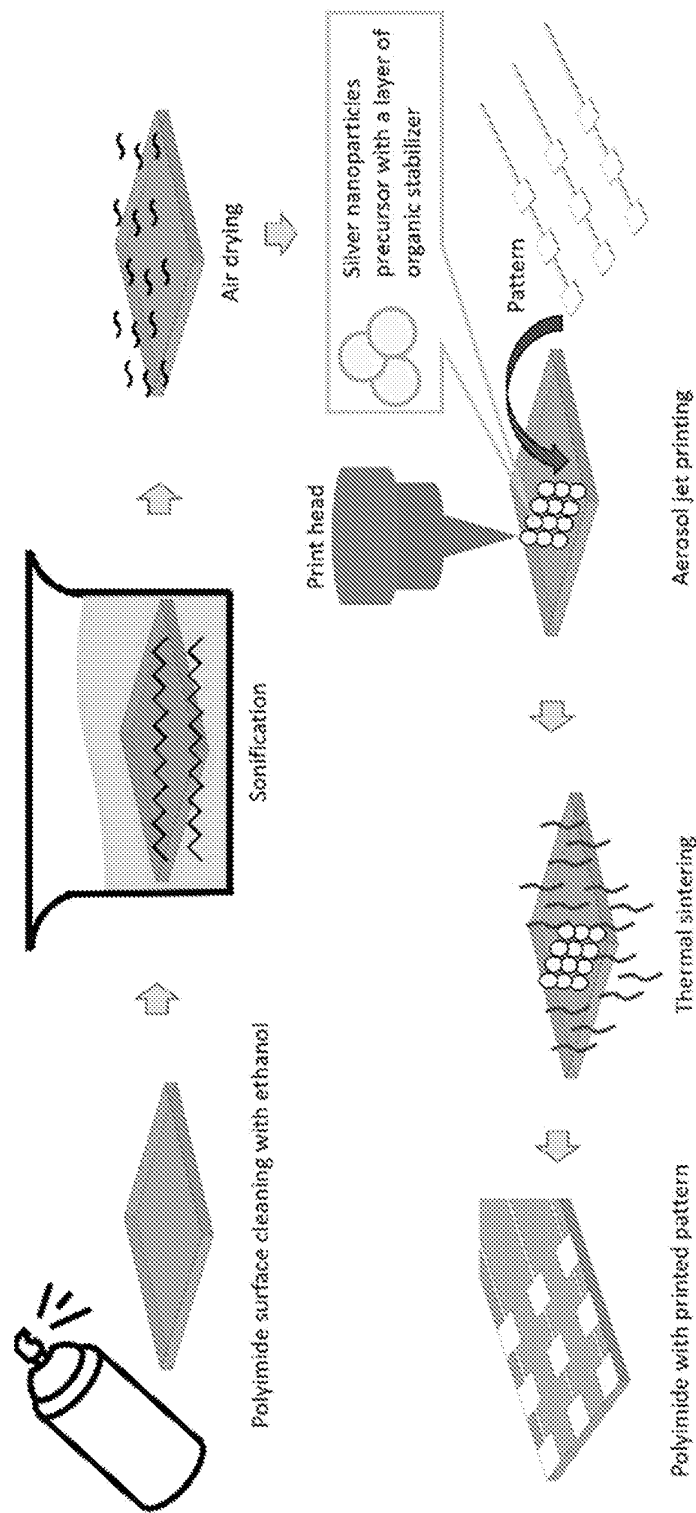
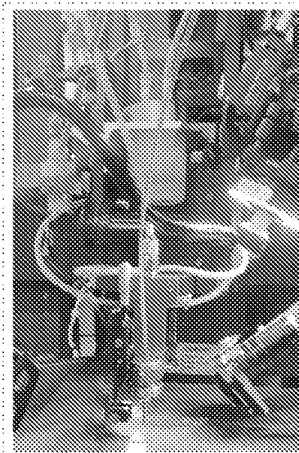
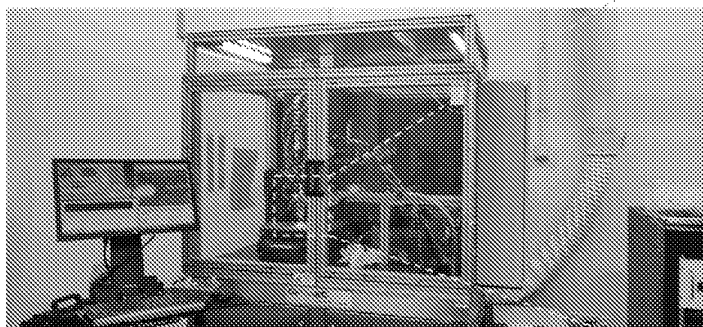


