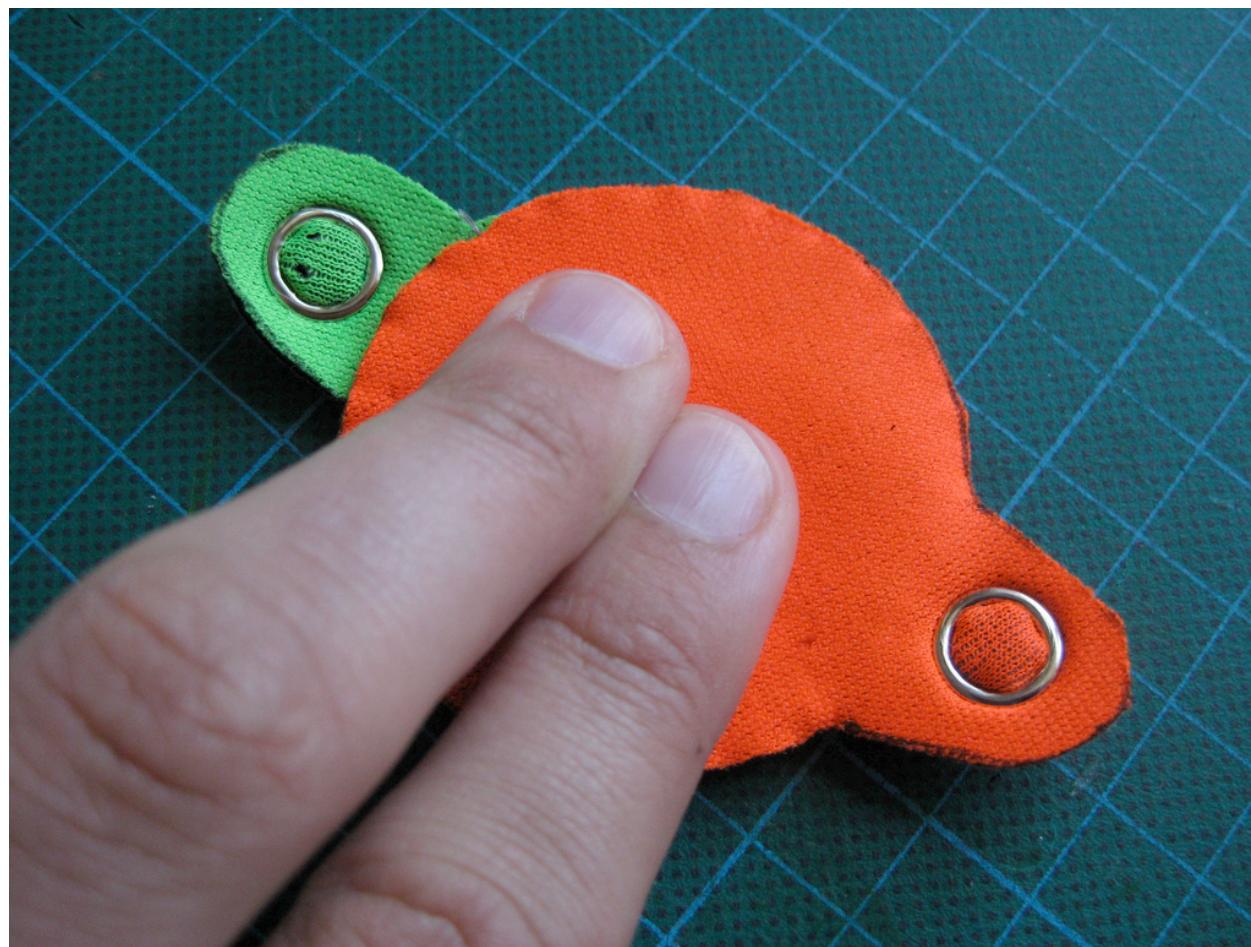
Bend Sensor



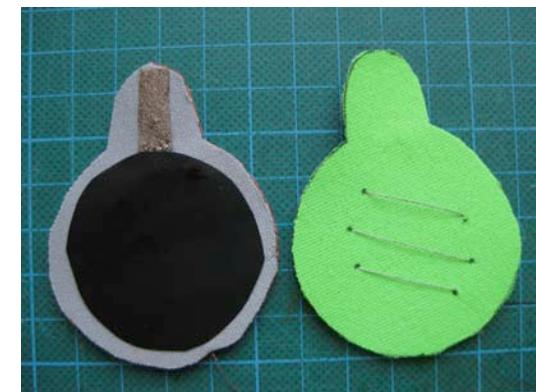
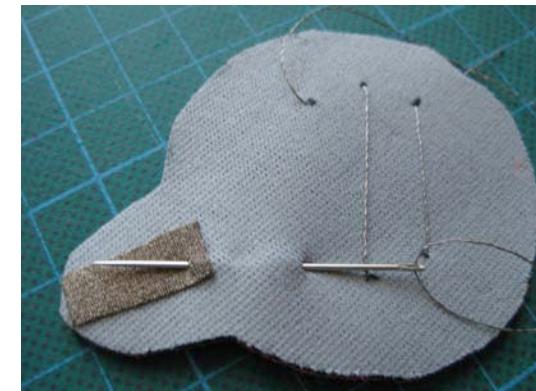
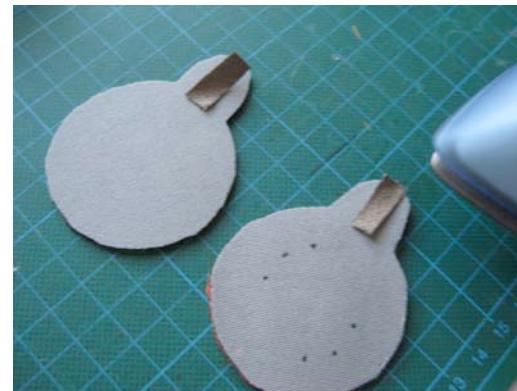
- neoprene
- conductive fabric
- Velostat
- conductive thread
- - - isolated cond. thread
- knot



