

Quadcopter

Huai-En Chen (陳懷恩), Chun-Chieh Yan (顏君健), Chun-Tang Wang (王俊棠)

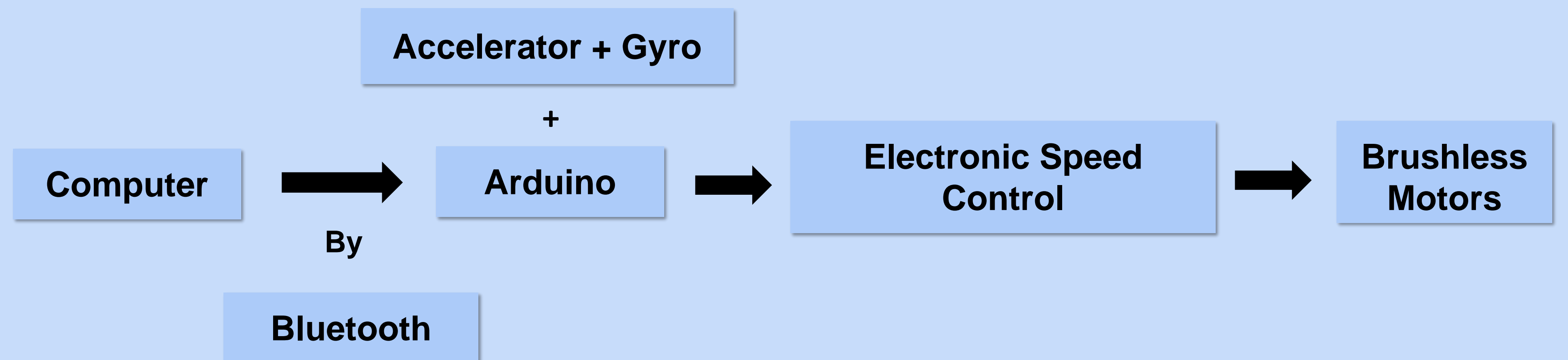
Instructor: I Lin (伊林), TA: 楊基, 蔡俊毅, 林柏丞, 周基霖

Experimental Physics I, Department of Physics, National Central University

Motivation

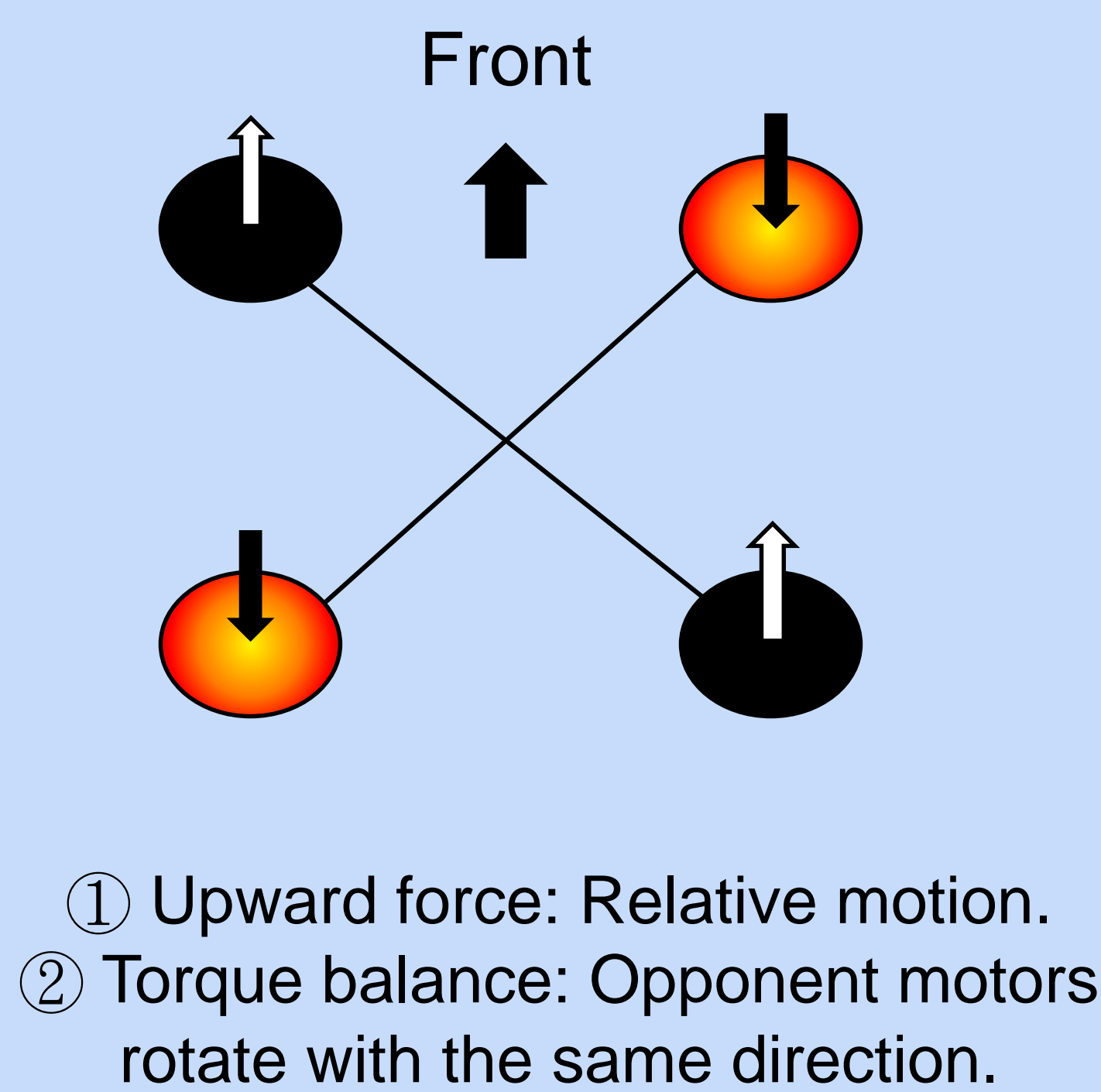
Recently, quadcopters become more and more useful. The most popular application is aerial photography. Besides, having an aircraft that is controlled easily is most of people's dreams. Therefore, we want to use some accessible components and the programming to let the quadcopter fly stably in the sky.

