IoT

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Designing and Fabricating Two Sensor Designs

1. Design

Two sensors are designed using two-finger design with the dimensions of 5 mm finger width, 5 mm Finger Gap, 8 cm finger length and 1 cm finger width, 1 cm finger gap, 8 cm finger length respectively.

Figure 1: Designing the Sensor Using Copper

2. Fabrication

They are then fabricated separately over a glass sheet with 10 cm height using copper tape.

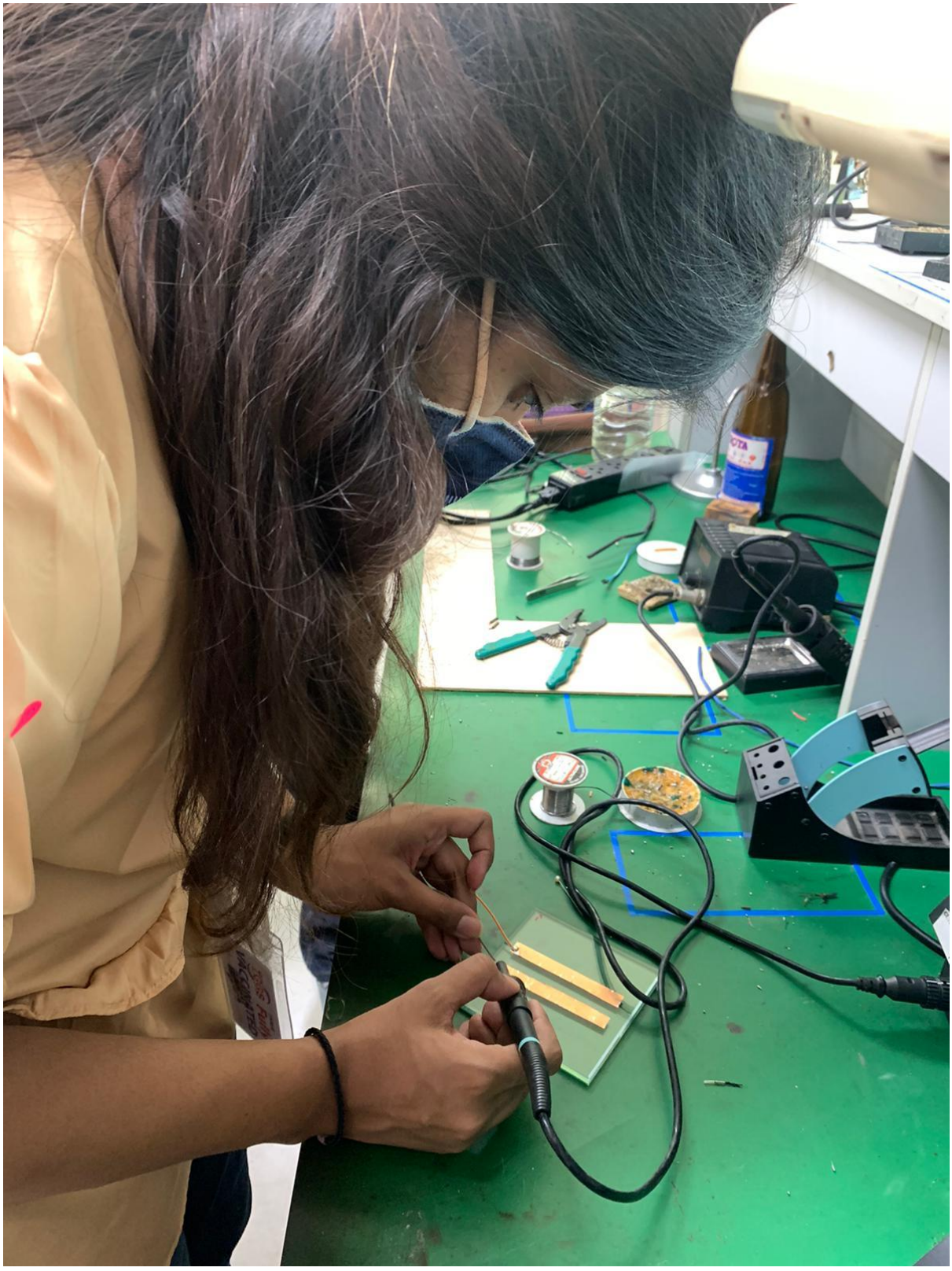

Figure 2: Soldering the wires for connections

Figure 3: Creating support to keep the sensor in place

3. Results

The capacitances values for the following scenarios are then analyzed using the LCR meter.

1. Capacitance (No touch, No cover)
2. Capacitance (Touch between the Electrodes, No Cover)
3. Capacitance (Touch '+' Electrode. No Cover)
4. Capacitance (Touch '-' Electrode, No Cover)
5. Capacitance (No touch, Cover)
6. Capacitance (Touch between the Electrodes, Cover)
7. Capacitance (Touch '+' Electrode. Cover)
8. Capacitance (Touch '-' Electrode, Cover)

Figure 4: Connecting sensor with LCR meter

The results are as follow for the Sensor # 1 with 5mm finger gap.

Capacitance (No touch, No cover)	4.19 pF
Capacitance (Touch between the Electrodes, No Cover)	180 pF

Capacitance (Touch '+' Electrode. No Cover)	4.69 pF
Capacitance (Touch '- 'Electrode, No Cover)	4.8 pF
Capacitance (No touch, Cover)	5.4 pF
Capacitance (Touch between the Electrodes, Cover)	4.85 pF
Capacitance (Touch '+' Electrode. Cover)	4.93 pF
Capacitance (Touch '- 'Electrode, Cover)	4.96 pF

Figure 5: Noting down Capacitance value when touching the '+' Electrode

The results are as follow for the Sensor # 2 with 1cm finger gap.

Capacitance (No touch, No cover)	2.86 pF
Capacitance (Touch between the Electrodes, No Cover)	57.2 pF
Capacitance (Touch '+' Electrode. No Cover)	3.34 pF
Capacitance (Touch '- 'Electrode, No Cover)	3.89 pF
Capacitance (No touch, Cover)	4.01 pF
Capacitance (Touch between the Electrodes, Cover)	3.11 pF
Capacitance (Touch '+' Electrode. Cover)	3.44 pF
Capacitance (Touch '- 'Electrode, Cover)	3.3 pF

4. Conclusion

These sensor designs show high capacitance change when touched between the electrodes without the glass cover. However, the sensitivity goes drastically down when the glass lid is placed, and only positive or negative electrode is touched.

5. Next Steps

Two other designs are under process after analyzing the results from previous experiments.