FIG. 1A



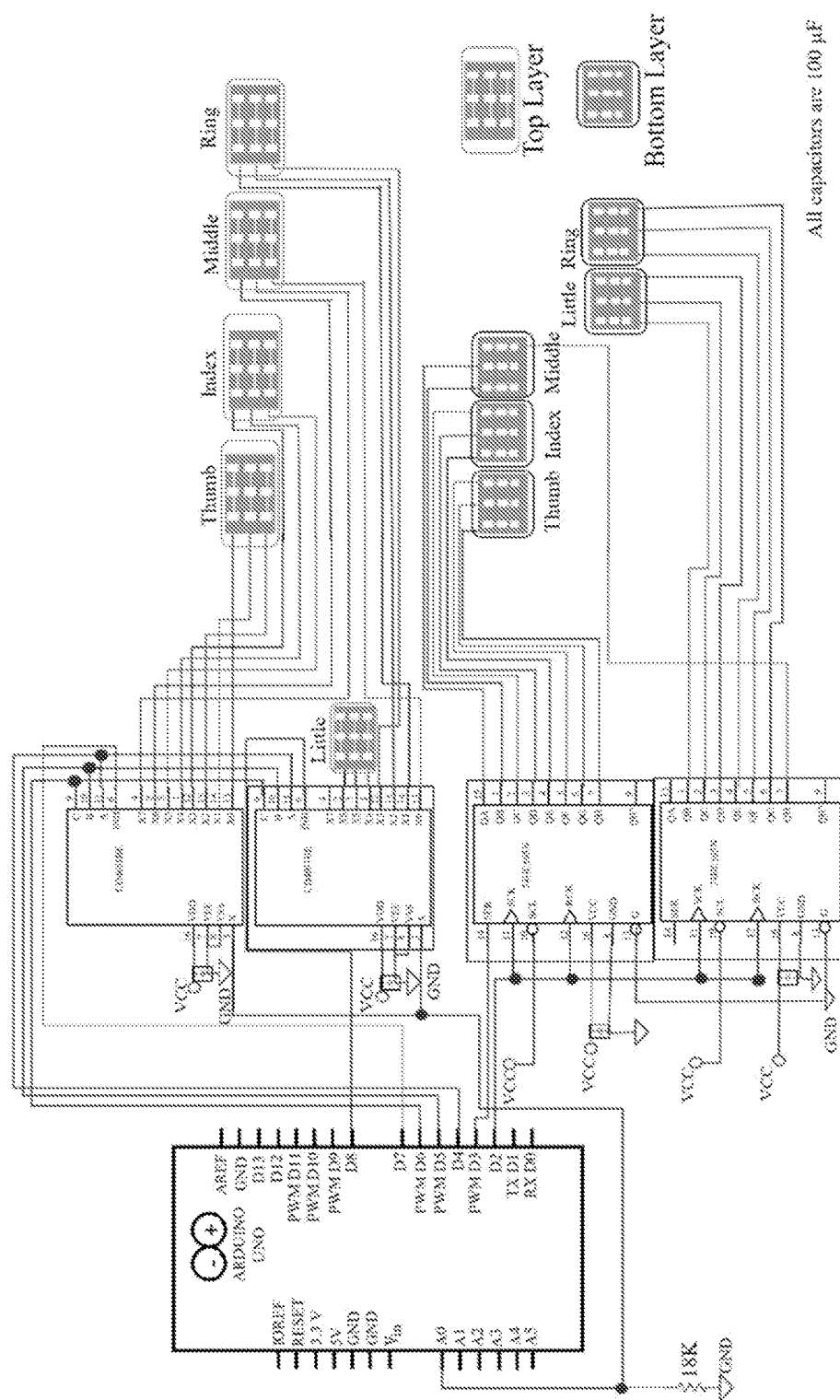
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FIG. 1B



Nozzle tip

FIG. 1C



All capacities are 100 ft.

