Eye-Tracking Coil Gun

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Our Work

We construct a coil gun which can take aim at an object we are looking at and then fire the coil gun by pressing the button.

Operation Procedure

| Reading data from eyes by electrodes | Fliter and amplifying circuit | Converting analog signal to digital signal | Sending data to Arduino by wires | Control the direction of the coil gun |

Electrooculography

The distribution of charges can be seen as a pair of dipole at the fundus and cornea. During the rotation, the potential difference over the eye changes. Thus, we can find the bridge between voltage difference and the angle.
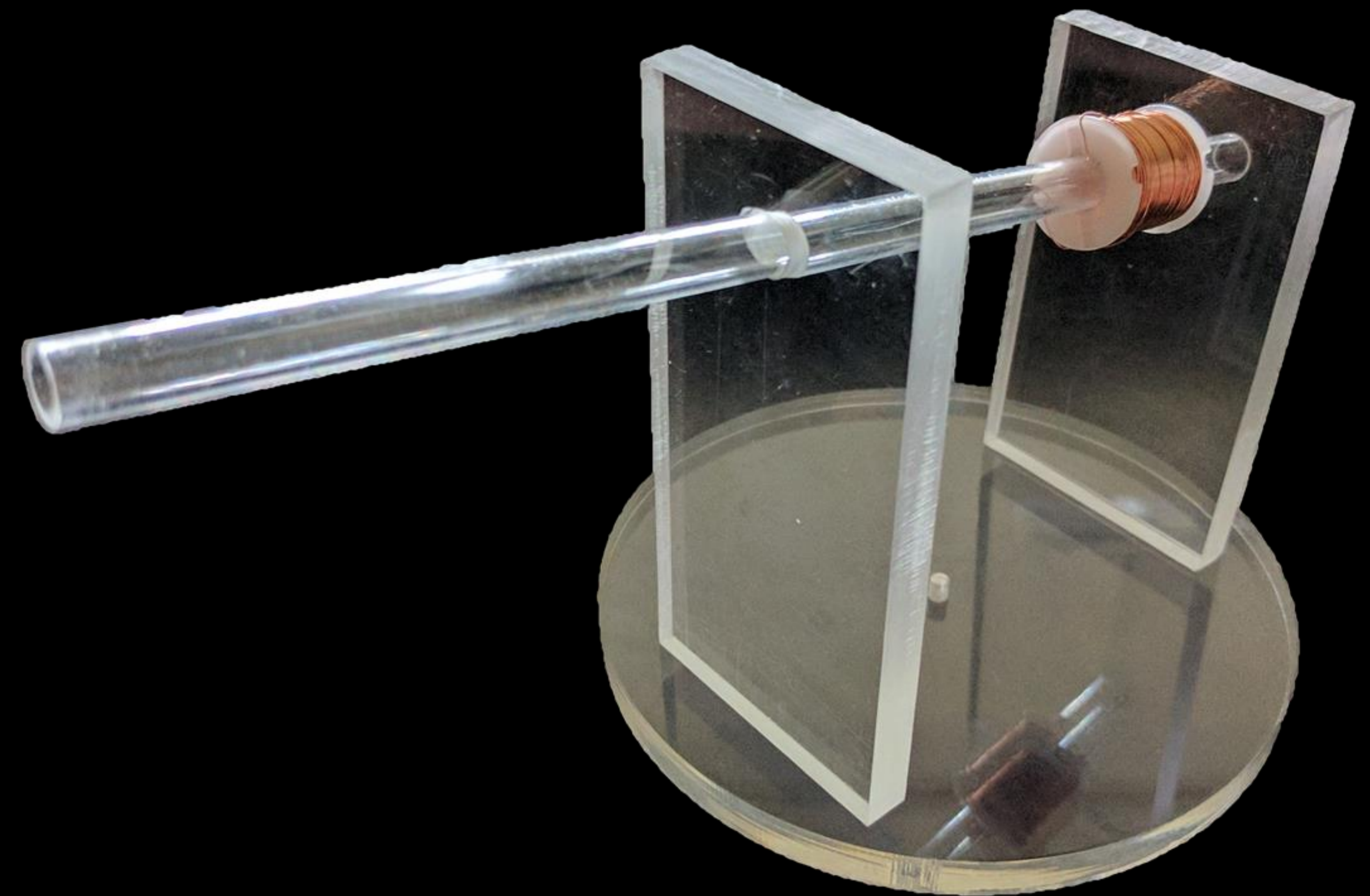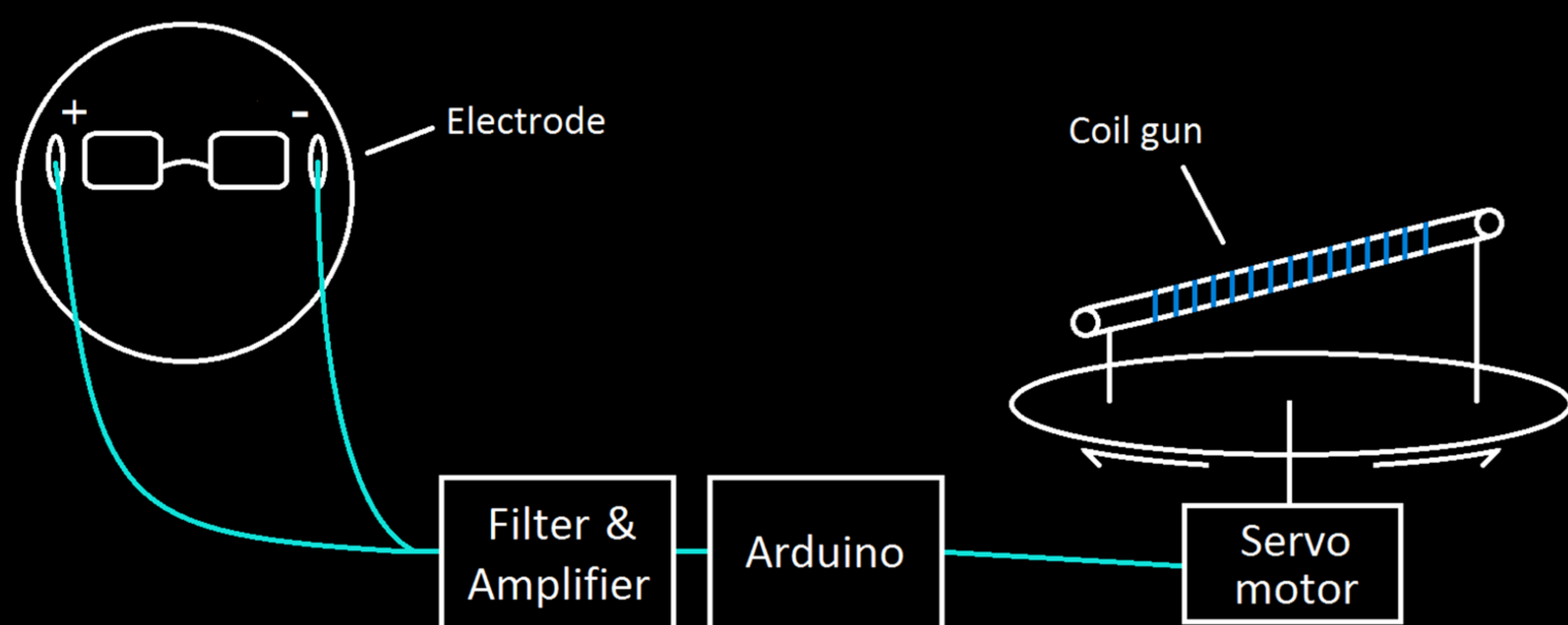