Structure of the Quadcopter

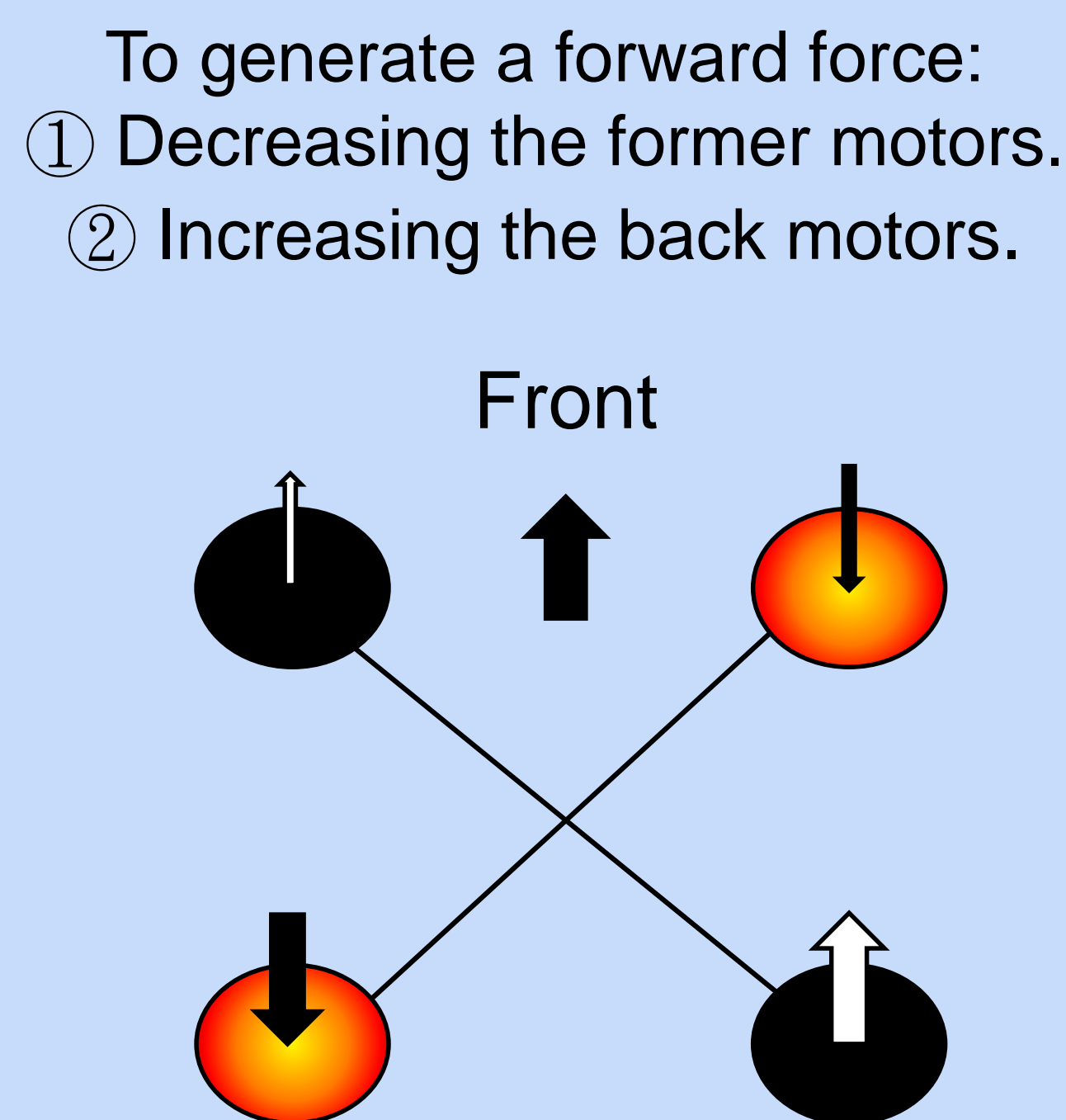