FIG. 1D

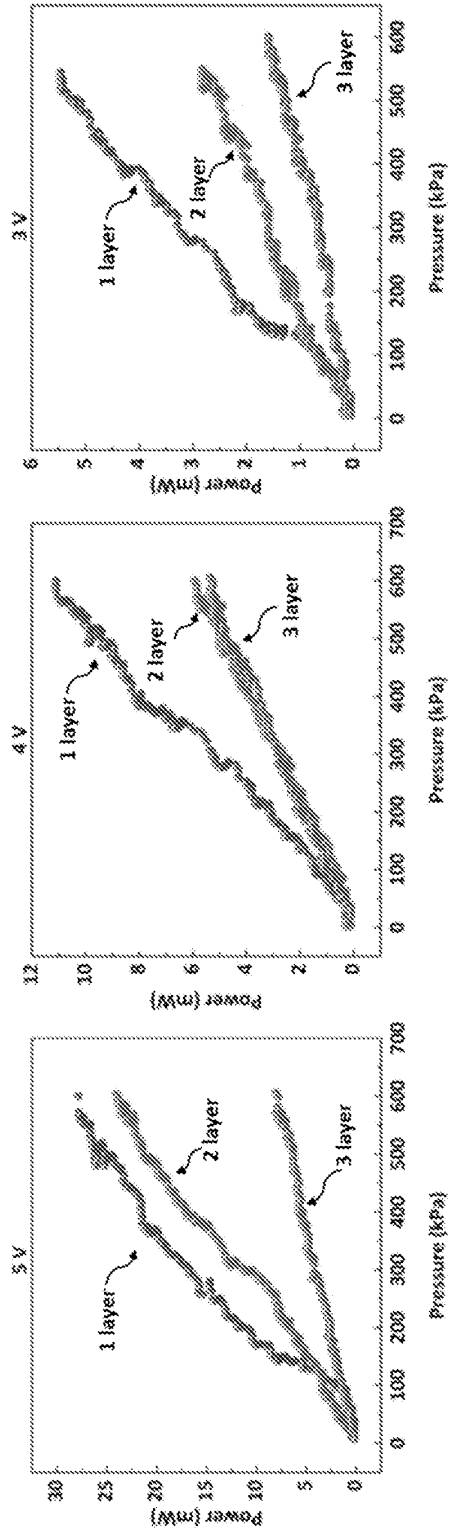


FIG. 2A

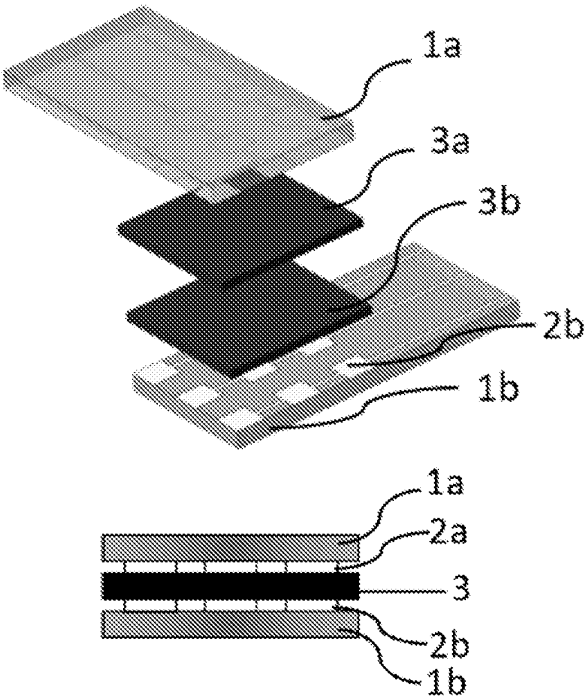


FIG. 2B

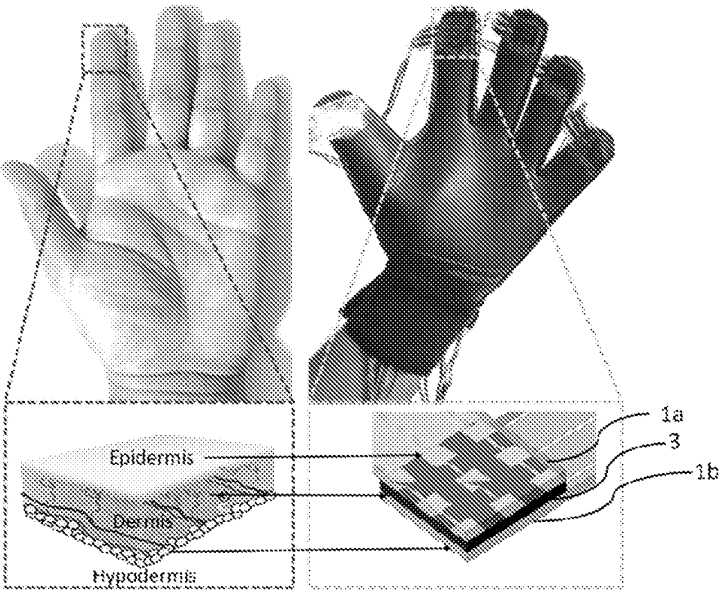


FIG. 2C

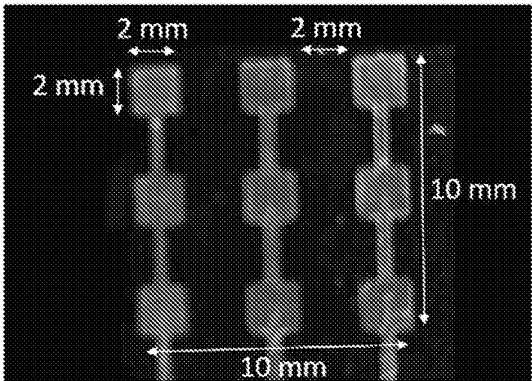


FIG. 3

Sensor properties		Value
Total pressure sensing nodes on each fingertip		9
Size of each sensing node		2 × 2 mm ²
Thickness		0.25 mm (for 1 piezoresistive film) 0.35 mm (for 2 piezoresistive films) 0.45 mm (for 3 piezoresistive films)
Pressure sensitivity range		10–600 kPa (for 1 piezoresistive film) 5–600 kPa (for 2 piezoresistive films) 5–600 kPa (for 3 piezoresistive films)
Linearity		almost linear in the range
Response time		4 ms

