

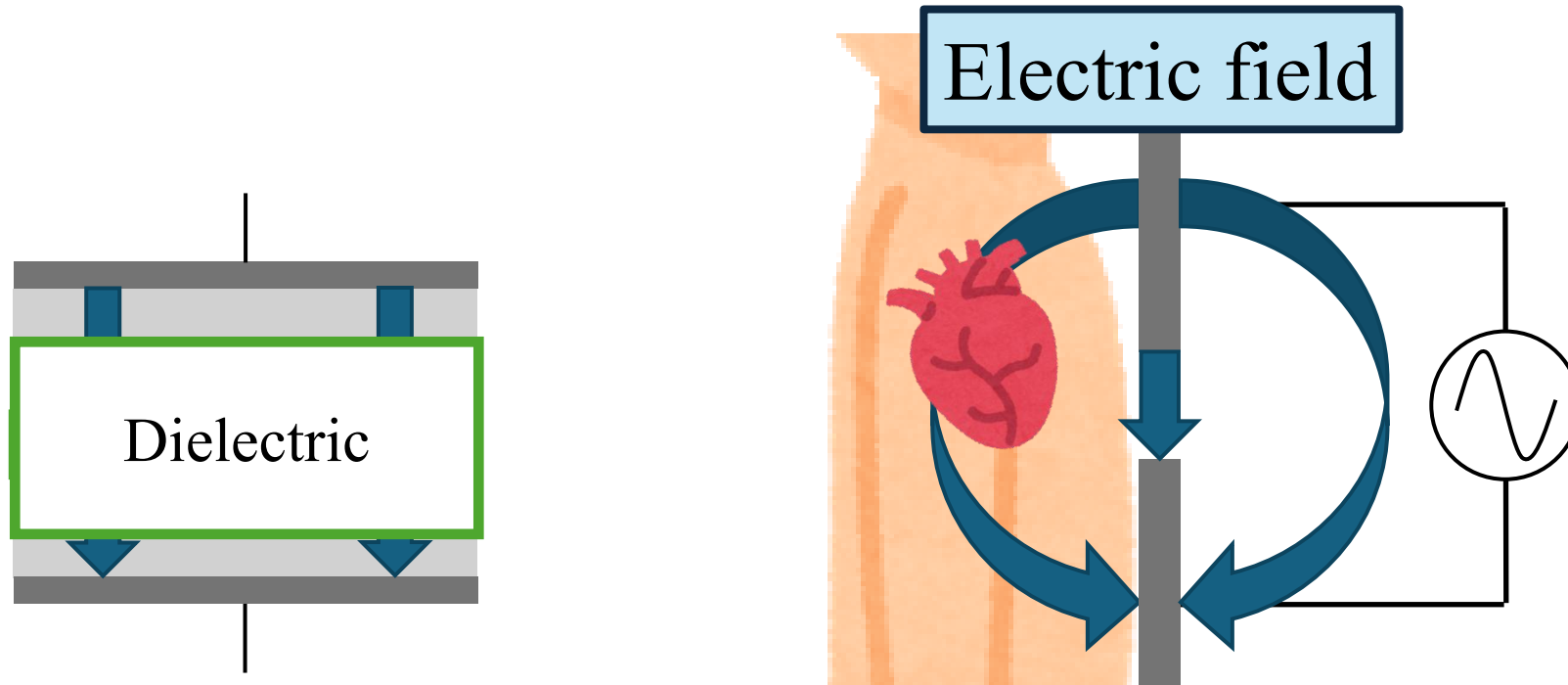


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a Respiration and Cardiac Dynamics Waves Measurement System using Coupled Capacitance Electrode