Signal Processing

An $0.05 \sim 30 Hz$ band pass filter, an instrumental amplifier, a $60 Hz$ low pass filter are used to amplify the signal and reduce the noises from skin and the circuit. A $2.5V$ offset is added for the control of Arduino.
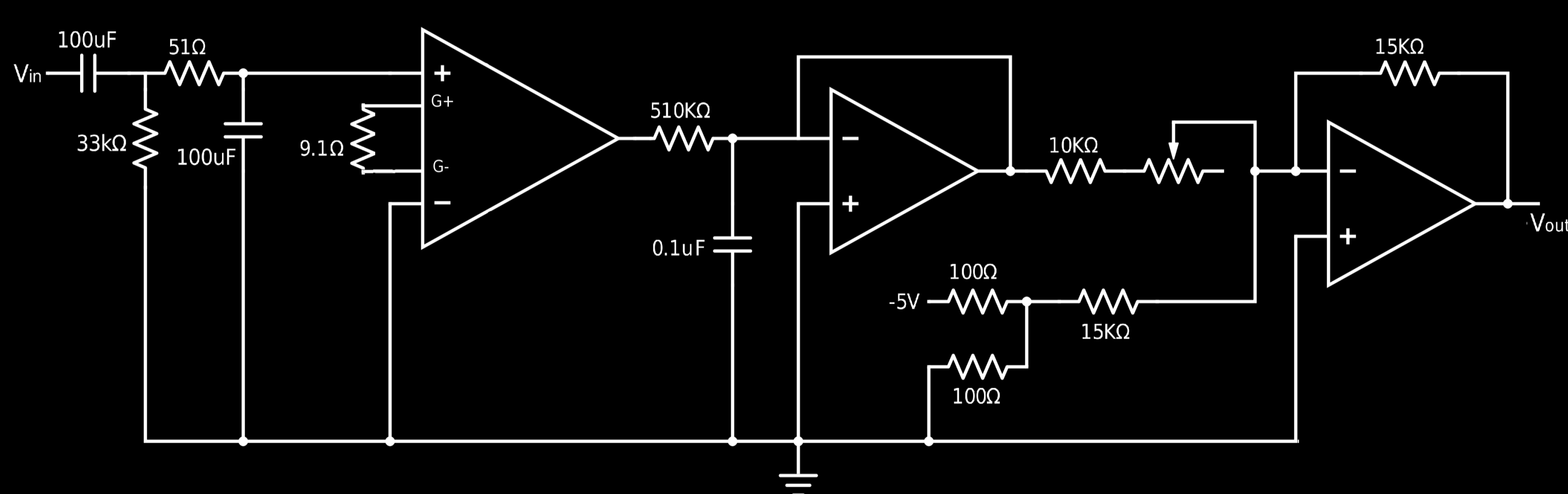
Coil Gun