FIG. 4A

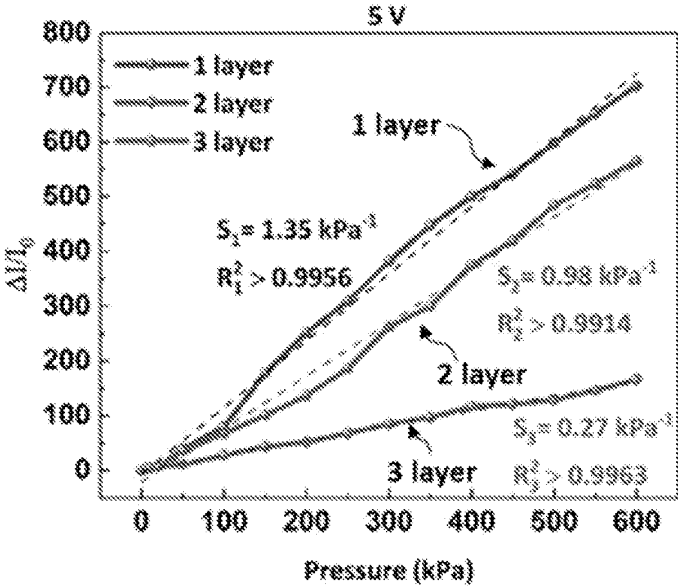


FIG. 4B

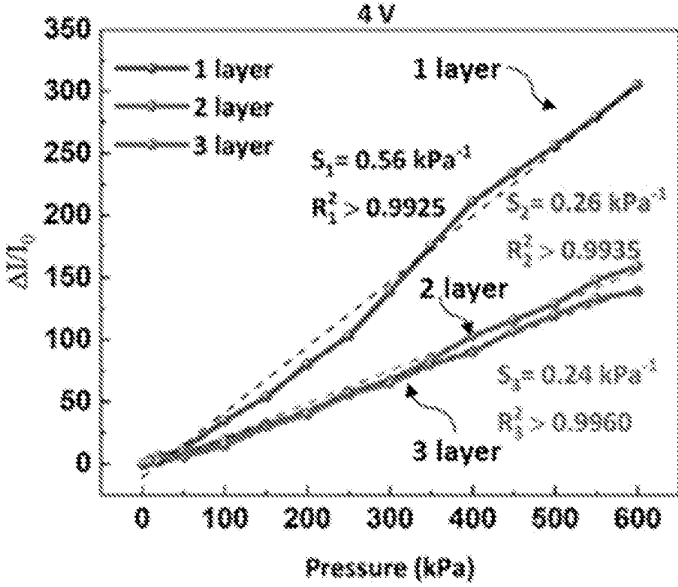


FIG. 4C

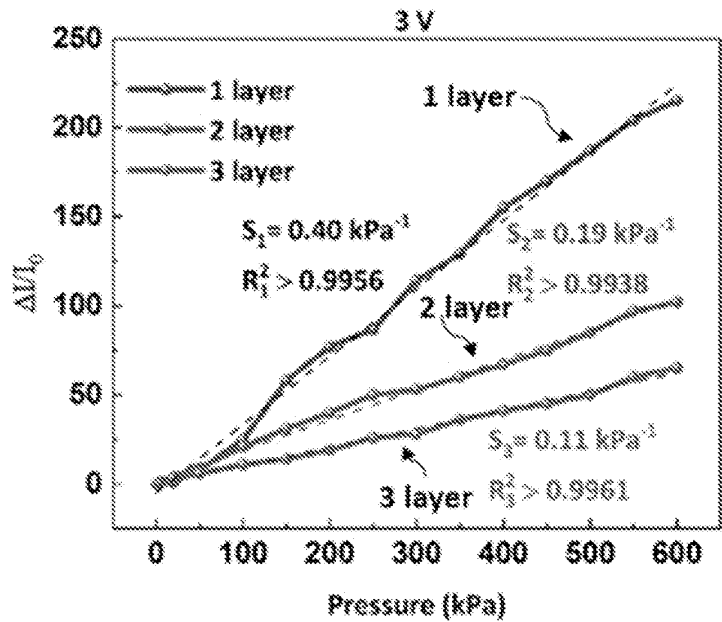
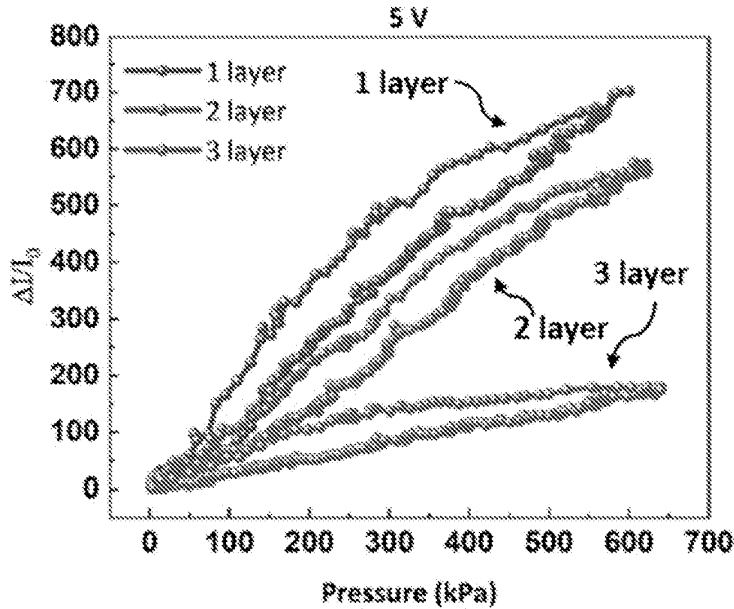


FIG. 4D



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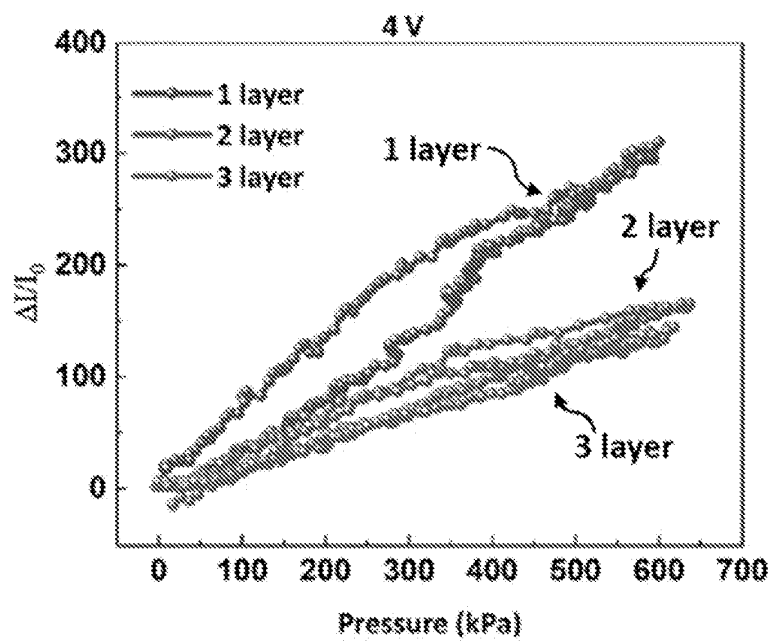
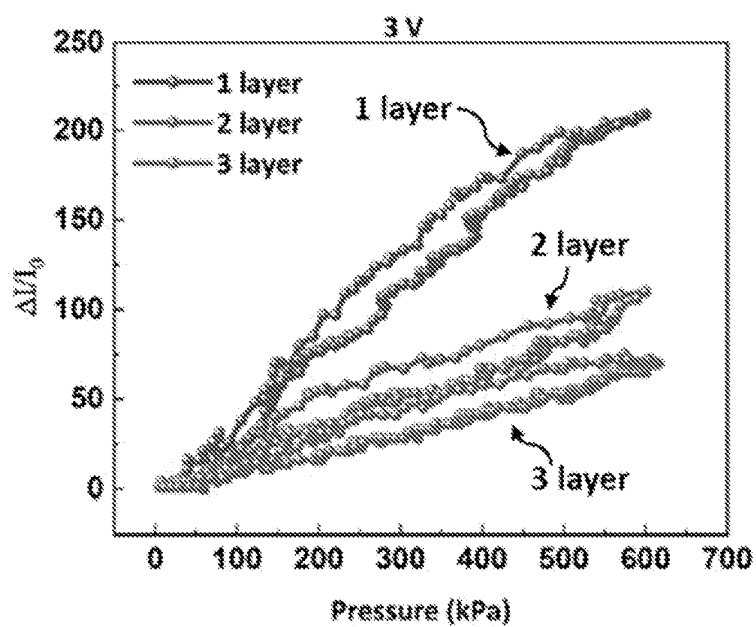
FIG. 4E**FIG. 4F**

