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

In between

Side 2

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

SIDE A

IN BETWEEN

SIDE B

knot

exposed conductive thread

isolated conductive thread
Pressure Sensor Matrix
Pressure Sensor Matrix

MATERIALS
- Neoprene
- Conductive thread
- Stretch conductive fabric
- Fusible interfacing
- Velostat
Pressure Sensor Matrix

SIDE A
- Neoprene
- Conductive fabric
- Exposed conductive thread
- Knot

IN BETWEEN

SIDE B
- A(1)
- A(2)
- A(3)
- A(4)
Tilt Sensor
Tilt Sensor

MATERIALS
- Neoprene
- Stretch conductive fabric
- Conductive thread
- Metal bead
- Stretchy fabric glue
Tilt Sensor

- 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

- Resistive fabric
- Conductive fabric
- Knot
- Conductive thread
- Double cond. thread
- Isolated cond. thread
Crochet Potentiometer
Crochet Potentiometer

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

Rotary potentiometer construction

Terminals

Wiper

Resistive strip
Stroke Sensor
Stroke Sensor

MATERIALS
- Neoprene
- Conductive thread
- Resistive thread
- Conductive fabric
- Fusible interfacing
Stroke Sensor

stroke direction

- a: Neoprene
- b: Conductive thread
- c: Non-conductive or resistive thread
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

SIDE A
- conductive fabric
- neoprene
- metal snap

IN BETWEEN
- perforated foam

SIDE B
- only perforate in the area you want to be sensitive
More Sensors...
www.instructables.com/member/Plusea
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 [...]

CROCHET TILT POTENTIOMETER

Combination of tilt sensing and potentiometer using regular wool and conductive wool from Schoeller.
Sensor or Switch interrupts the flow of electricity
USB power and serial communication

Positive Power

Pull-up resistor

Analog Input

Negative Ground

Sensor or Switch interrupts 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

```cpp
// LED connected to digital pin 13

void setup() {
  pinMode(ledPin, OUTPUT);
}

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
}
Processing

```java
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 width = 1200;
int height = 800;

// >Pose input array, using prefix
int[] xPosition = (0);
int[] yPosition = (0);

int[] messageArray = (0);

// Arrays for thresholding
int[] thresholdMin = (50);
int[] thresholdMax = (50);

// variables for serial connection, portname and baudrate are user specific
Serial port;

// Set your serial port here (look at list printed when you run the application)
String VS = Serial.list();
String portname2 = VS;
int baudrate = 9600;
```
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

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www.media.mit.edu/~plusea