Pressure Sensor



Pressure Sensor

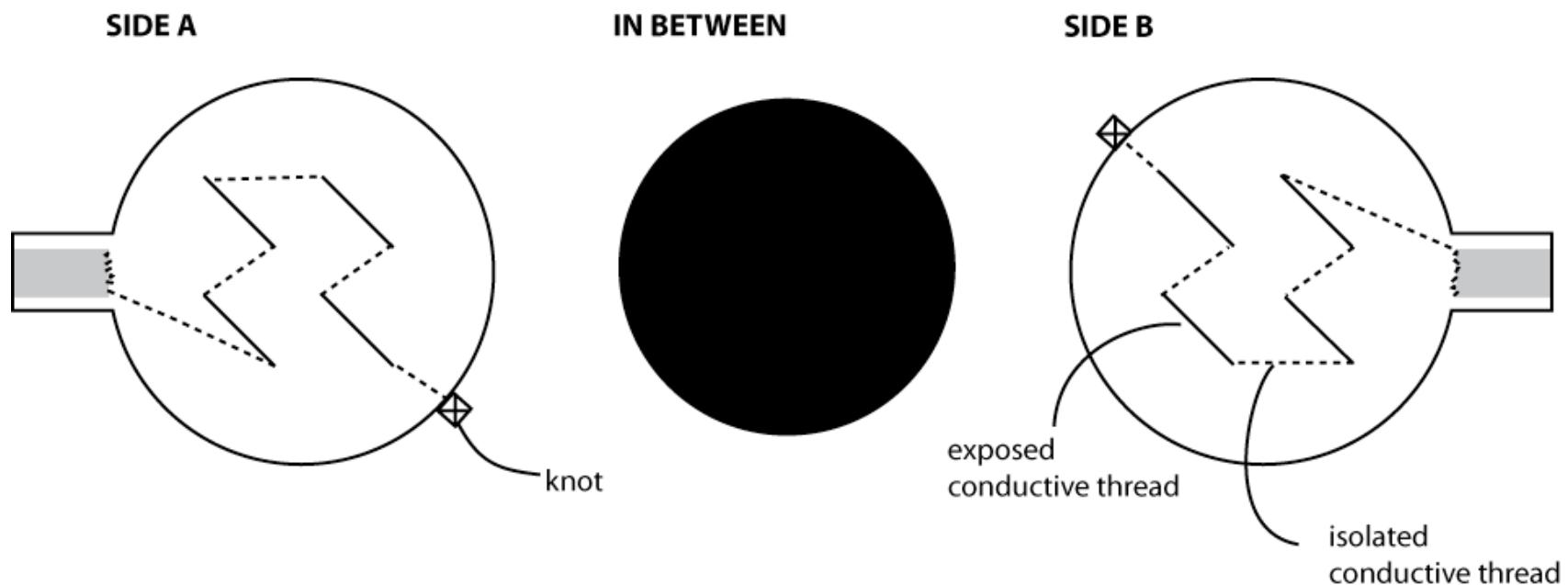


MATERIALS

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

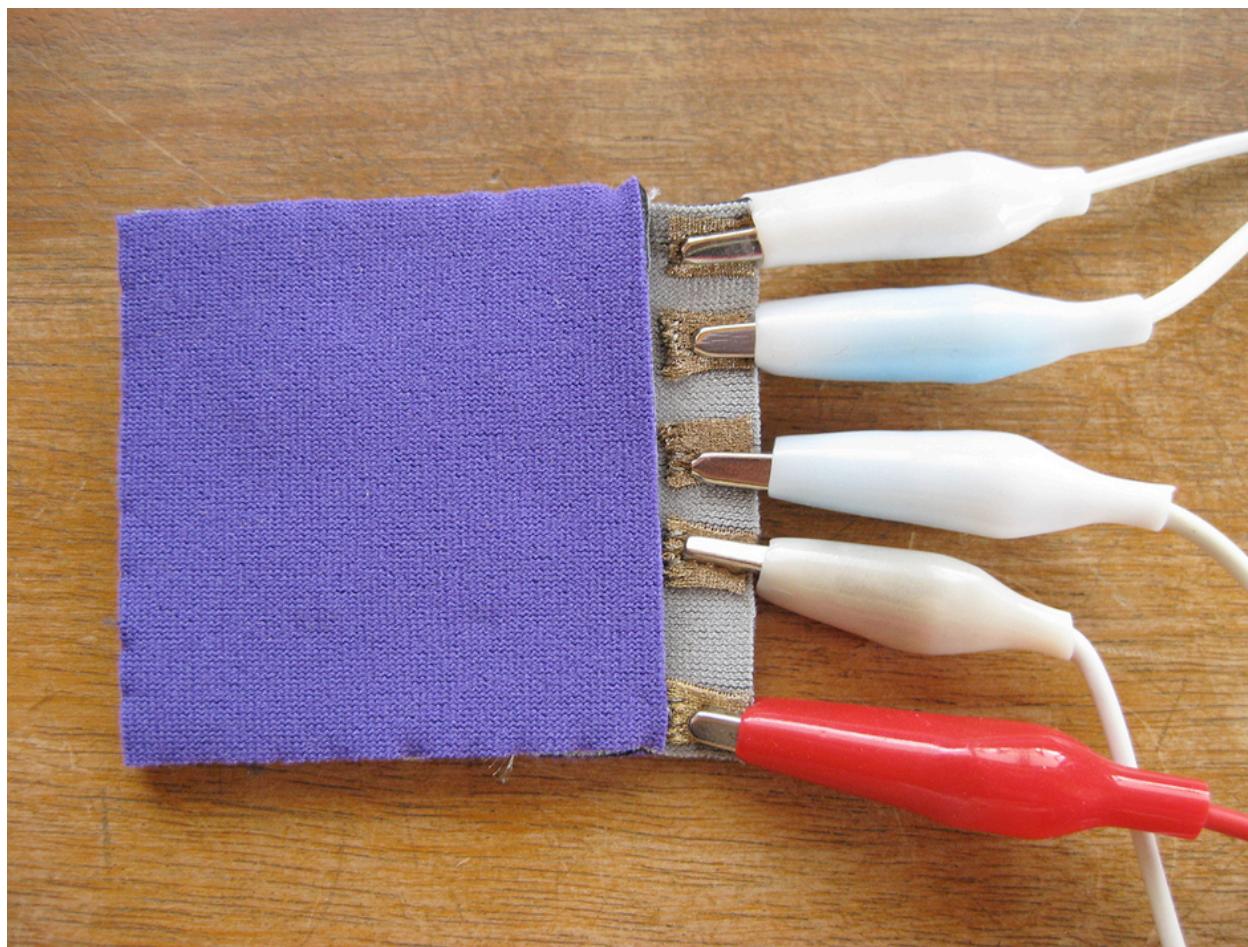


Pressure Sensor

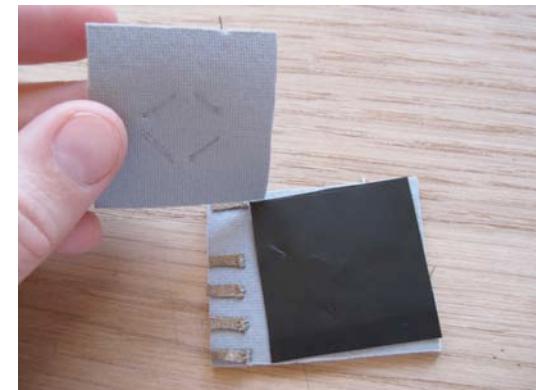
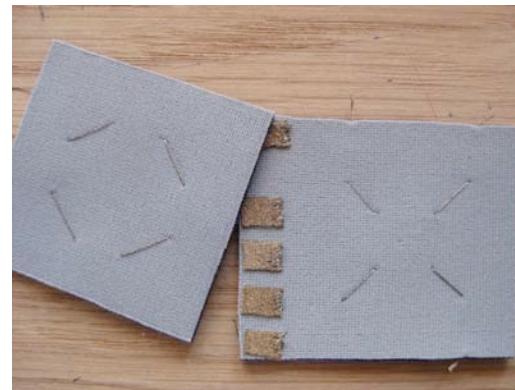
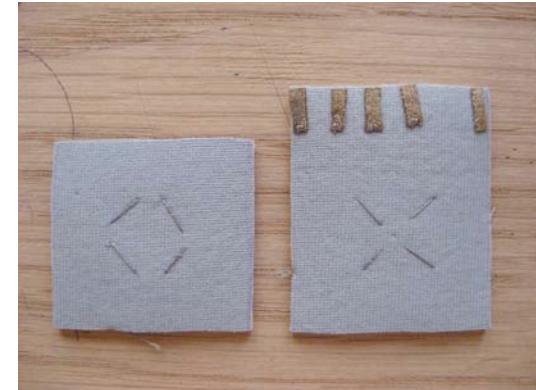
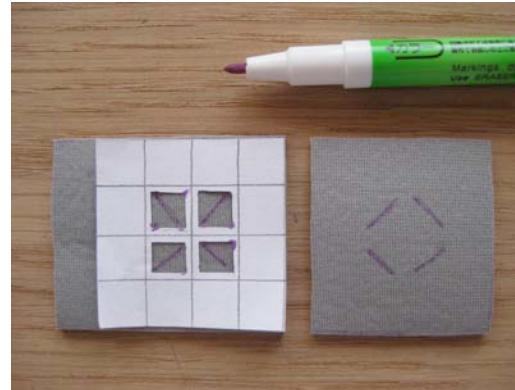