FIG. 5

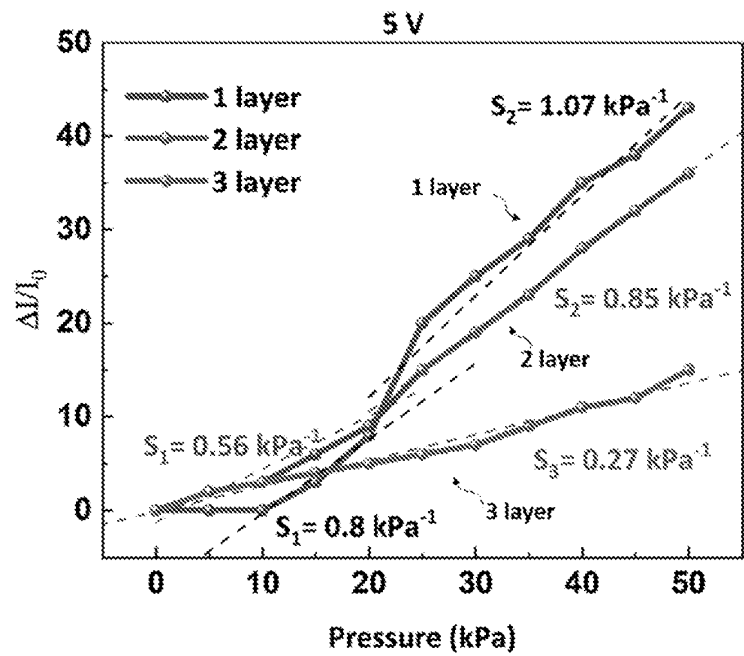


FIG. 6

Sensor characteristic	Number of resistive sensing layers	Applied voltage		
		5 V	4 V	3 V
Sensitivity [kPa^{-1}]	1	1.35	0.56	0.40
	2	0.98	0.26	0.19
	3	0.27	0.24	0.11
Hysteresis [%]	1	17.45	16.92	9.22
	2	33.52	23.11	18.69
	3	35.43	25.13	21.74

FIG. 7A

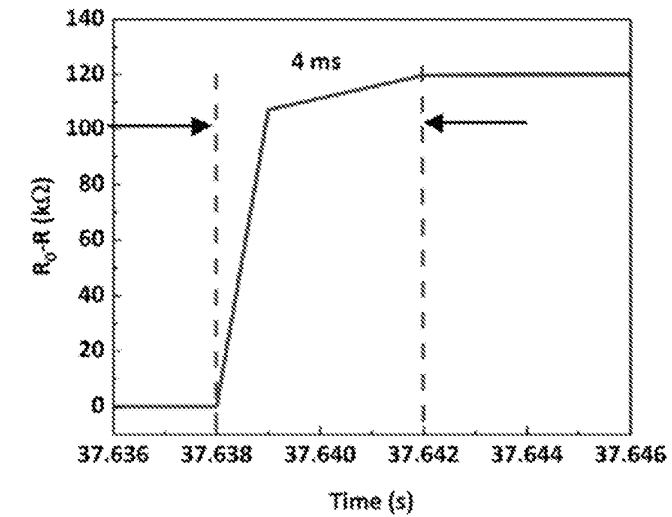
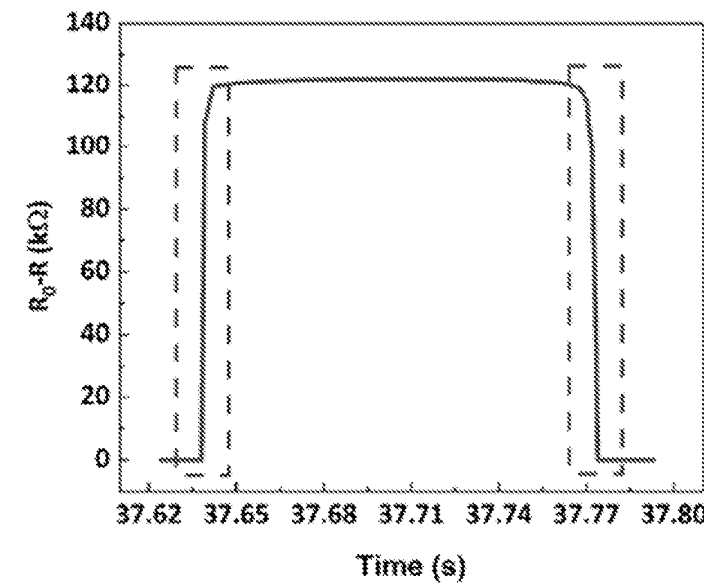