Measurement Principle

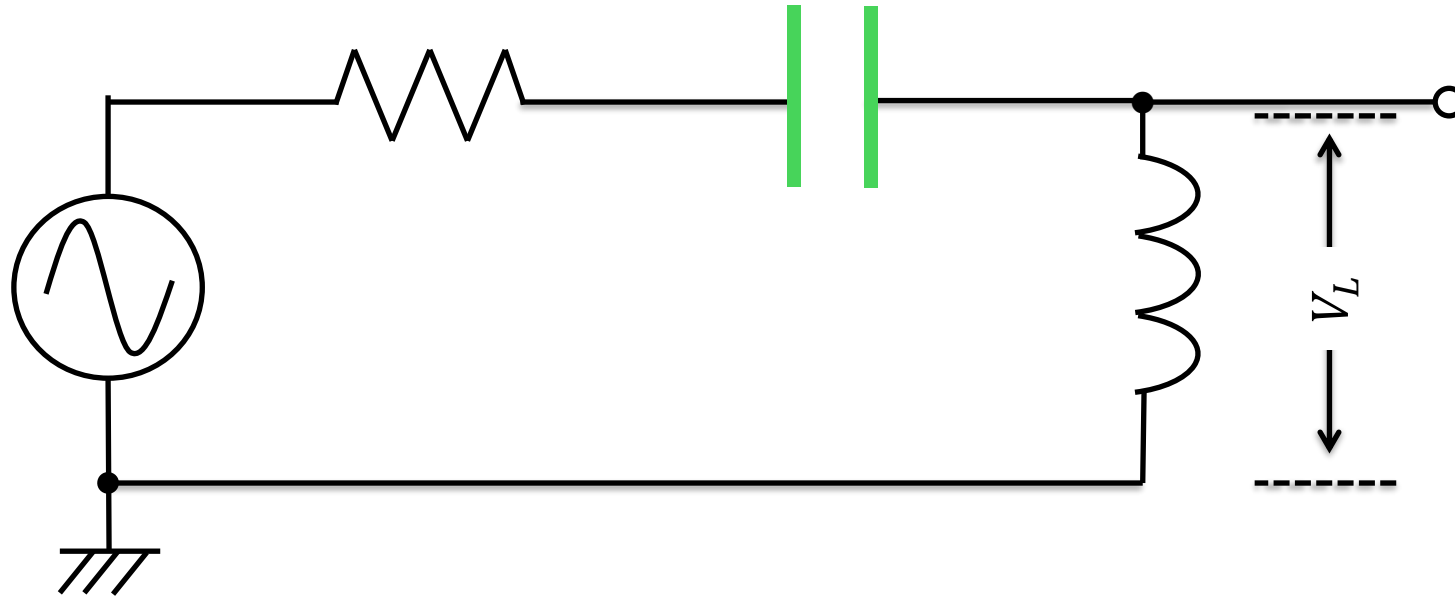


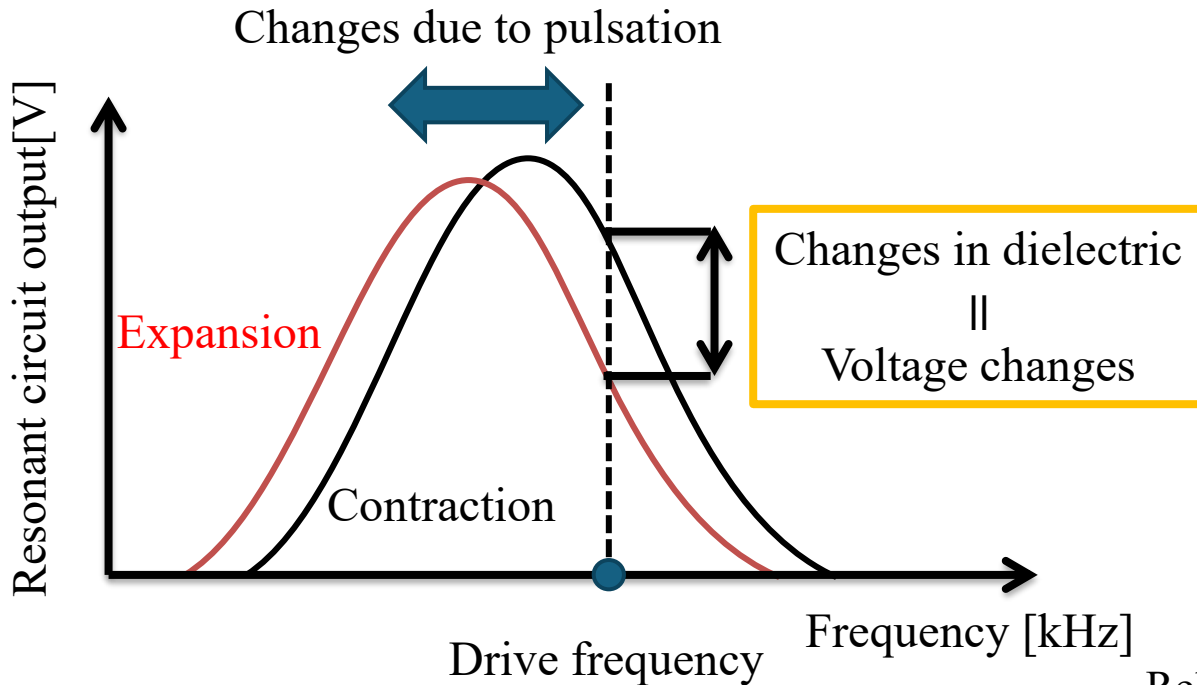
The capacitance C is proportional to the relative permittivity ϵ_s .

- The change in capacitance caused by the heartbeat is extremely small, I use an RCL series resonant circuit to amplify the voltage change associated with the capacitance variation.
- The change in capacitance is measured as the voltage across the coil.

RCL series resonant circuit

Replace the capacitor element with the proposed electrode.