Flying Modes

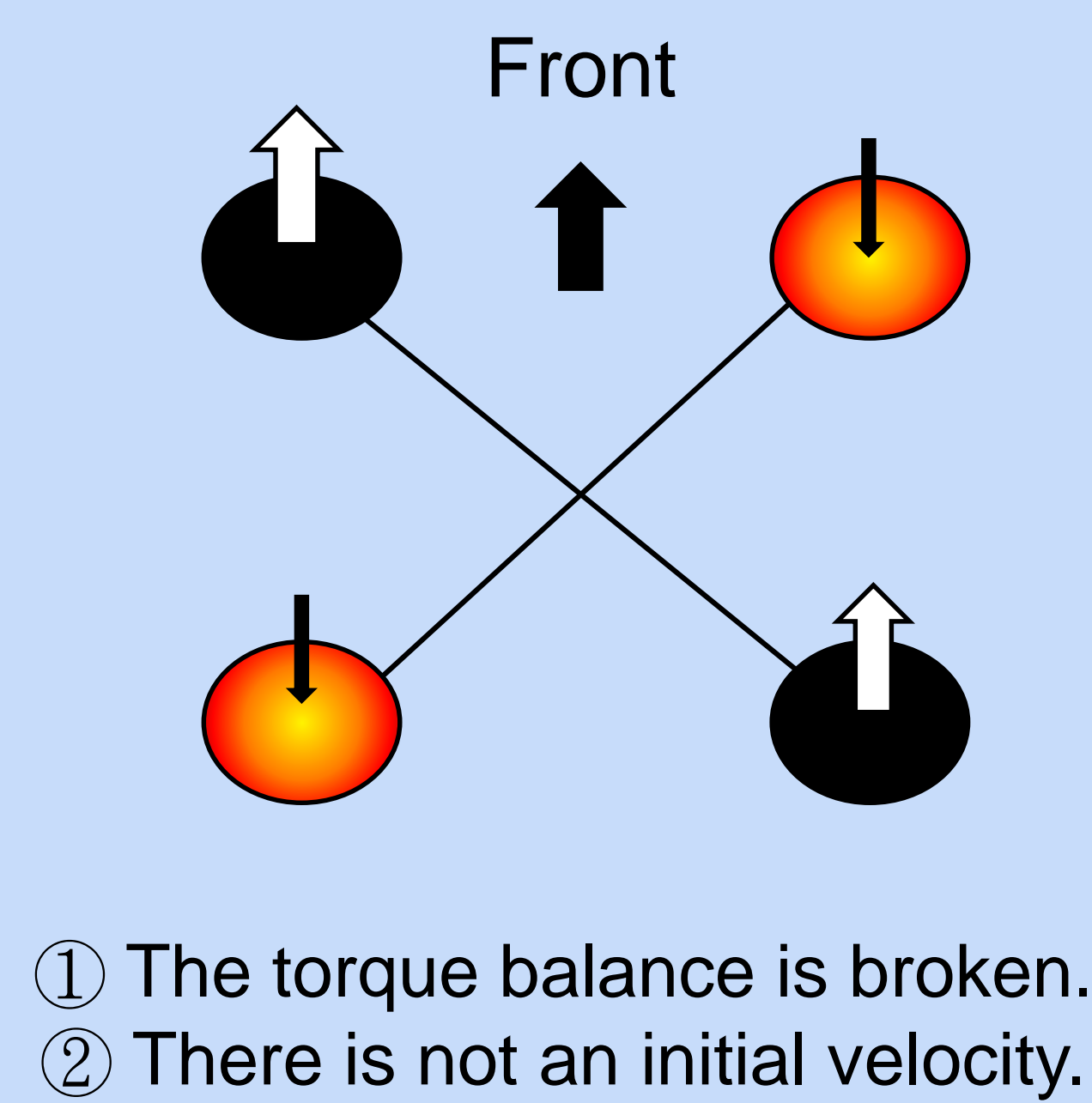
Vertical



