

Development of A Flexible Pressure Sensor Array with Only 2 I/O Ports to Distinguish Object Hardness



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Abstract

A Flexible pressure sensor array to achieve multi-point and high spatial resolution at the same time with only 2 I/O ports.

The flexible pressure sensor array is based on

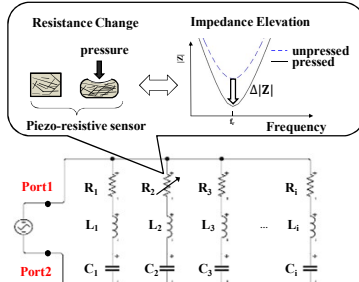
- Parallel RLC resonance circuit
- PDMS/Graphene mixture as piezoresistive sensor

Performance of the flexible pressure sensor array

- Single pressure sensor measure from 37.5 kPa to 250 kPa
- Loading multi-points force on the array
 - Distinguish different pressure from 50 to 250 kPa.
 - Distinguish different hardness of objects.

Design

Flexible pressure sensor array with 2 I/O ports



- By only two ports, sensing multi-points pressure
- Sensing RLC resonance with resistance changed

Fabrication

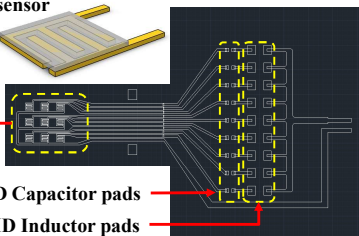
Flexible pressure sensor array

- Combine from
 - PDMS/Graphene mixture
 - Electrodes of electric circuit

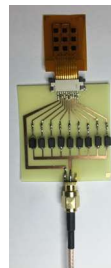
Resonance circuit component

- Circuit solder with
 - SMD Capacitors
 - SMD Inductors
 - One I/O connector

Single sensor



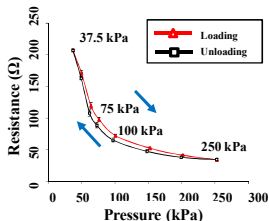
Flexible pressure sensor array and RLC resonance circuit



Completed work

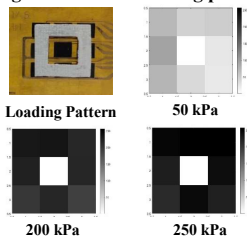
Results

• Single sensor calibration

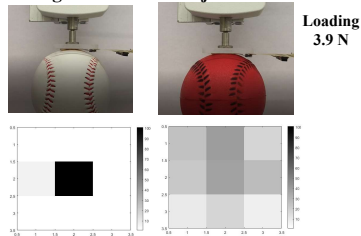


• Multi-points sensing

Distinguish different loading pressure



Distinguish different object hardness



Conclusions

- Flexible pressure sensor array with 2 I/O ports to distinguish object hardness is successfully achieved
- Single Sensor can measure the pressure from 37.5 kPa to 250 kPa
- Multi-points loading, this design can distinguish different loading pressure in 50, 200 and 250 kPa.
- This design successfully distinguishes different object hardness when loading 3.9 N.

Acknowledgments

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