Resonant Frequency

$$f_r = \frac{1}{2\pi\sqrt{LC}} [\text{Hz}]$$

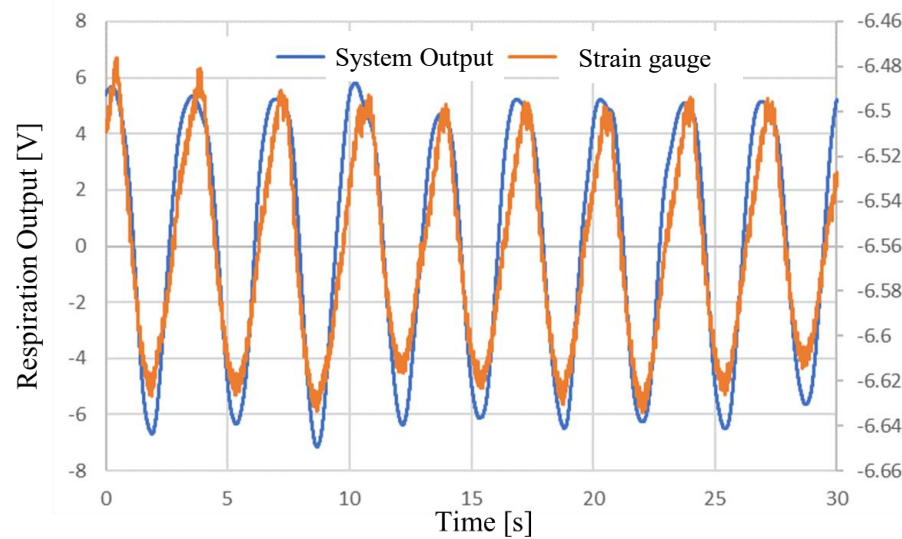
Q Value

$$Q = \frac{1}{R} \cdot \sqrt{\frac{L}{C}}$$

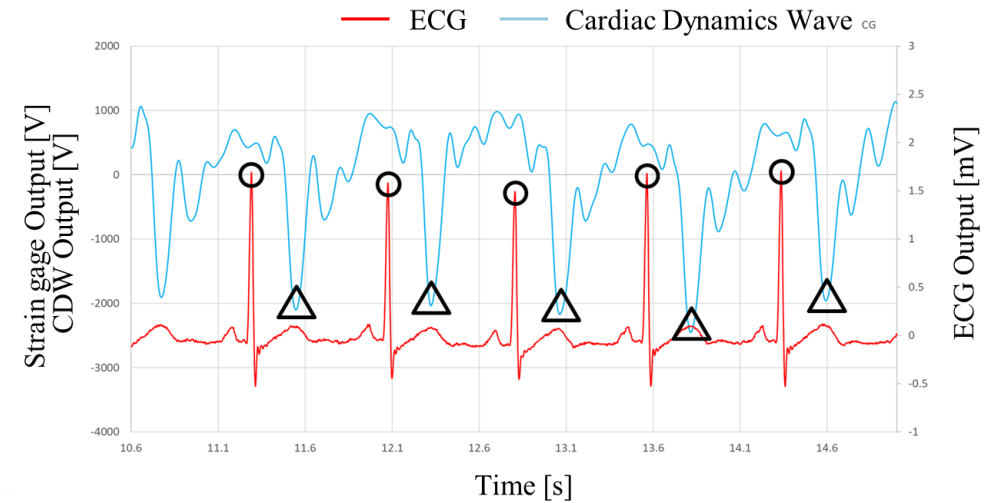
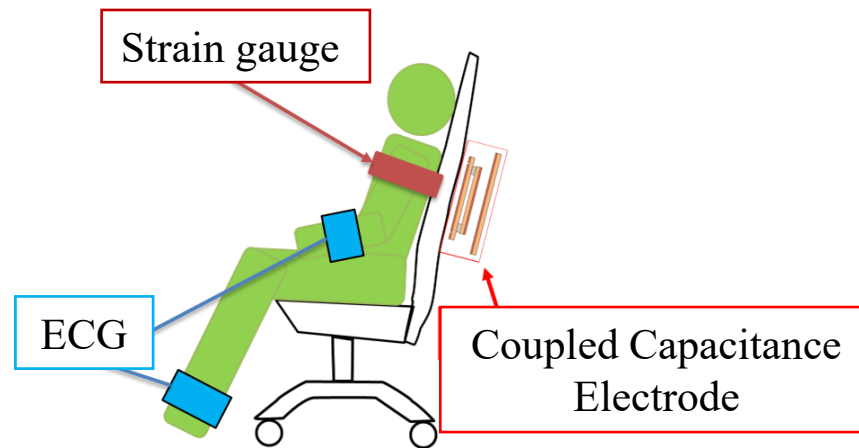
- The frequency characteristics change with changes in the dielectric material.
- The change in the dielectric material can be measured as a voltage difference.

Relationship when measured from the back

	Contraction	Expansion
Capacitance	↓	↑
Resonant Frequency	↑	↓
Q Value	↑	↓
System Output	↑	↓



Respiratory measurement results



CDW measurement results