The capacitors are charged when the button is released. The button pressed, the first thyristor will be switched off and the second one switched on. Then, the capacitors give the power to the coil and accelerate the projectile.

$3.3\ mF \times 4$

$9V$

Turn 20° to the left

Turn 40° to the right (right limit)

Turn 20° to the right
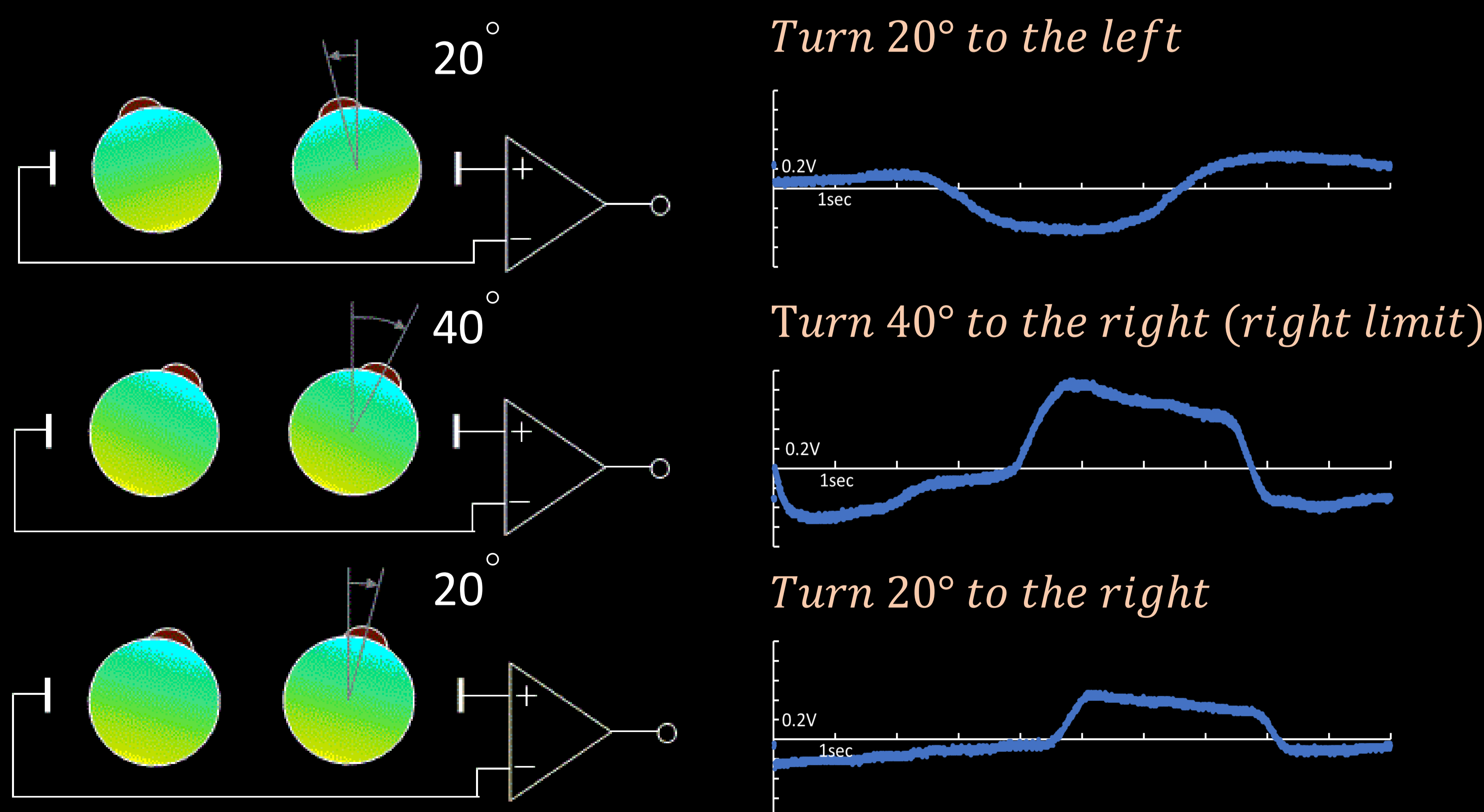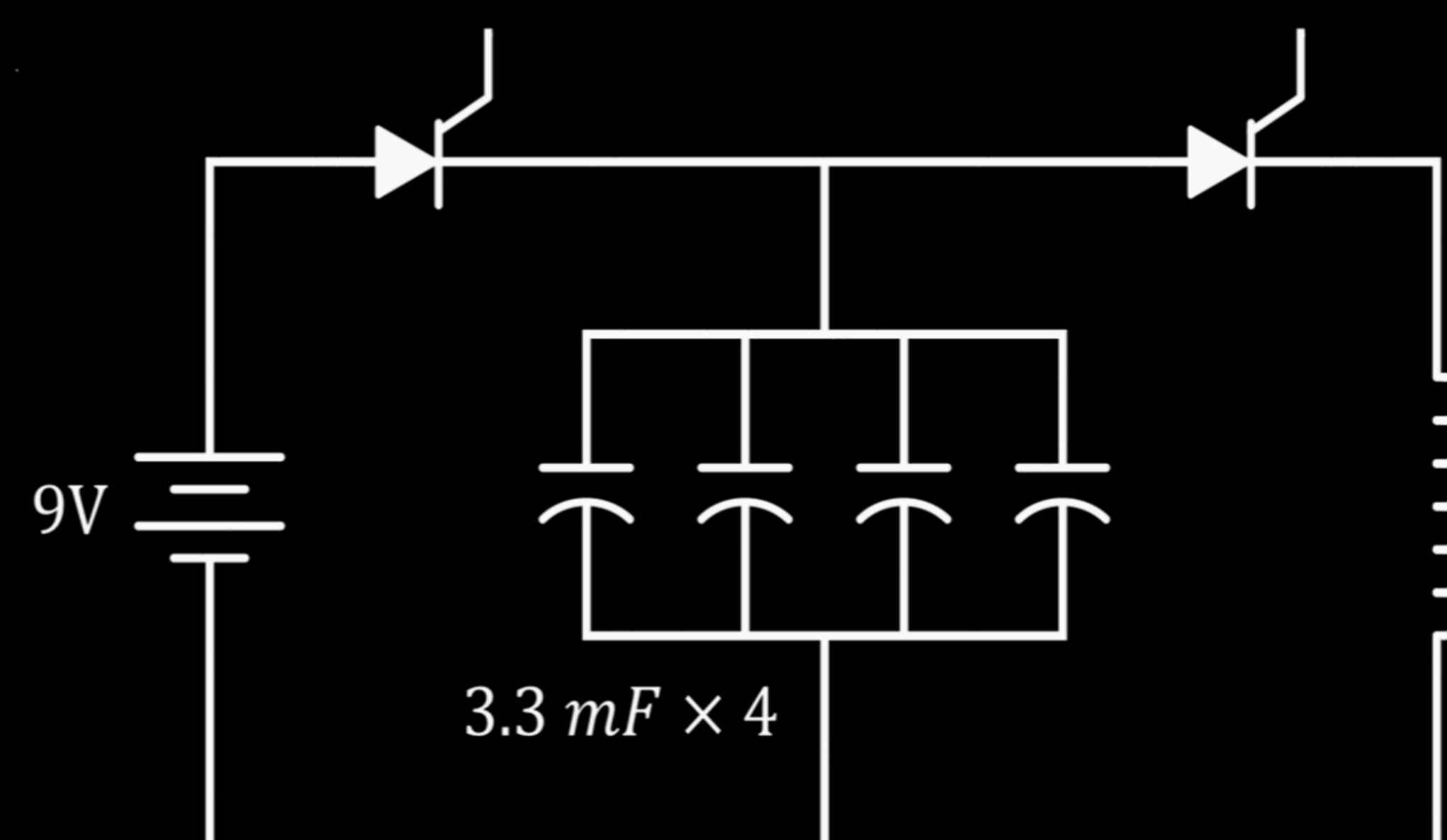
Conclusion

- The noises in eye signals can be produced by the skin and circuits.

- We can find a calibration line to fit the relation between the rotational angle and voltage signal.

- The calibration lines are not the same for different subjects.

- The number of turns per length of the coil and the total capacitance influence the power of the coil gun.

Reference

Automatic Electrooculogram Classification for Microcontroller Based Interface Design - by M. Trikha, A. Bhandari and T. Gandhi, IEEE (2007)
The electrooculogram (E.O.G.). Principle and technic. Its value in the study of maculopathies - by PA Dorne (1971)