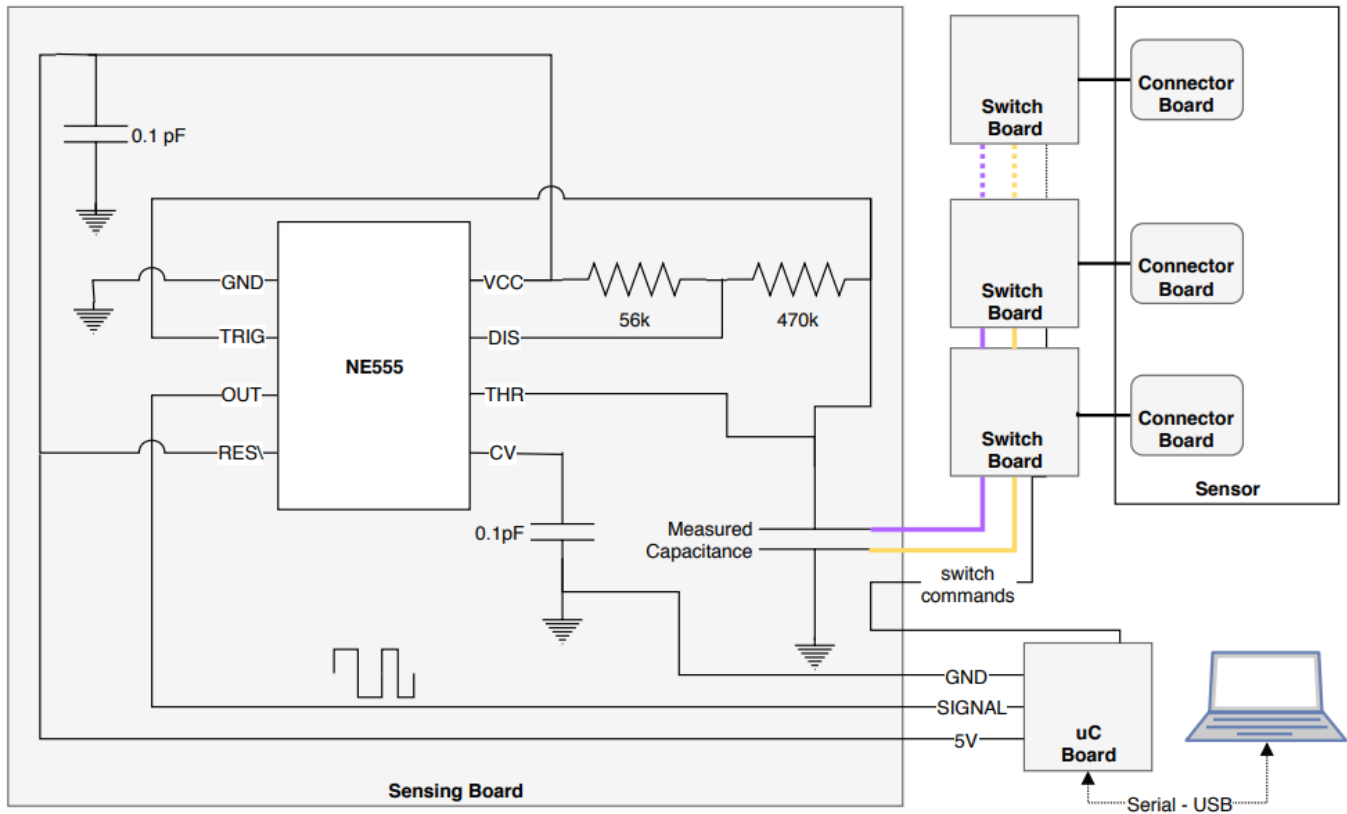# 555 Capacitance Measure Circuit

Original Design

Fig. 26. Our modular setup consists of two parts. Left: The capacitance sensing circuit is implemented with a NE555 timer IC, resulting in a square SIGNAL of the charging time that is read by the uC and sent to the computer. Right: The uC board and the switch boards go through all combinations, dynamically connecting the current set of source electrode strips (purple) and ground electrode strips (yellow); see Sec. 4.2 and Fig. 6 for details.

NE555

Truth table

PIN 2	PIN 6	Q	^Q	PIN 3
> 1/3 VCC	> 2/3 VCC	0	1	0
> 1/3 VCC	< 2/3 VCC	Stay		
< 1/3 VCC	< 2/3 VCC	1	0	1
< 1/3 VCC	> 2/3 VCC	Unstable		

Pin

- 1 GND: connect to ground line
- 8 VCC: connect to fire line
- 2 TRIG: input 1, compare with 1/3 VCC
- 7 DIS: Connect to GND when output of S-R become 1 (PIN 3 output 0).
- 3 OUT: output
- 6 THR: input 2, compare with 2/3 VCC
- 4 RES: Switch of the S-R latch
- 5 CV: useless, connect to ground through a capacitor

Formula

C = 1/(f · (R1 + 2R2) · ln(2))

- We can enlarge two resistance? Since we neglect the resistence of the electrodes, the larger the resistance is the accurate we get. The trade of is the measuring time which we don't care. The choice in the paper is for real-time case.

- We need to measure and subtract the parasitic capacitance by doing the same experiment on two unconnected conector board.