Pressure Sensor Matrix

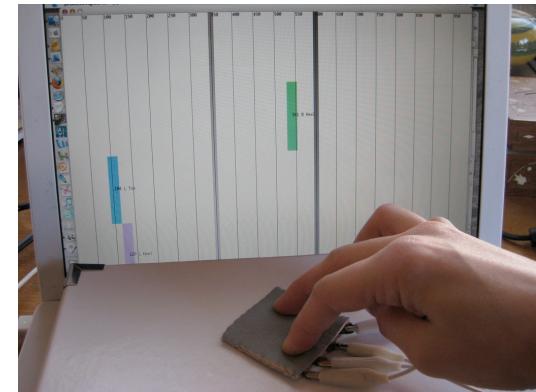


Pressure Sensor Matrix

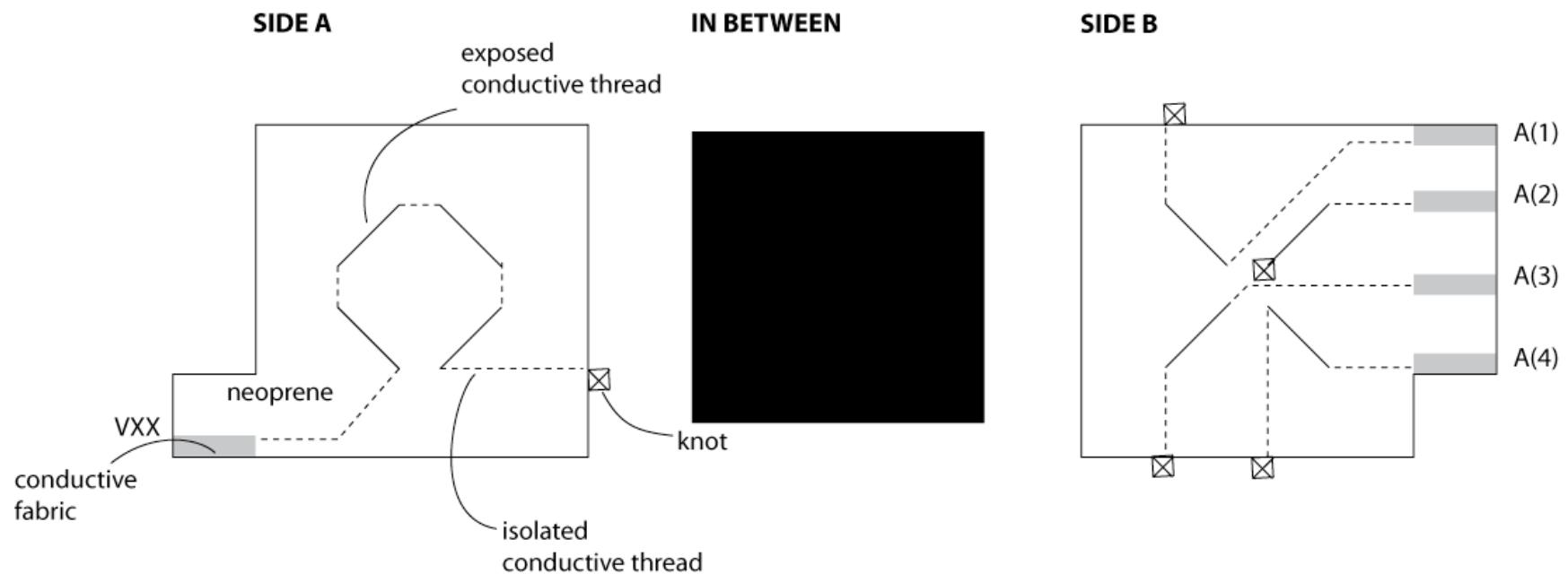


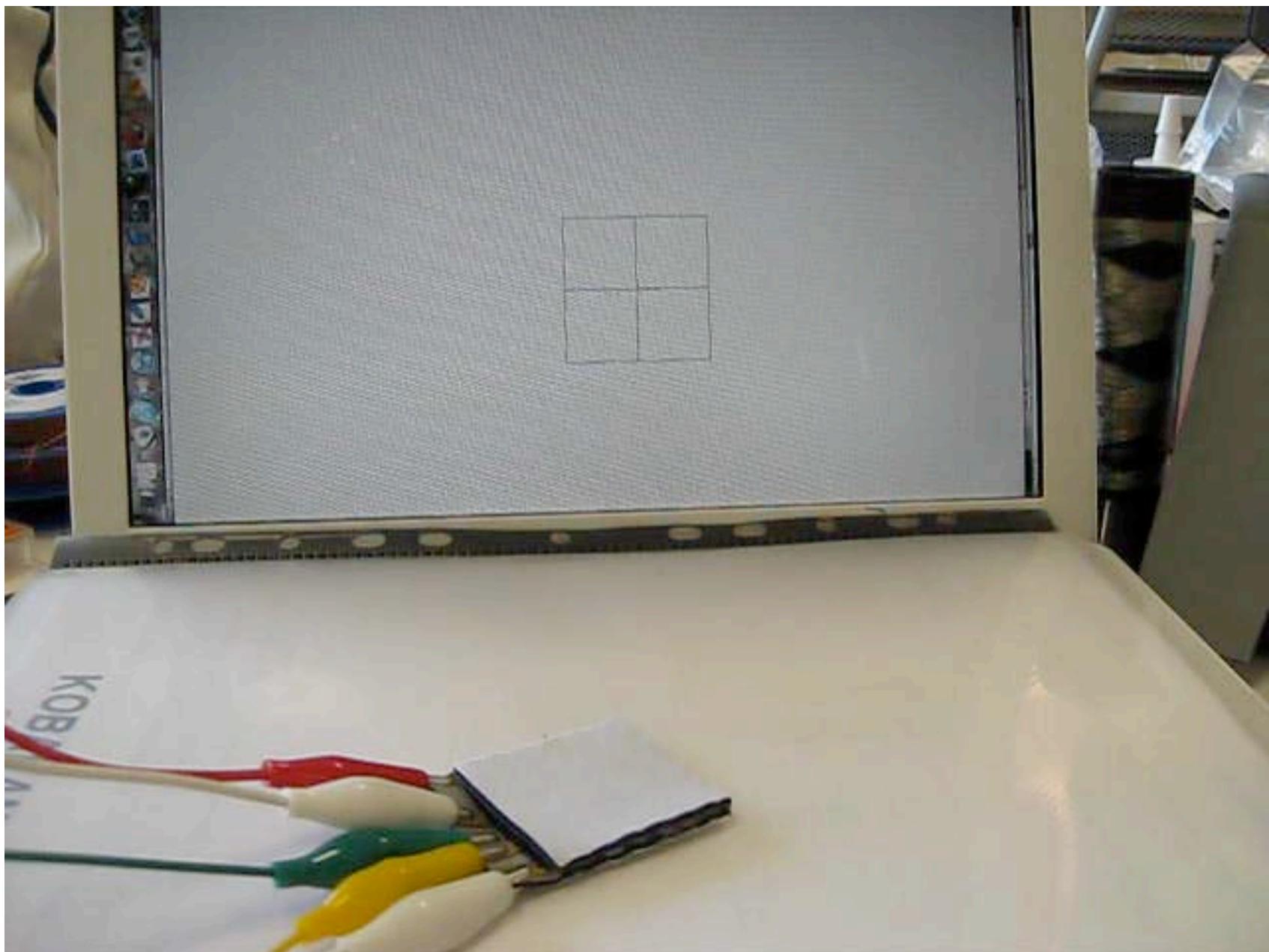
MATERIALS

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



Pressure Sensor Matrix

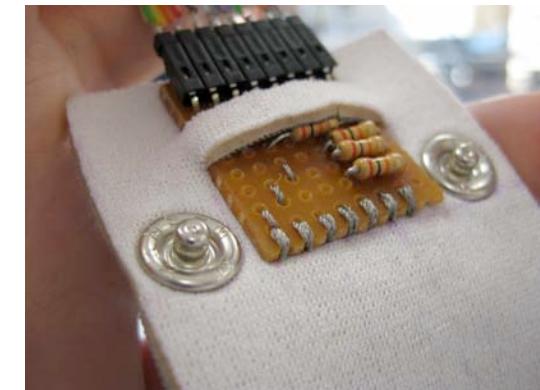
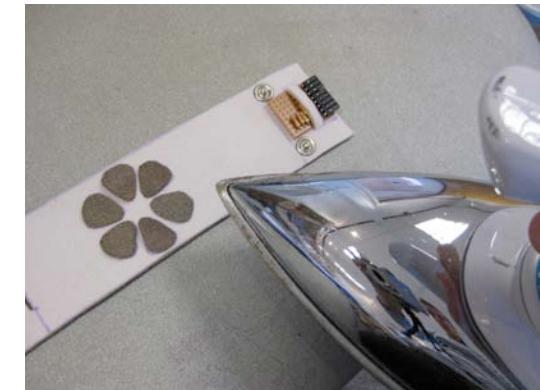




Tilt Sensor



Tilt Sensor

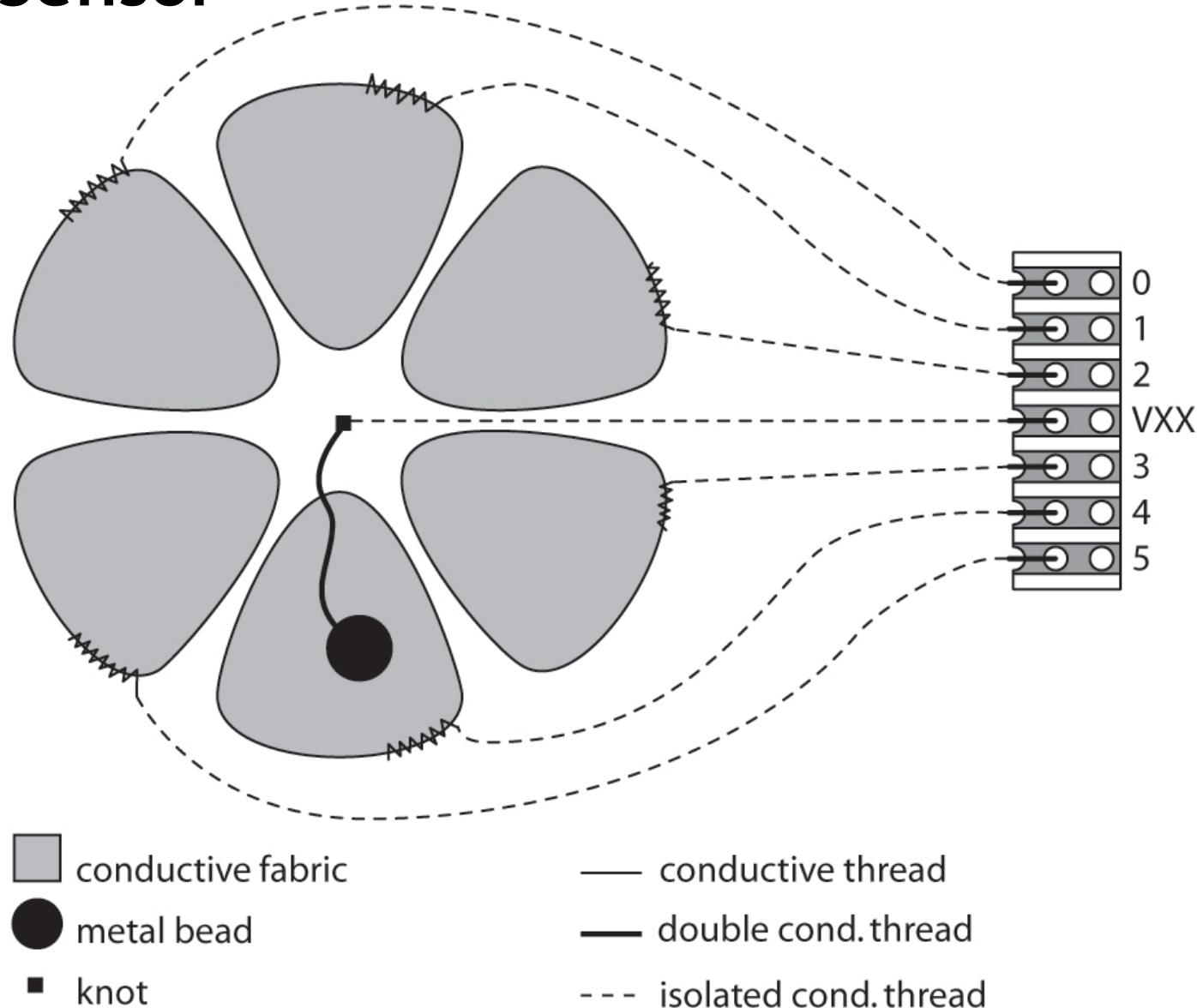


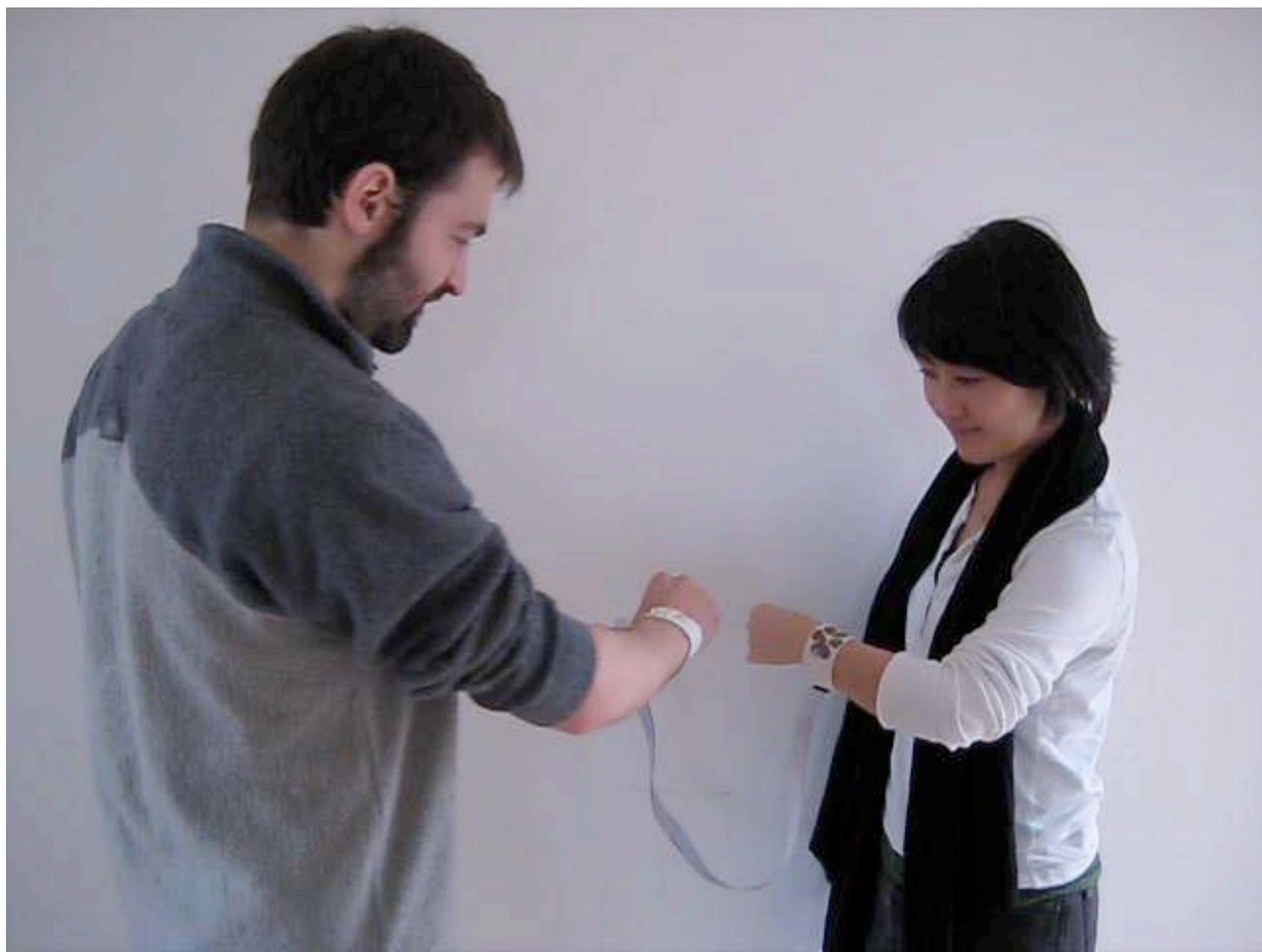
MATERIALS

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



Tilt Sensor

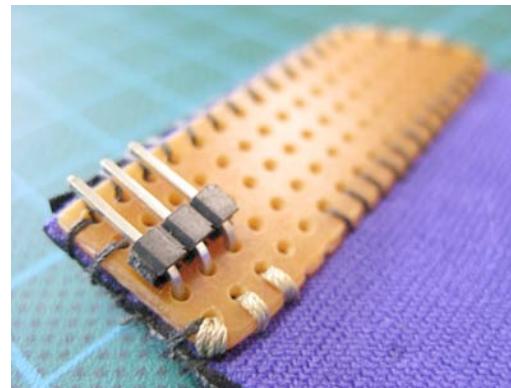
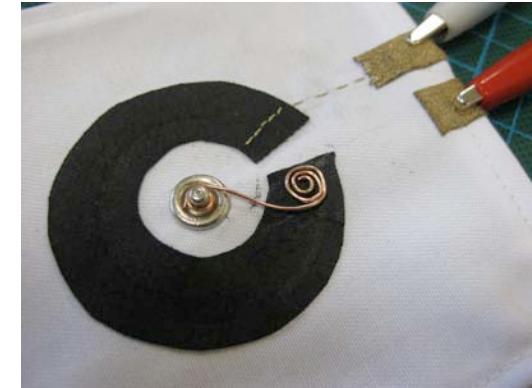