FIG. 7B



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FIG. 7C

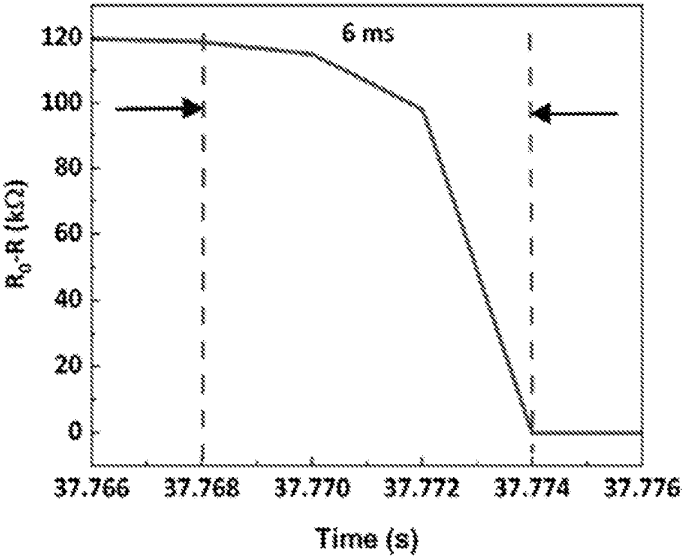


FIG. 7D

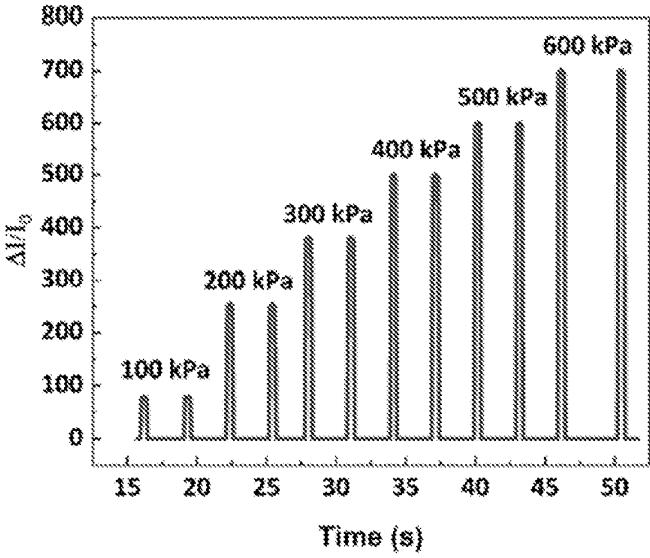


FIG. 7E

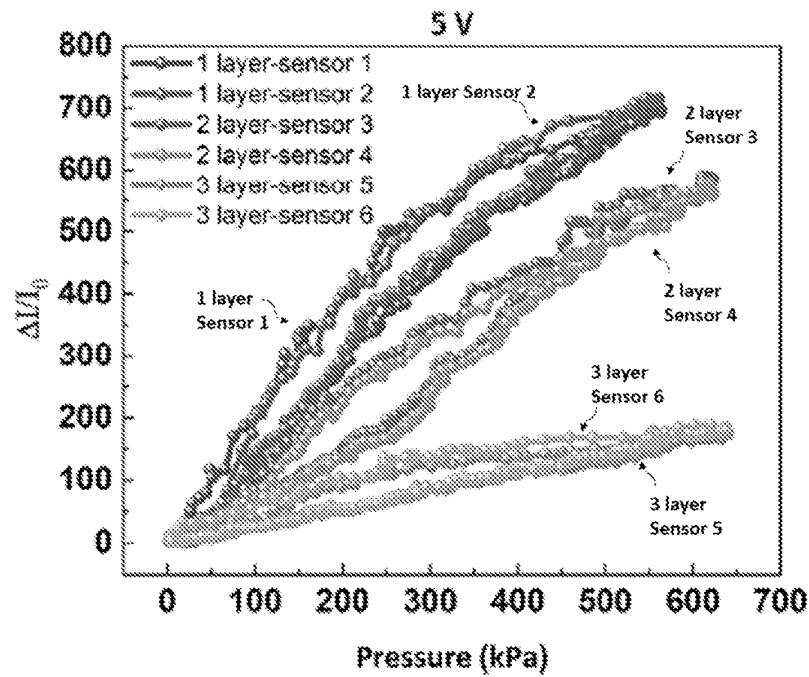


FIG. 7F