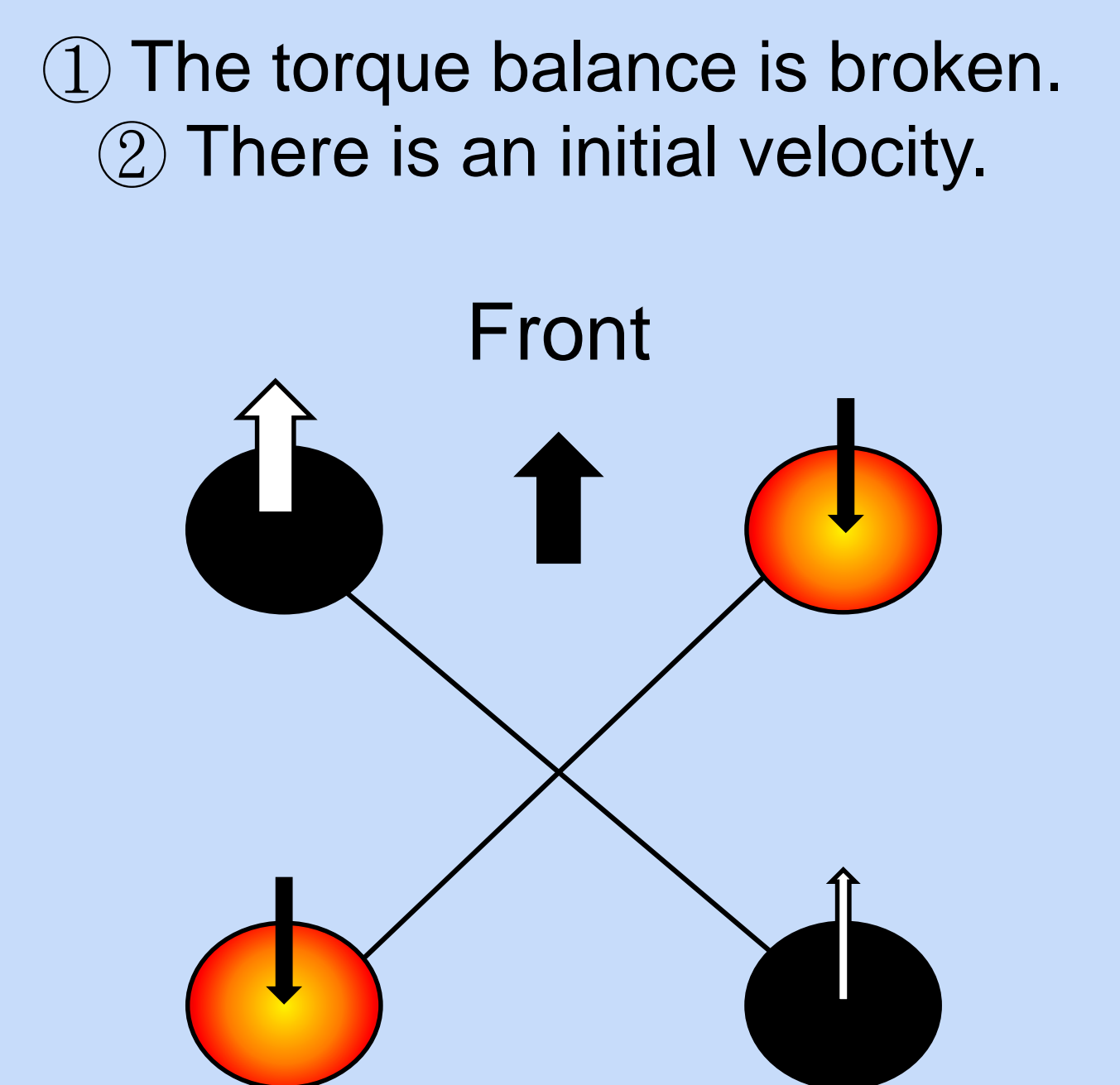
Translation (Forward)