Fabric Potentiometer



Fabric Potentiometer

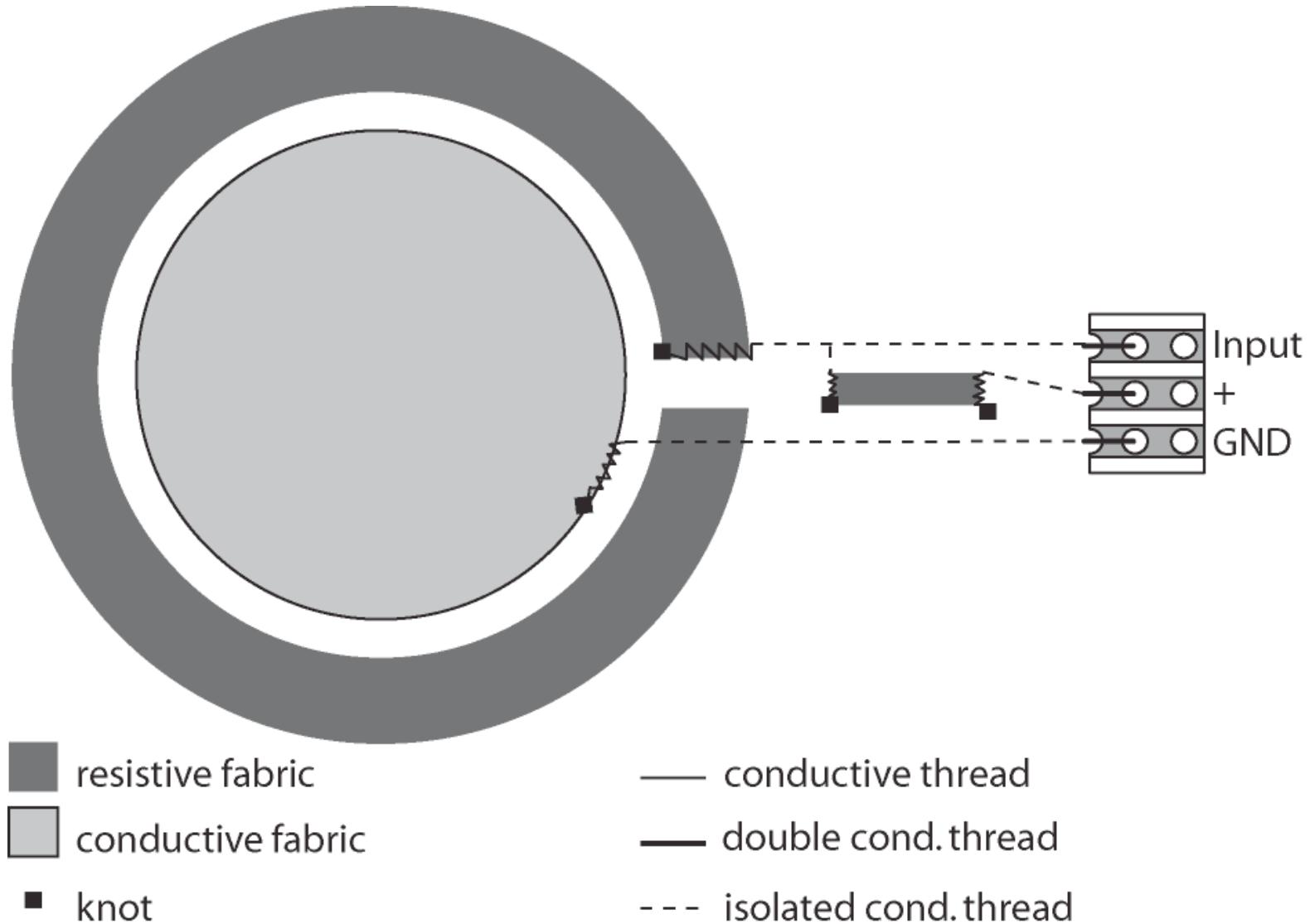


MATERIALS

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

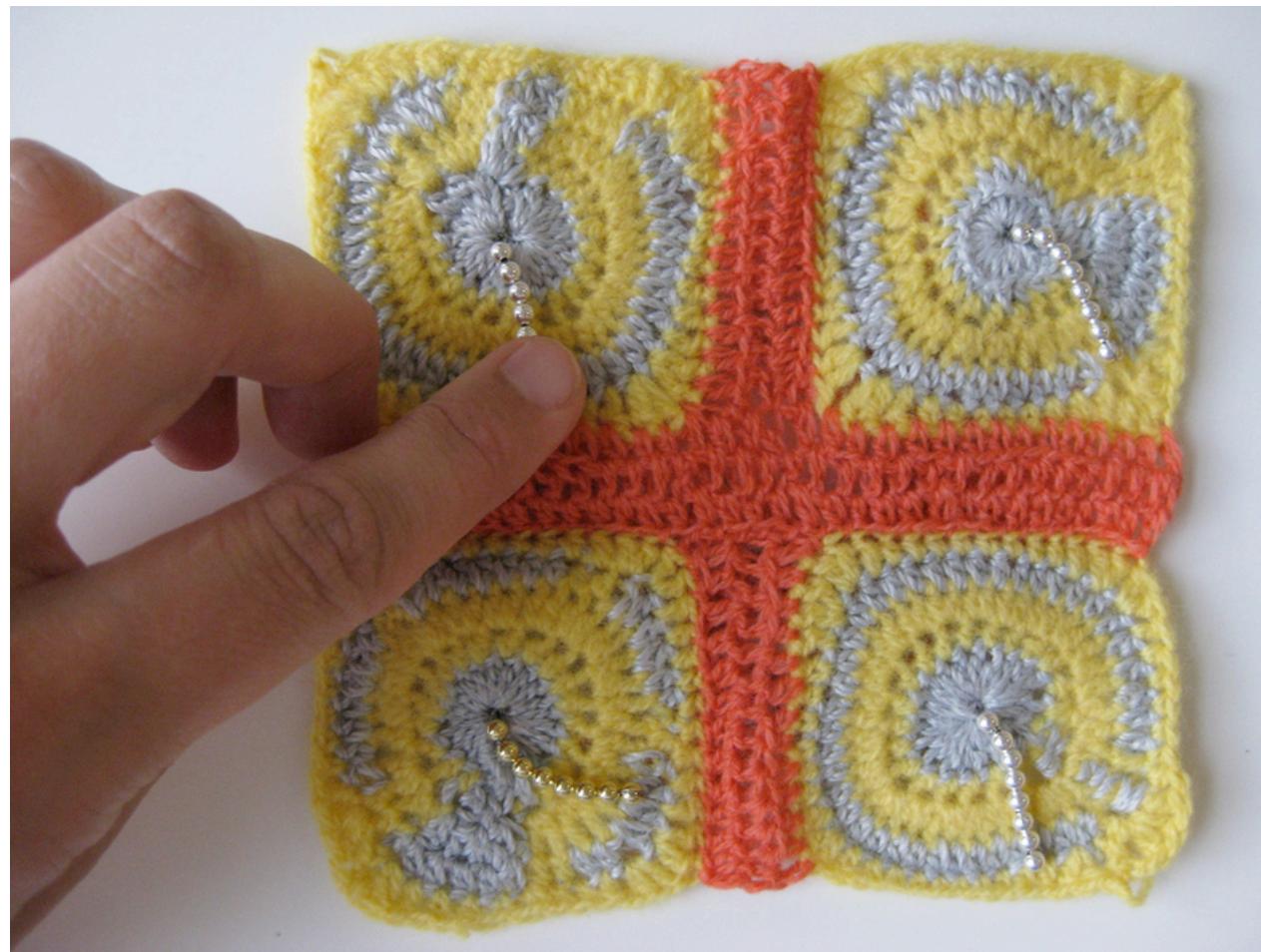


Fabric Potentiometer





Crochet Potentiometer



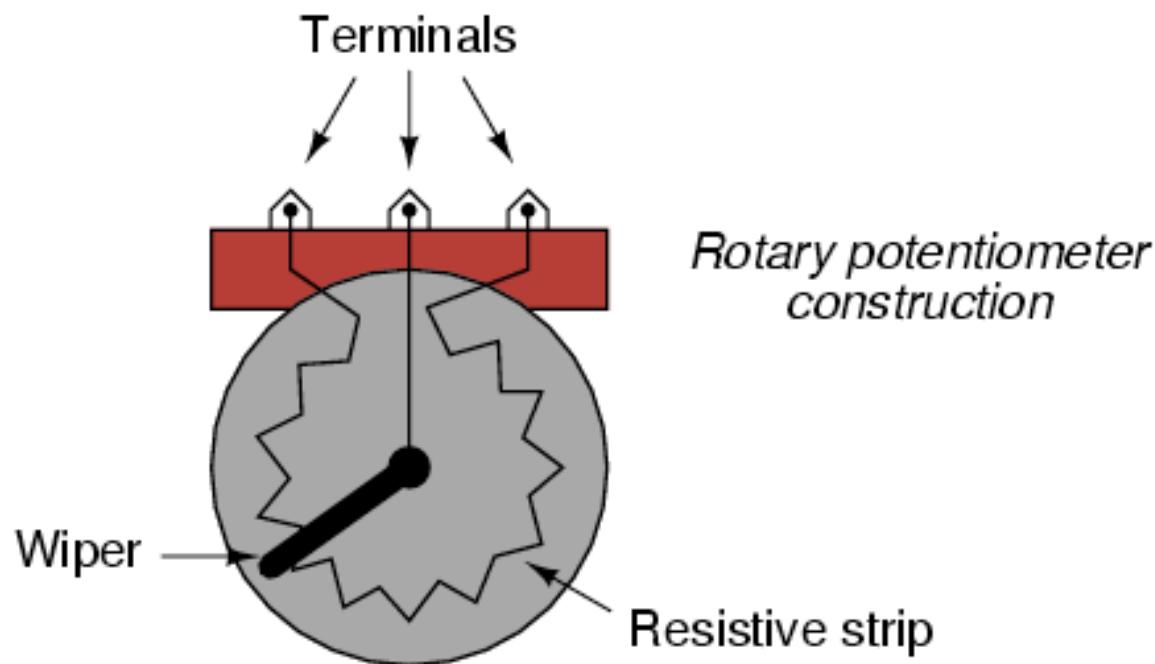
Crochet Potentiometer

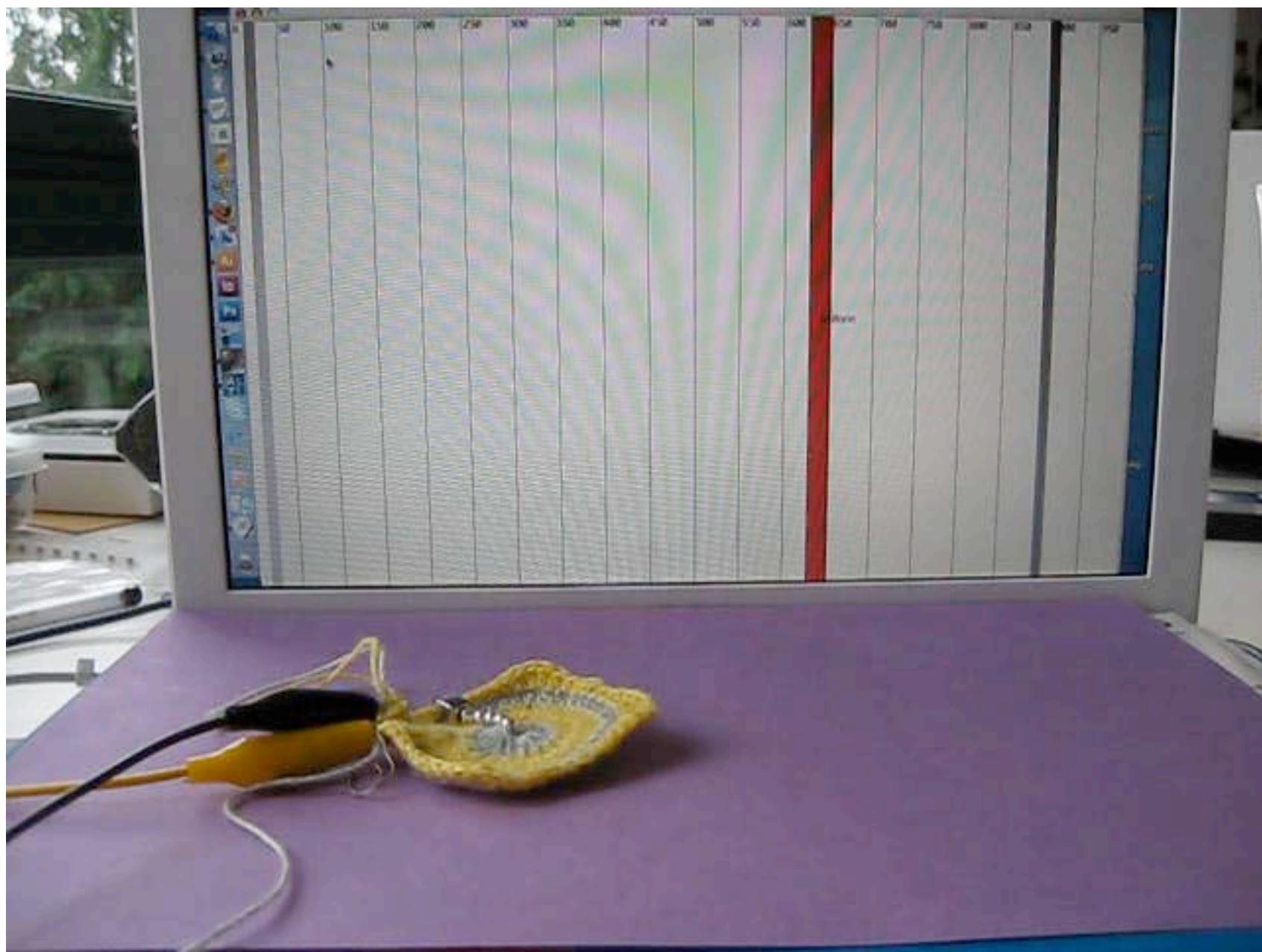