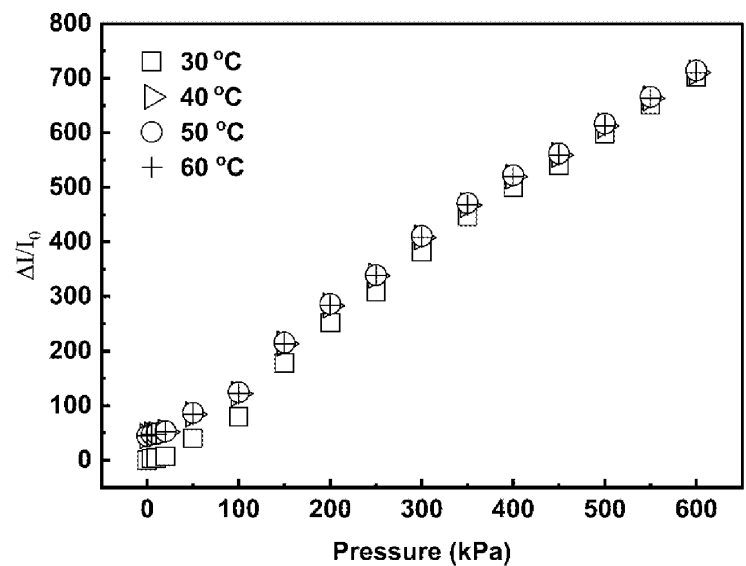


FIG. 8

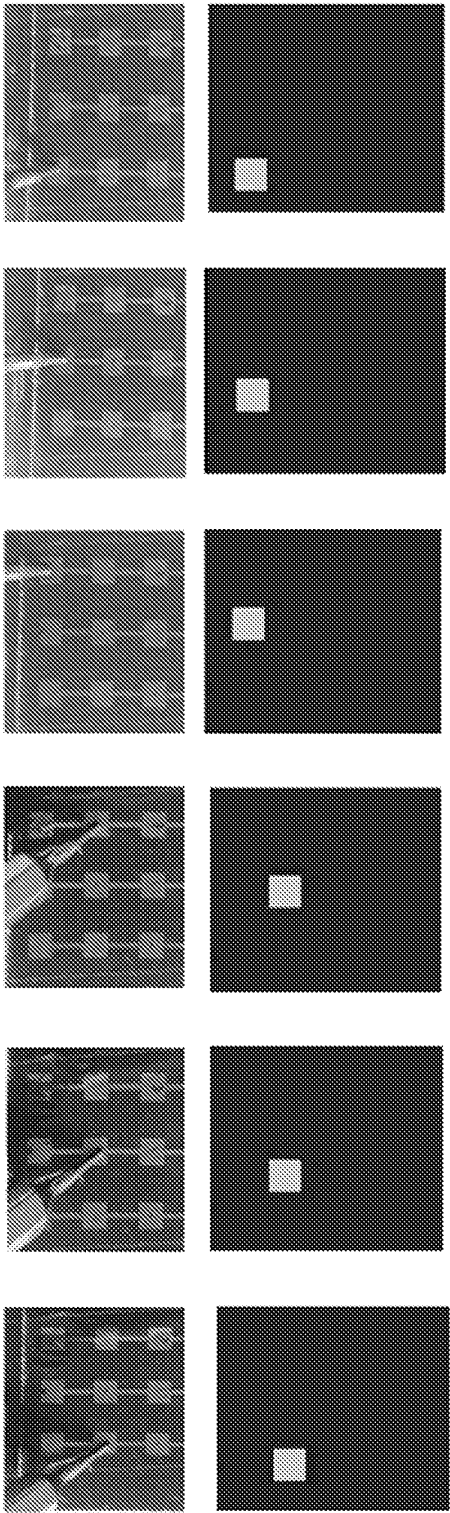


FIG. 9A

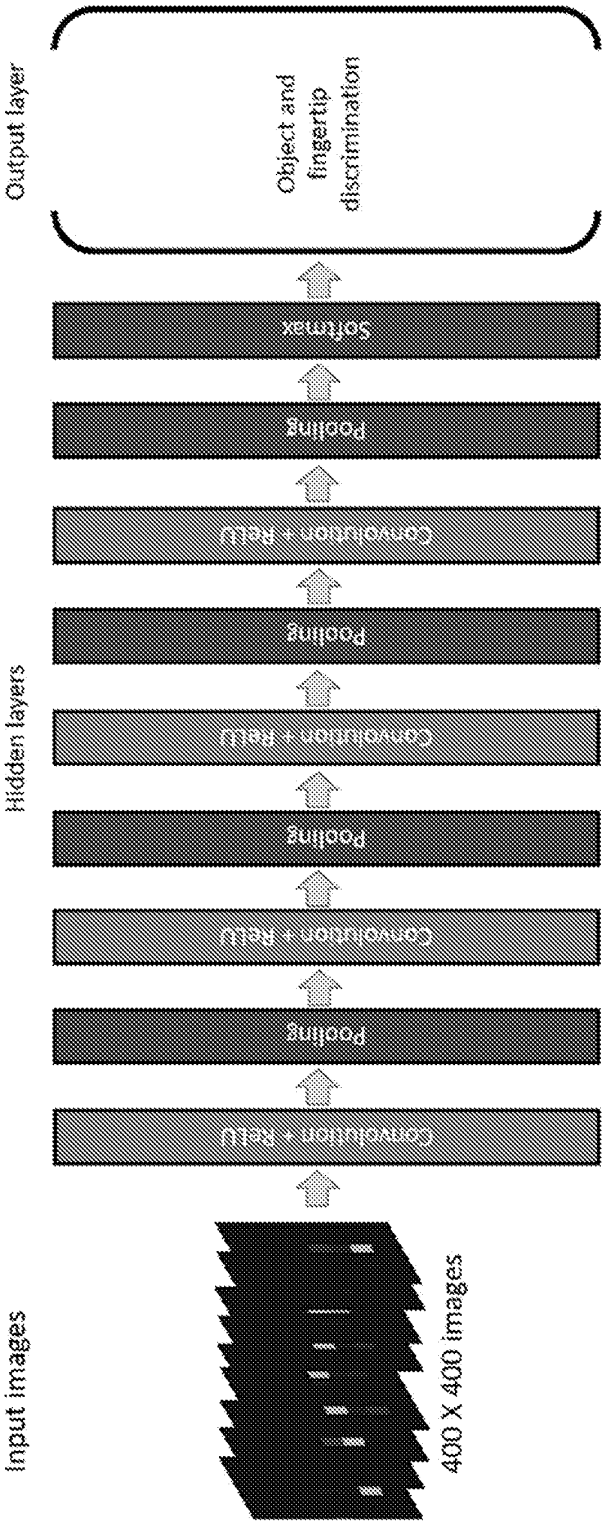


FIG. 9D

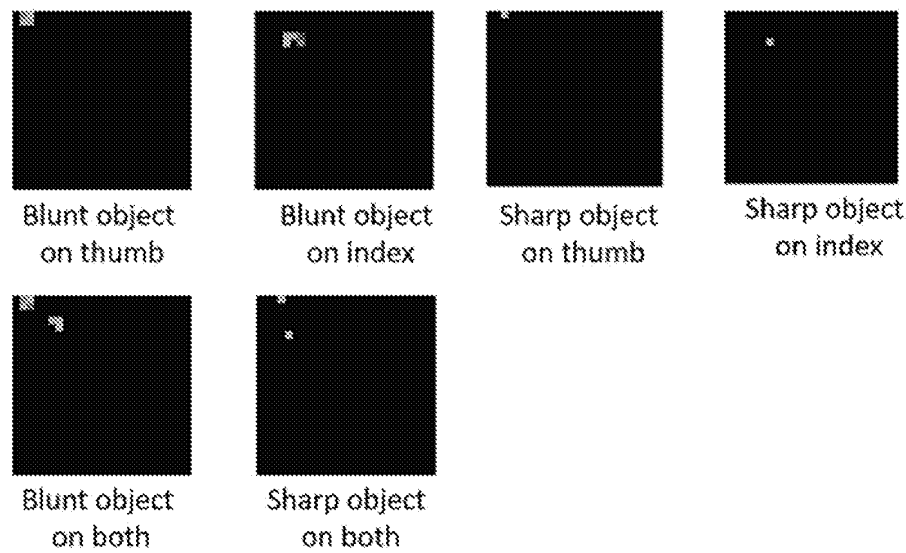
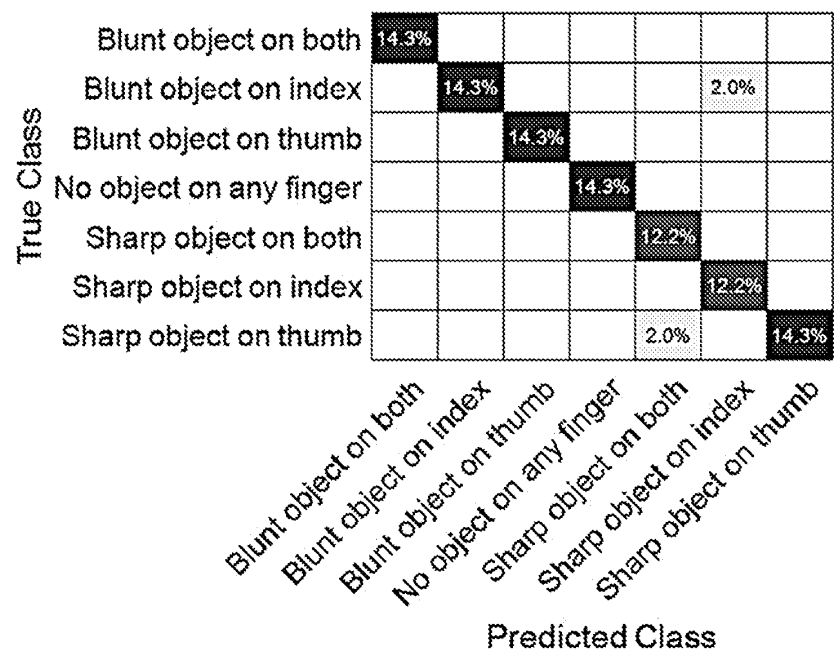


