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Interactive Systems

Project : Developing a Textile Bend Sensor

Guided By : Elena Marita Werny

Submitted By : Krunal Jagdishbhai Koshiya

Matriculation Number : 2577581

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A Textile Bend Sensor

Bend Sensor: A Bend sensor is a sensor that measures the amount of deflection or bending.

Textile Sensor: Textile based sensors provide an interface between the user and an electronic system by converting physiological or environmental signals into electrical signals.

Textile Bend Sensor:

- can be used for measuring the bend of human joints when attached to the body(on the cloths).
- can equip clothes with a smart sensing capability, while preserving the comfort of the user.

In this project, the **objective** is **to make such a Textile Bend Sensor which can detect bending**.

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Basic Principle

- **The Velostat allows more electricity to pass through as the harder you press the two conductive layers together, with the Velostat in between.**
  - When the sensor is bent, it exerts pressure on velostate which is placed in between Neoprene strips.
  - Because of the pressure, the Velostat allows more current to pass through.
  - As more current will be able to pass through, there is a decrement in the Resistance of the sensor.
  - More bending of the sensor will result in more decrement in the Resistance of the sensor.

This will be more clear once we will see the design of the sensor(in the next slide).

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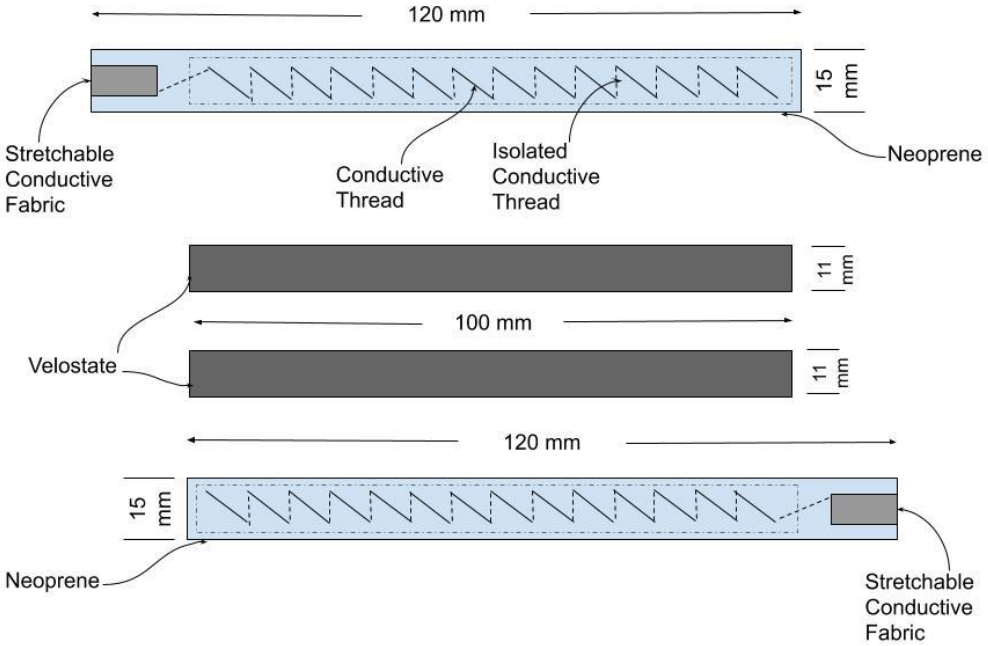
Design & Development



[Figure 1: Design of the Sensor]

1. **Cut** Neoprene, Conductive Fabric and Velostate in a **dimensions as shown** in the figure 1.
2. As shown in the figure 1, **Neoprene** will be **stitched with conductive thread**.
3. **Conductive fabric** will be stitched as shown in the figure by normal thread.
4. **Velostat** will be placed **in between two neoprene** strips which are stitched already.
5. After that sensor will be **stitched** together around the **outer periphery** by normal thread.

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Challenges

Technical Implementation Challenges

- Getting the desired **Sensitivity and Output Range** of the sensor. If required, i will have to change gap between stitches of conductive thread, few dimensions like length, width, etc.
- **Representation of the output** of the sensor is a bit challenging for me as i am planning for doing it without using any microcontroller.

Interaction Design Challenges

- We are suppose to make a project which **fit into the 15 X 15 cm wooden frame**, this is challenging for me as i am making a bend sensor. I will have to bend it while checking/showing that it is working fine, at the same time it should fit in the frame.

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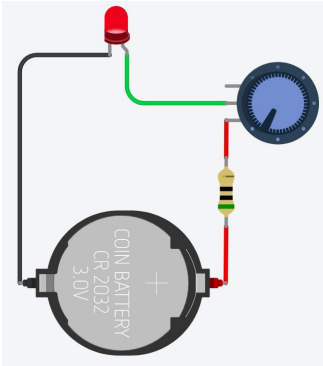
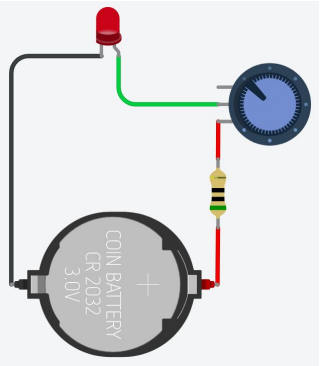
Representation of the Output

- As shown in the figure, potentiometer is used as variable resistor instead of bend sensor in a circuit.
- When resistance of the sensor is comparatively less, LED will glow brighter as shown in the figure 2.
- When resistance of the sensor is comparatively more, LED will glow brighter as shown in the figure 3.



[Figure 2: Sensor resistance is low]



[Figure 3: Sensor resistance is high]

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Current Status

- Made a design of the sensor by using Google Draw for clarity purpose.
- Collected most of the required material from IS2020 Group.
- Now, I will buy remaining things like Battery (Button Cell), LEDs.
- I am following the Gantt Chart shown beside, i am in the second week now.

GANTT CHART

Task Number	Task Name	Week 1 June 18-June 24	Week 2 June 24-July 1	Week 3 July 2-July 8	Week 4 July 9-July 15	Week 5 July 16-July 22	Week 6 July 23-July 29	Week 7 & 8 July 30 - August 12
1	Gathering remaining required materials							
2	Find substitute of non-acquired materials							
3	Improvisation in design if necessary (based on material).							
4	Developing a Sensor							
5	Fine-tuning of the developed Sensor							
6	Pilot Run for Evaluation							
7	Finalization and Testing							

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Open Questions

- **How to present the output** of the sensor without using any microcontroller?
  - By using a simple LED? (Not sure about Visibility of changing brightness)
  - Directly by using Multimeter? Or
  - any other suggestions?