MATERIALS

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

Potentiometer

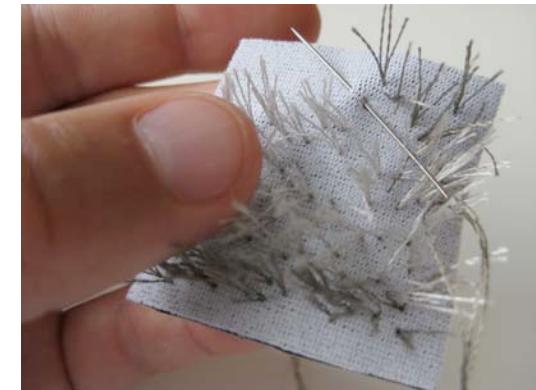




Stroke Sensor



Stroke Sensor

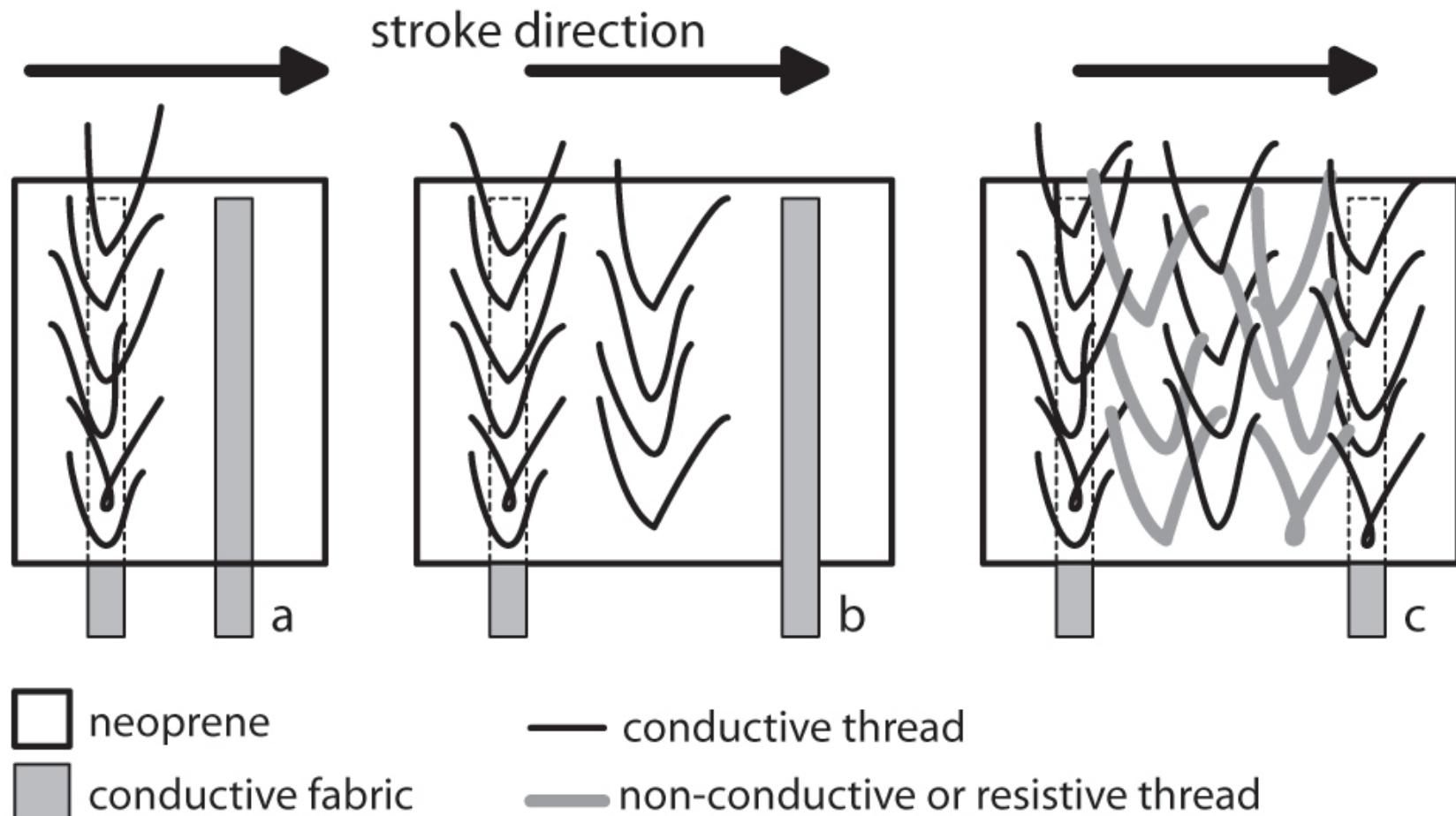


MATERIALS

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

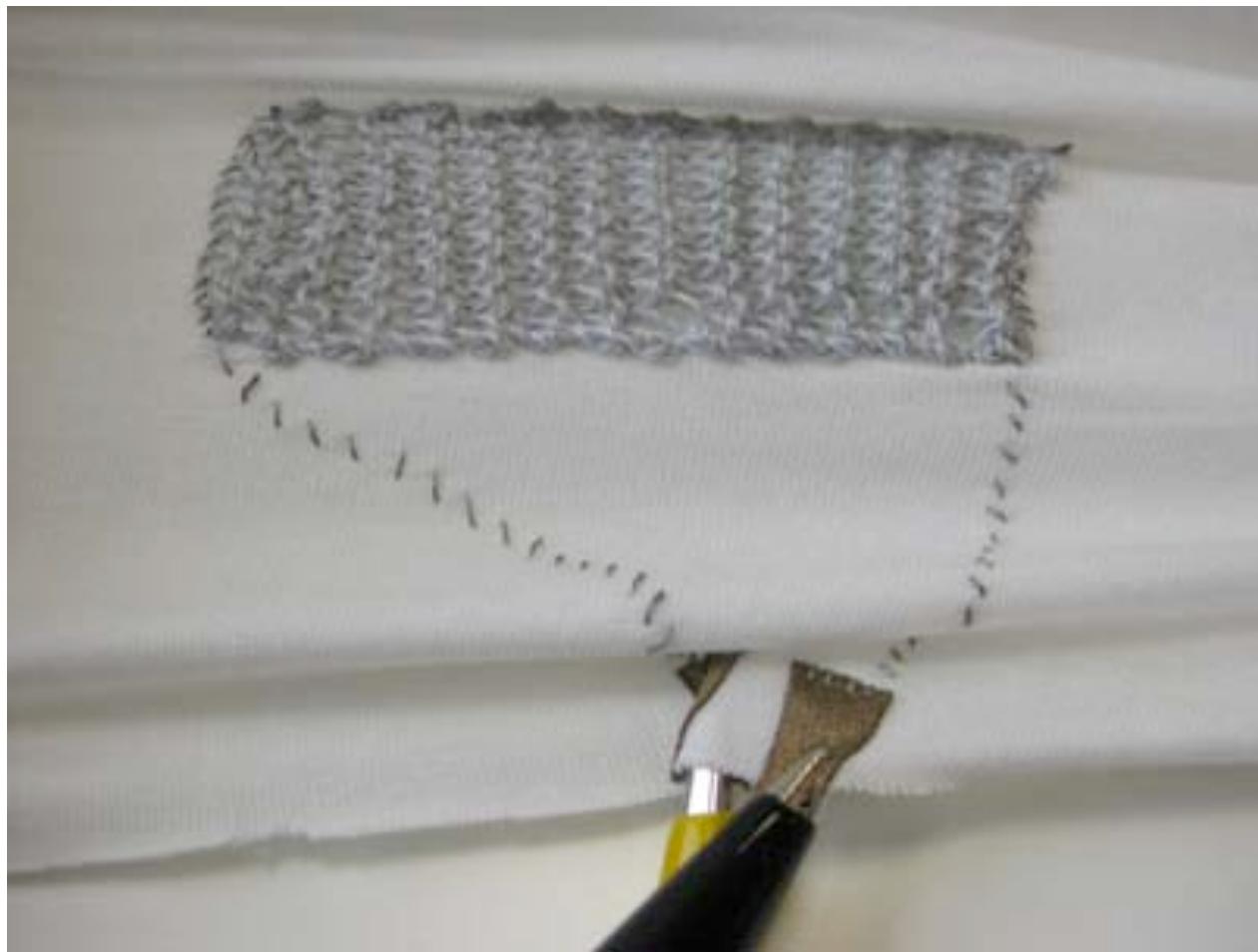


Stroke Sensor

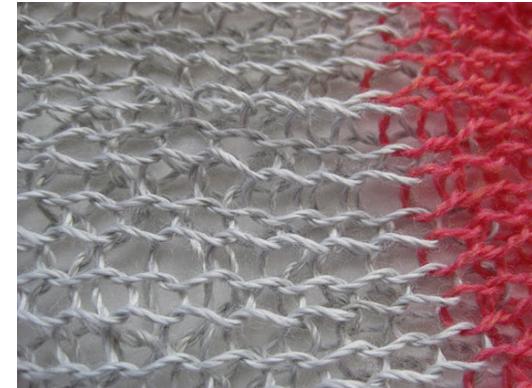