FIG. 9E



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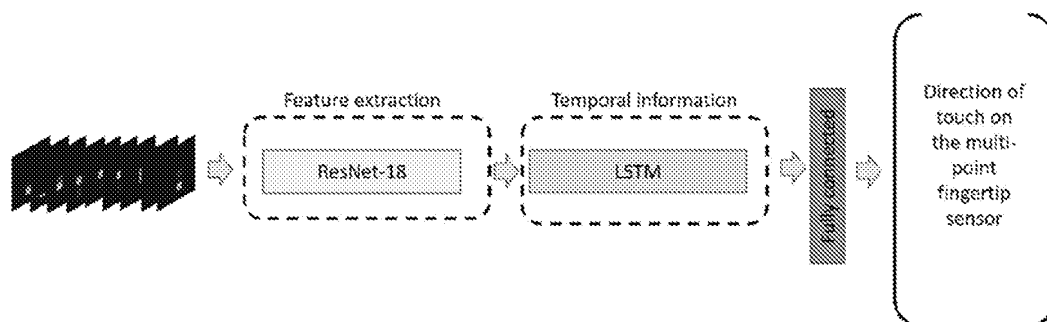
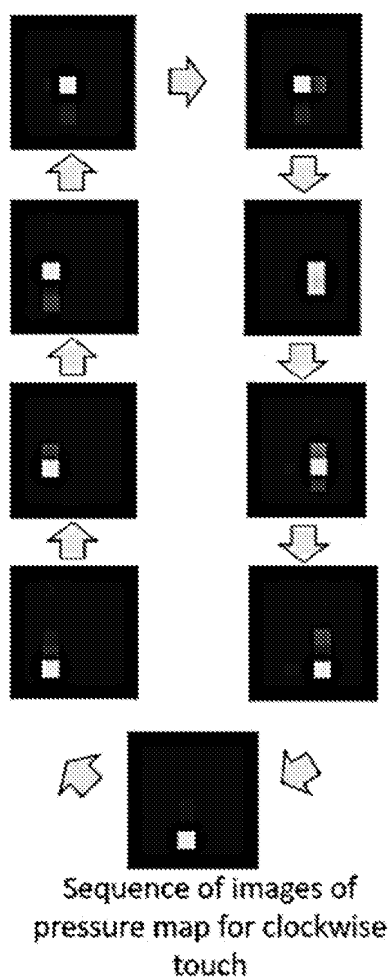
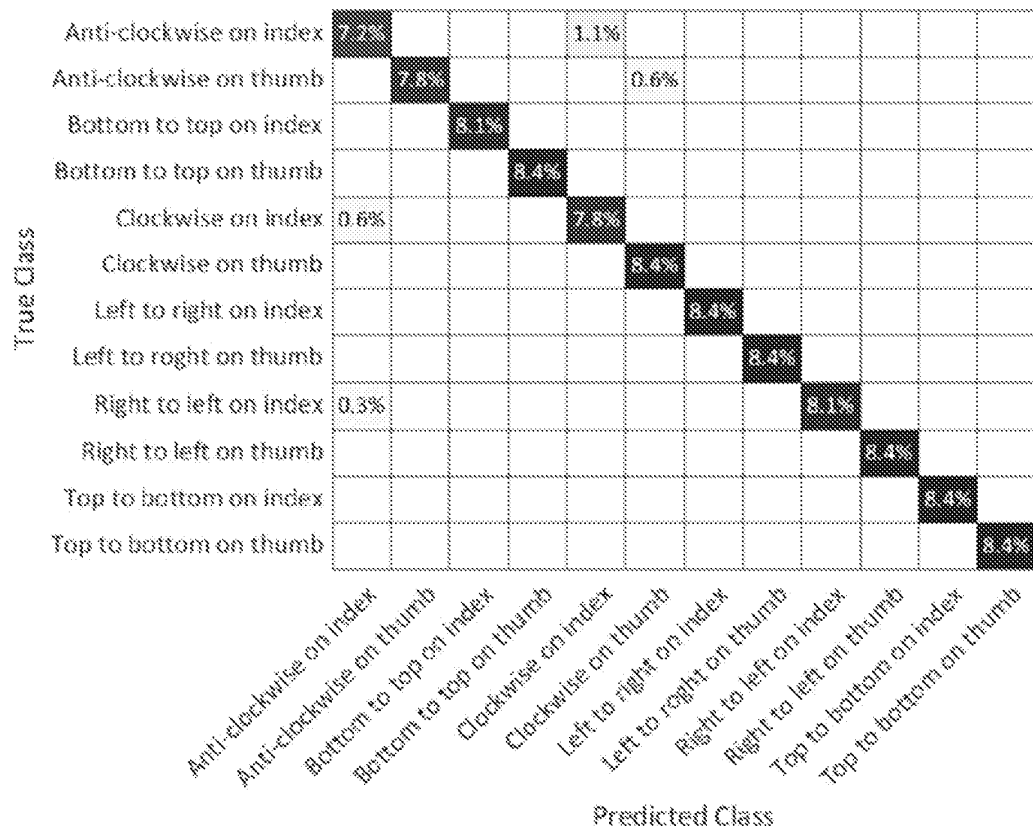
FIG. 10A**FIG. 10B**

FIG. 10C



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FIG. 11