Stroke Sensor - VIDEO

Knit Stretch Sensor



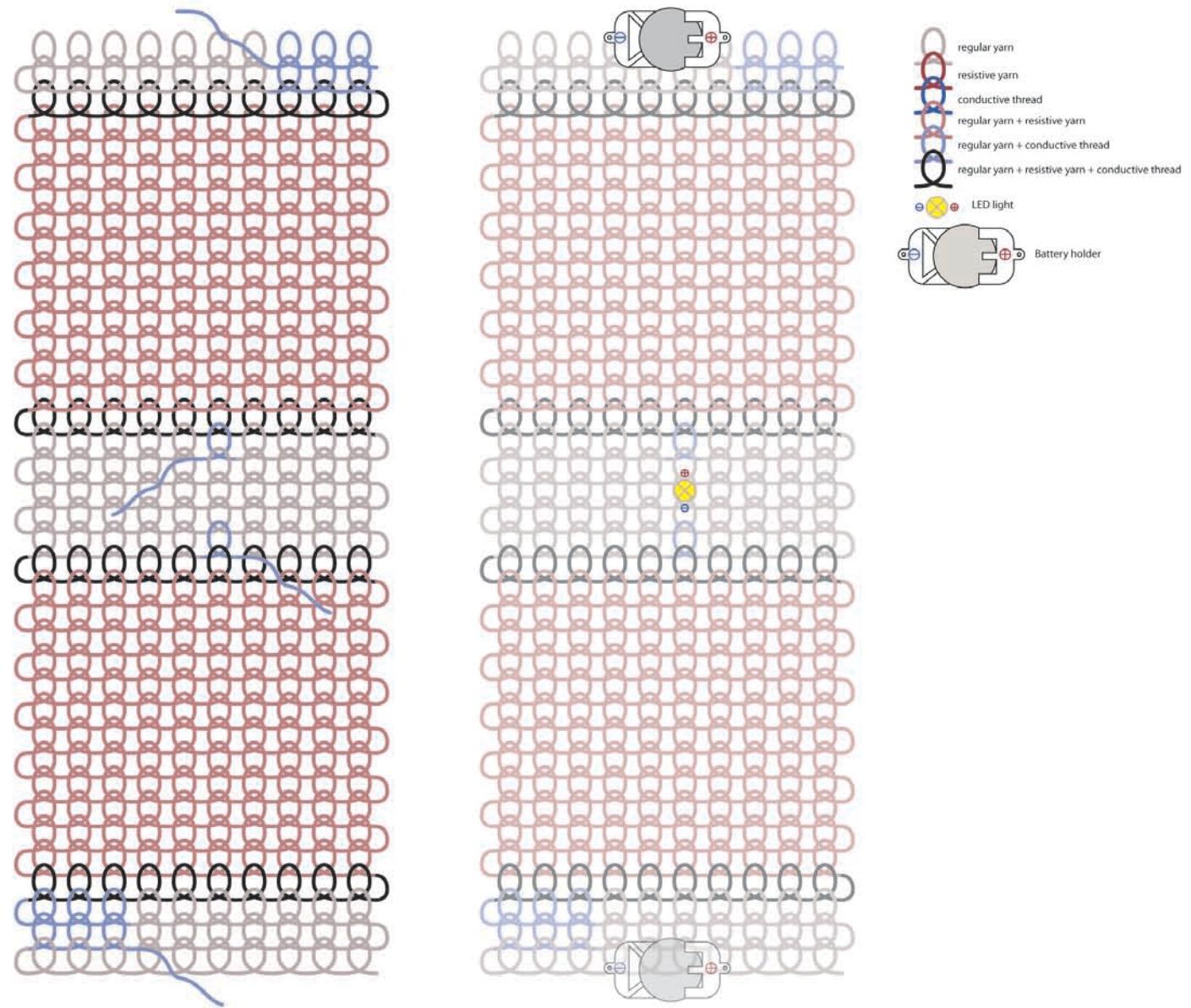
Knit Stretch Sensor

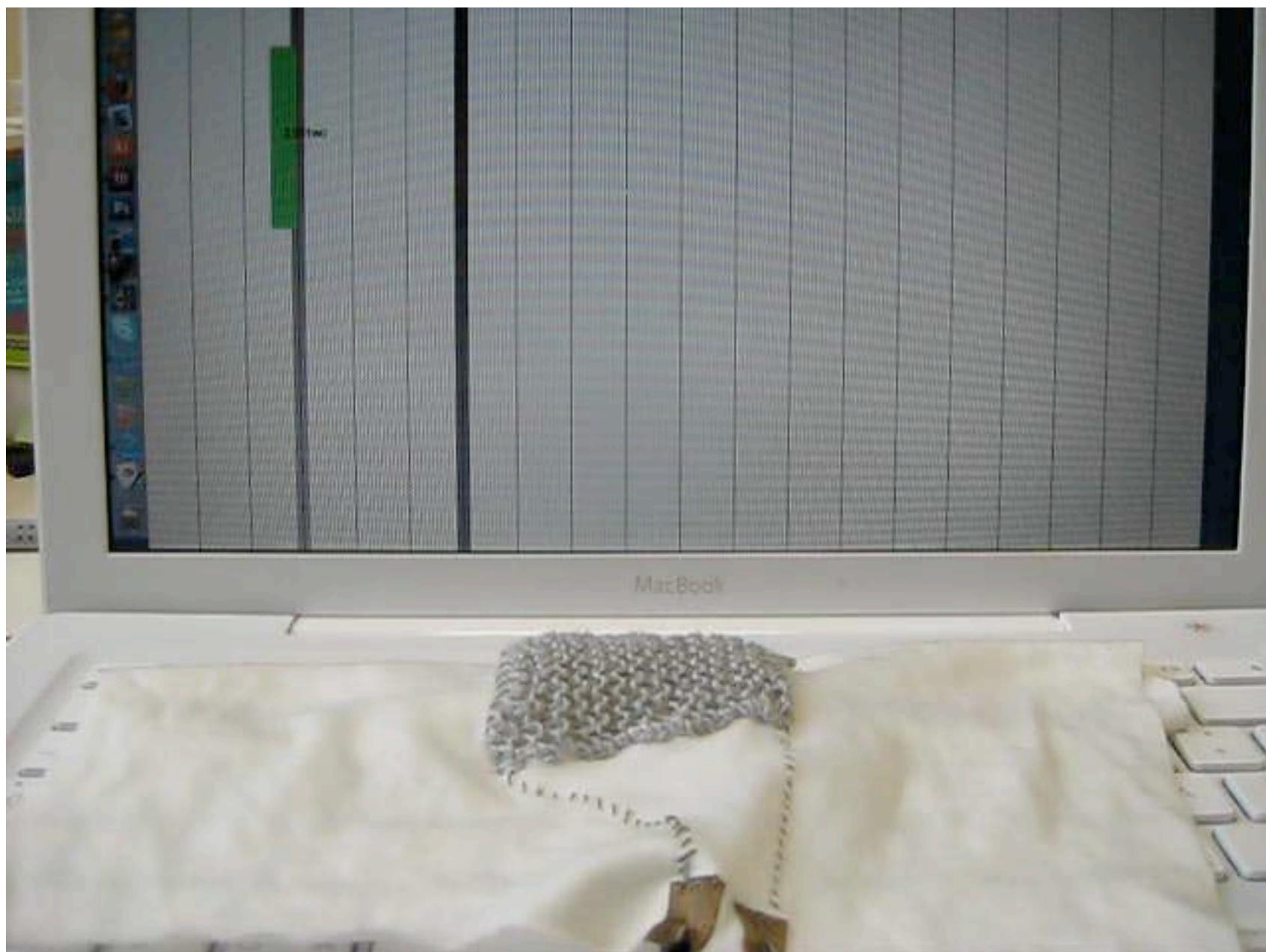


MATERIALS

- Resistive yarn
- Regular yarn

Knit Stretch Sensing Bracelet

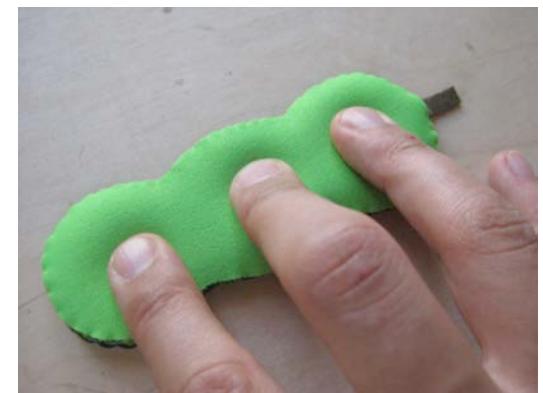
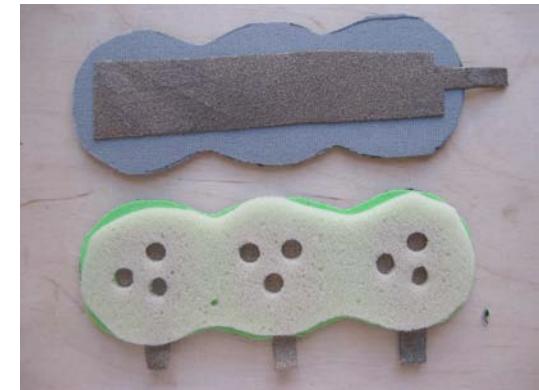
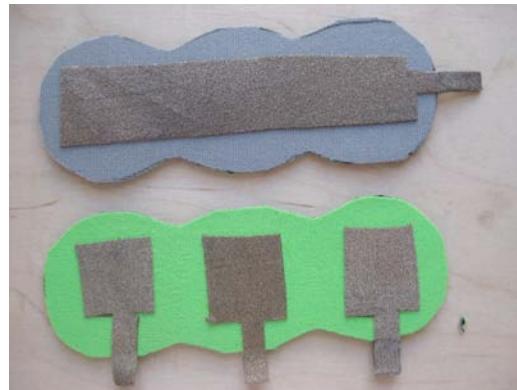




Fabric Button



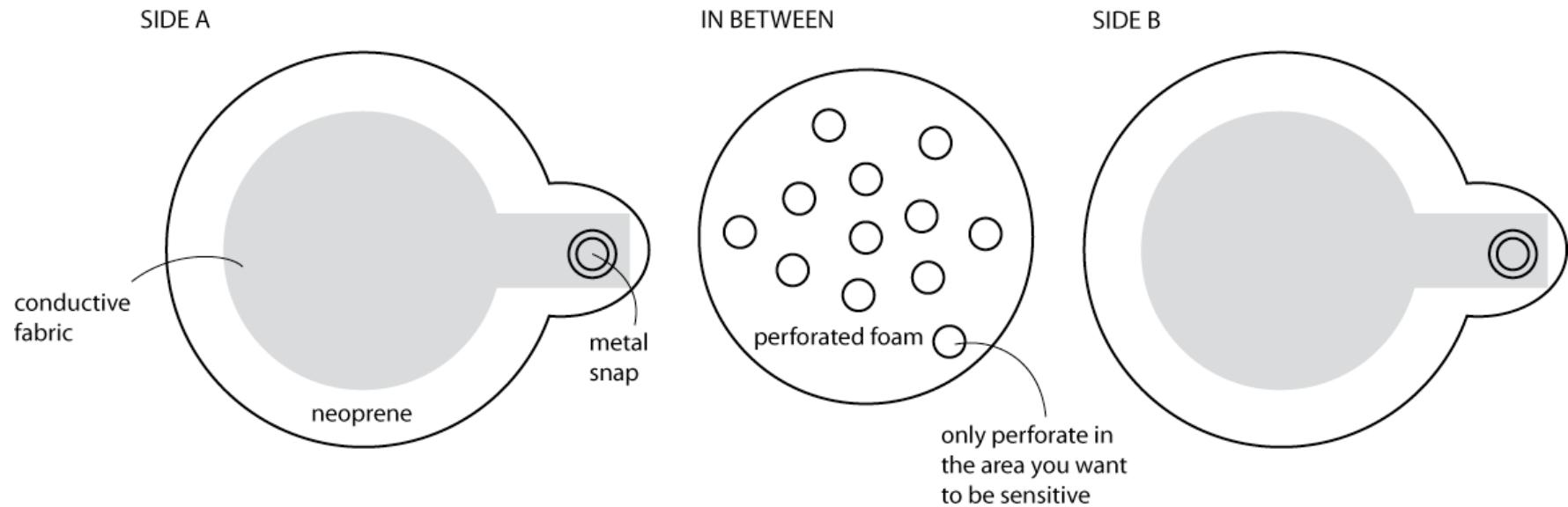
Fabric Button

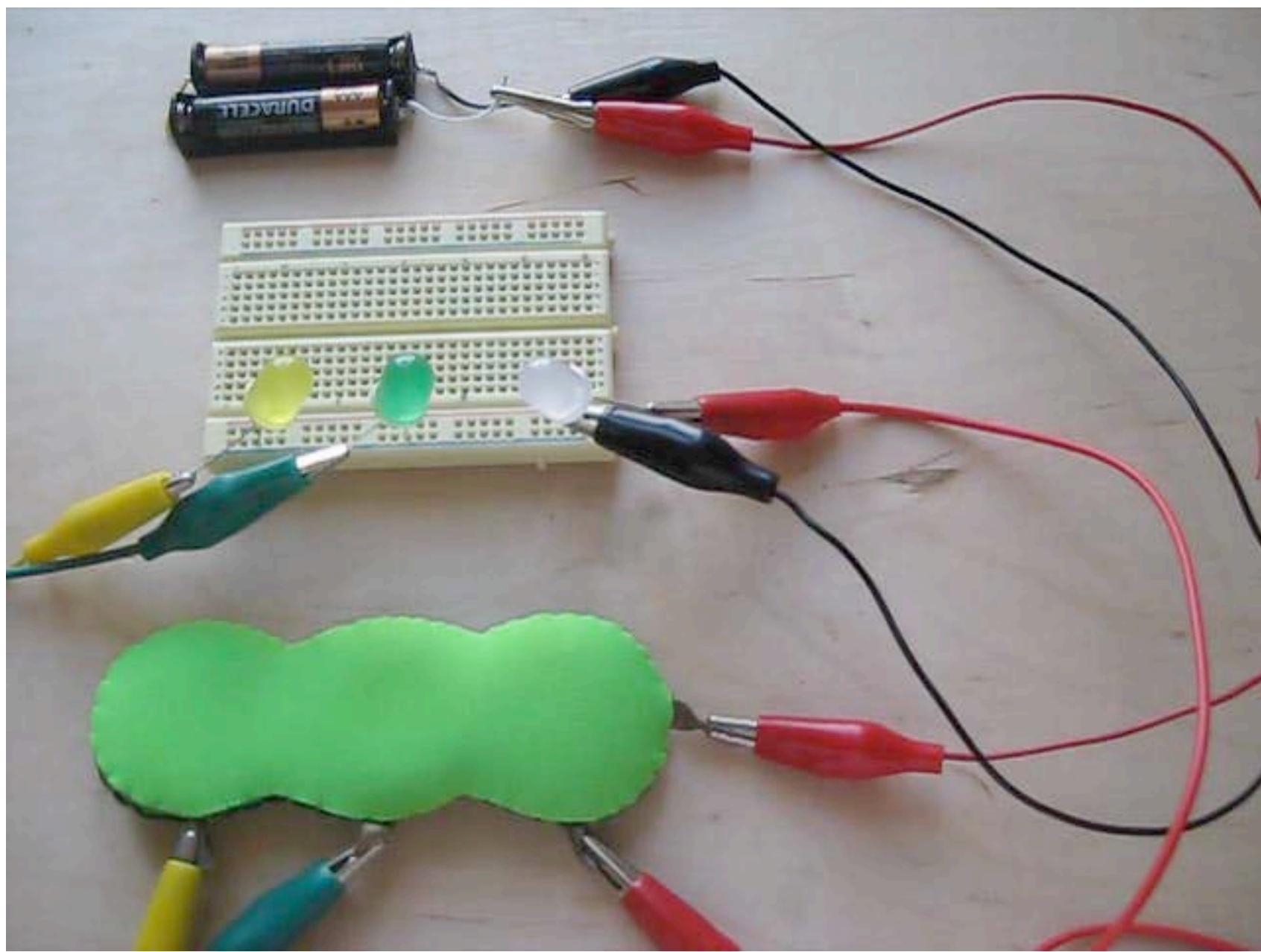


MATERIALS

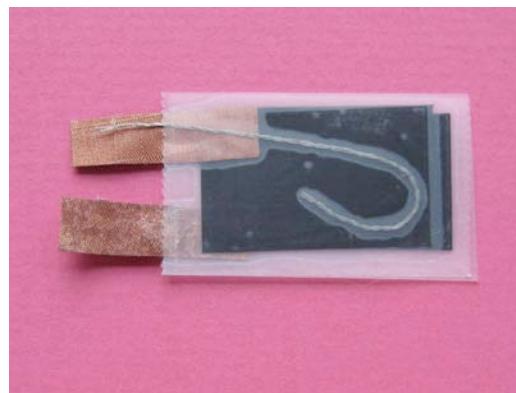
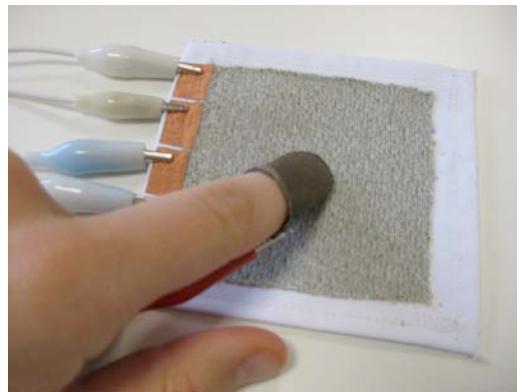
- Neoprene
- Stretch conductive fabric
- Fusible interfacing
- Foam

Fabric Button





More Sensors...



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FEATURED Stickytape Sensors

FEATURED Neoprene Bend Sensor IMPROVED

FEATURED Limpet Push-Button

FEATURED Time Sensing Bracelet

FEATURED Tilt Sensing Bracelet

FEATURED Pressure Sensor Matrix

FEATURED Solar Necklace T-Shirt

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SENSORS

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SENSORS

Sensors

CROCHET PRESSURE SENSOR



Here is the crochet pressure sensor.

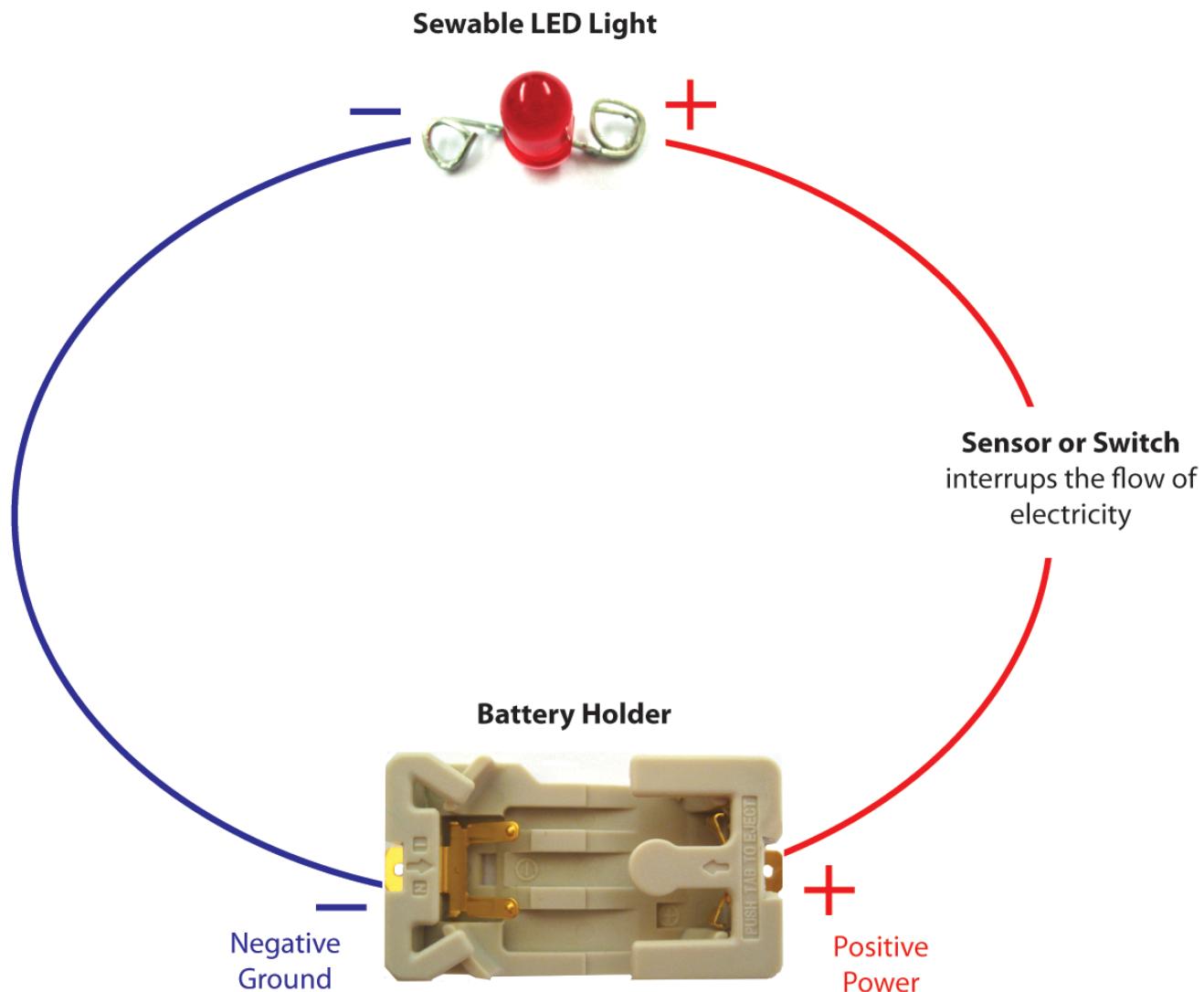
The main principle is same as regular pressure sensor. Instead of conductive fabric or thread, I used conductive yarn from Schoeller, Nm 50/2 60/40 Pes/Inox @ Euros 65.00/kg (25,000 metres/kg). Since this yarn is very thin, it is mixed with normal yarn and crochet, which is what you can see [...]

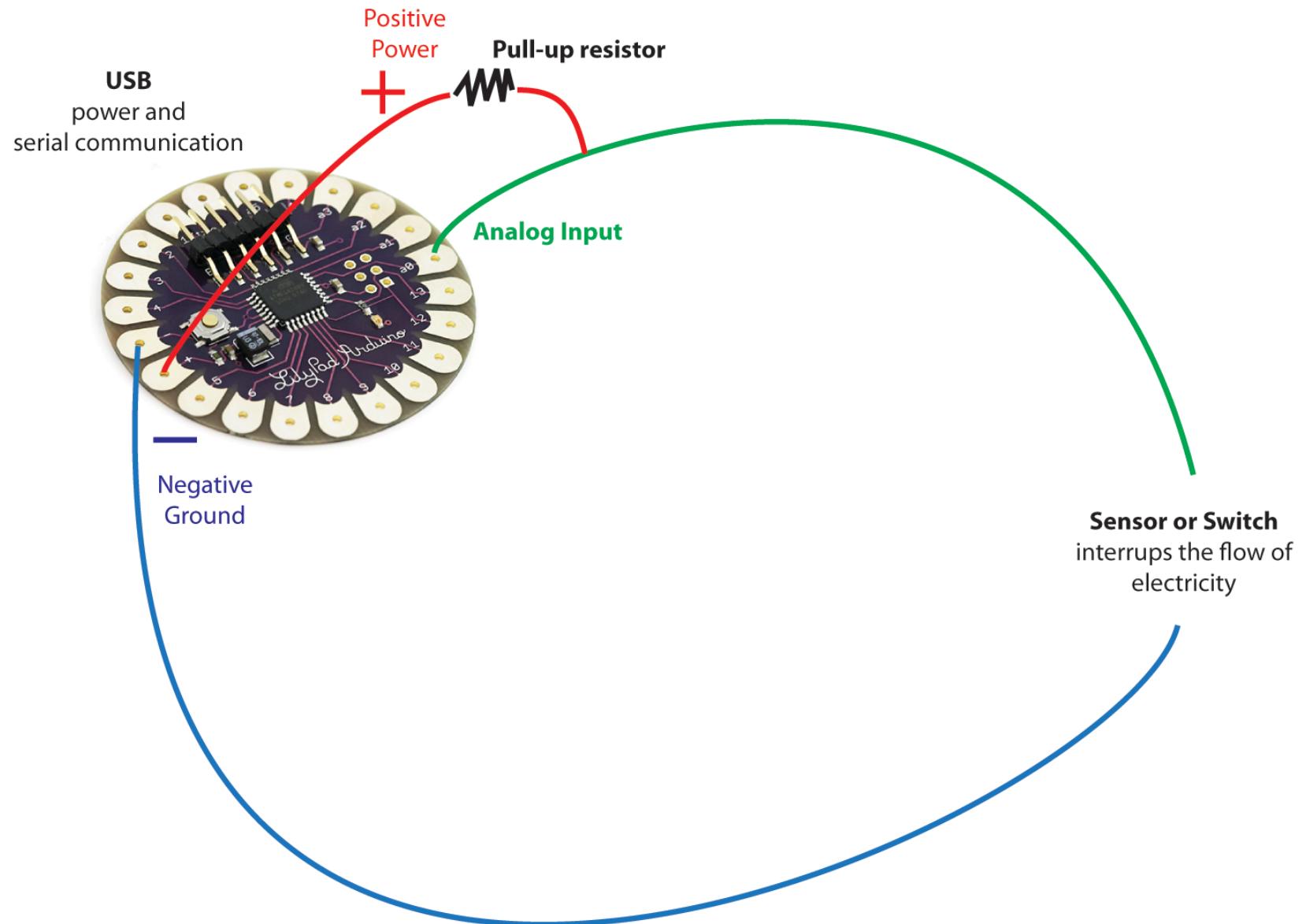
Sensors

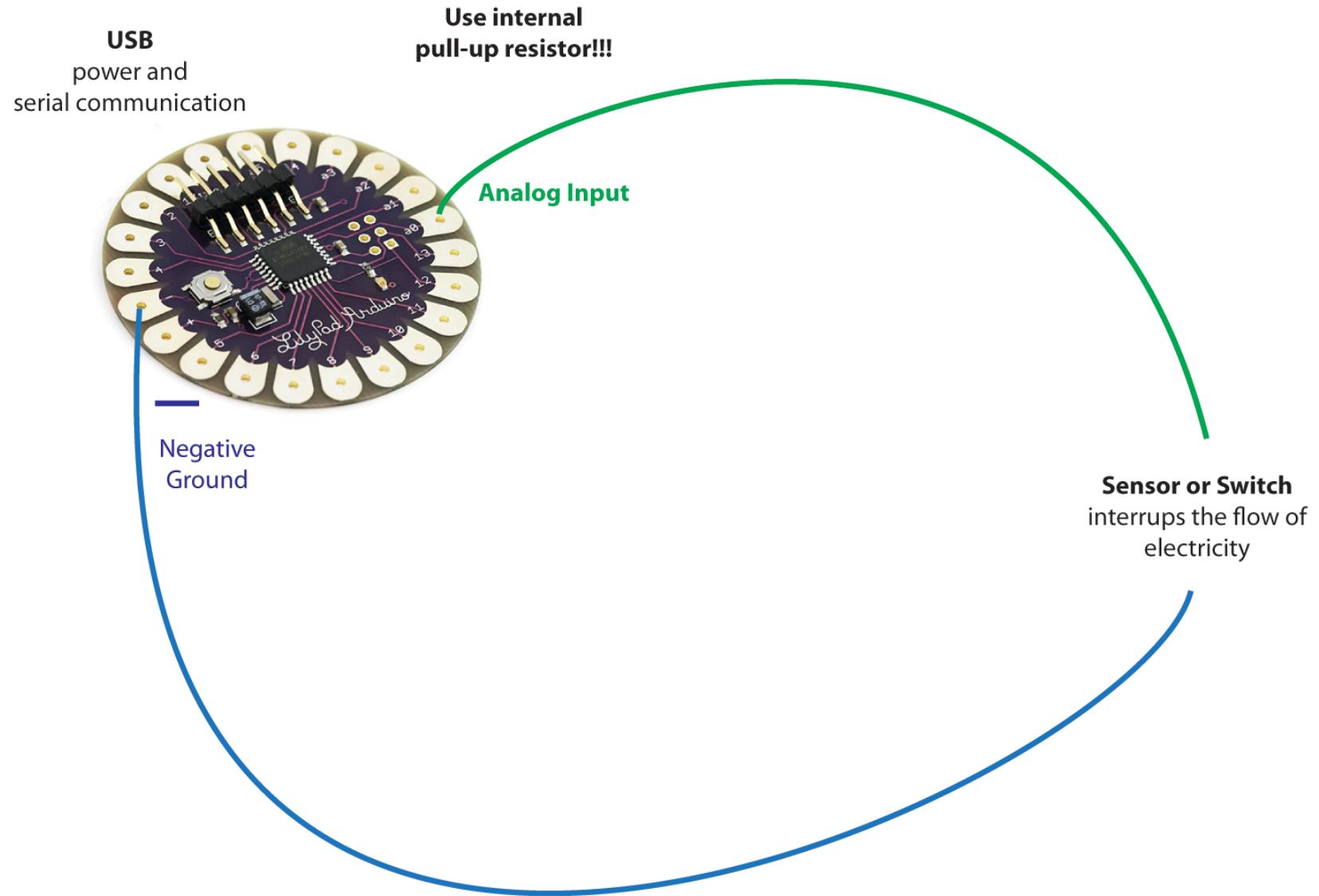
CROCHET TILT POTENTIOMETER



Combination of tilt sensing and potentiometer using regular wool and conductive wool from Schoeller.







Arduino LilyPad

Blink | Arduino 0017

Play Stop Run Up Down Refresh

Blink

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

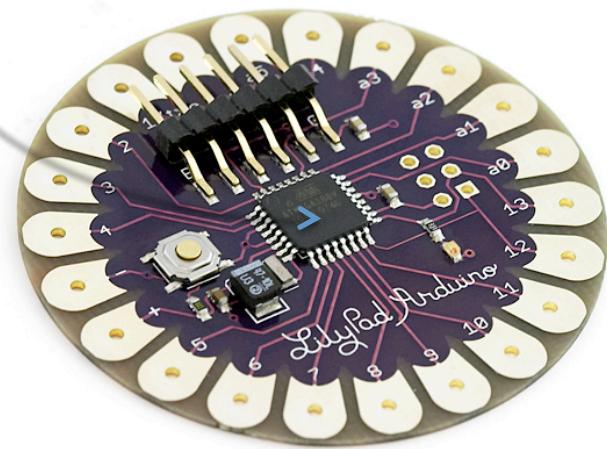
// The setup() method runs once, when the sketch starts

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};

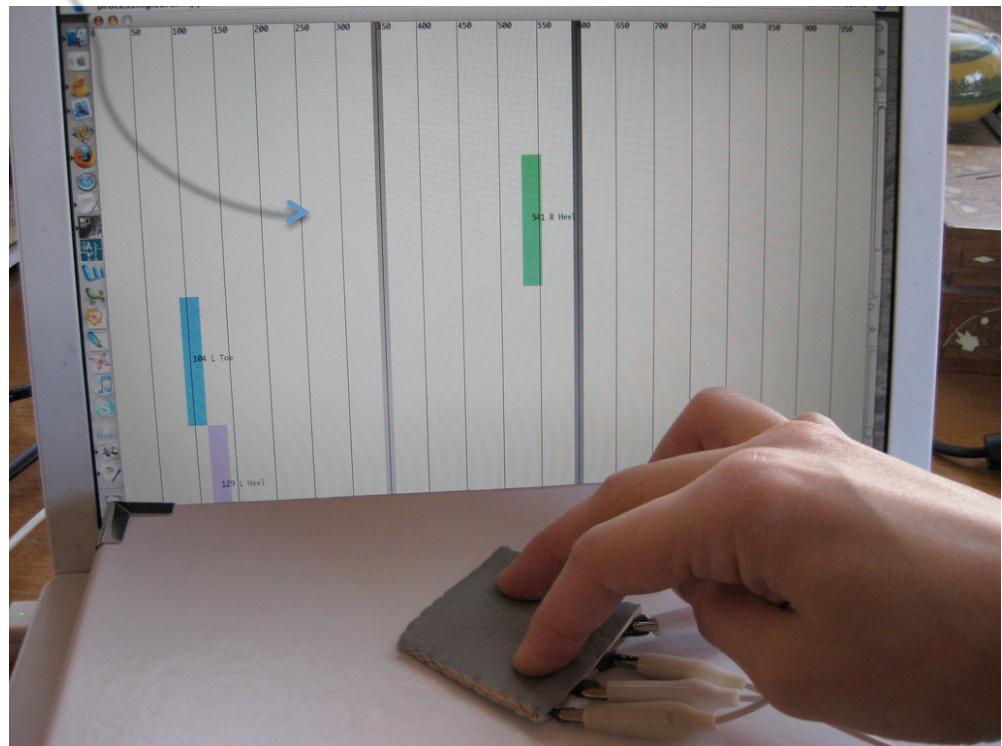
//
int[] messageArr= {0};

// 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 application)
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

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