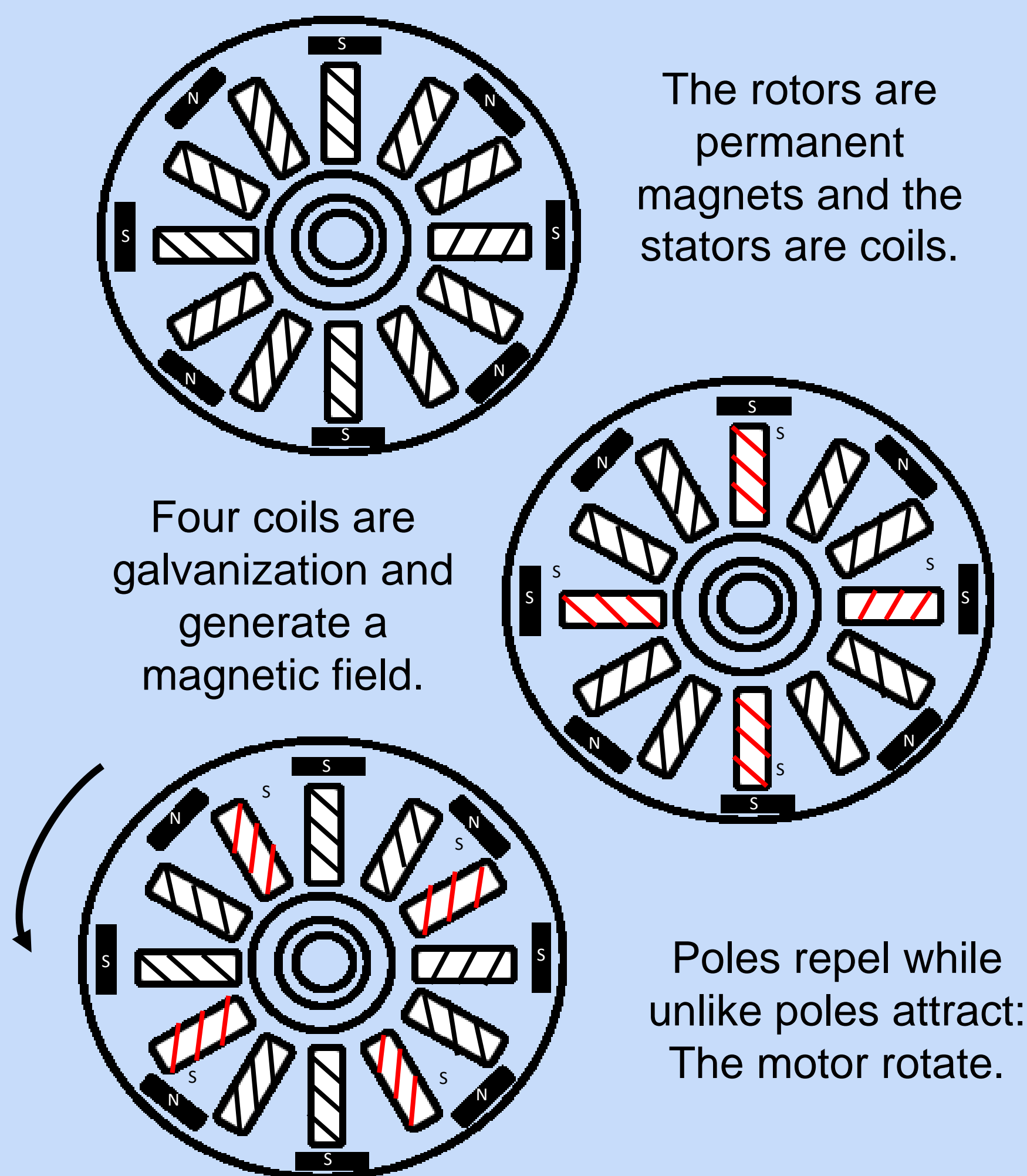
Spin (Clockwise)



Yaw (Left Yaw)

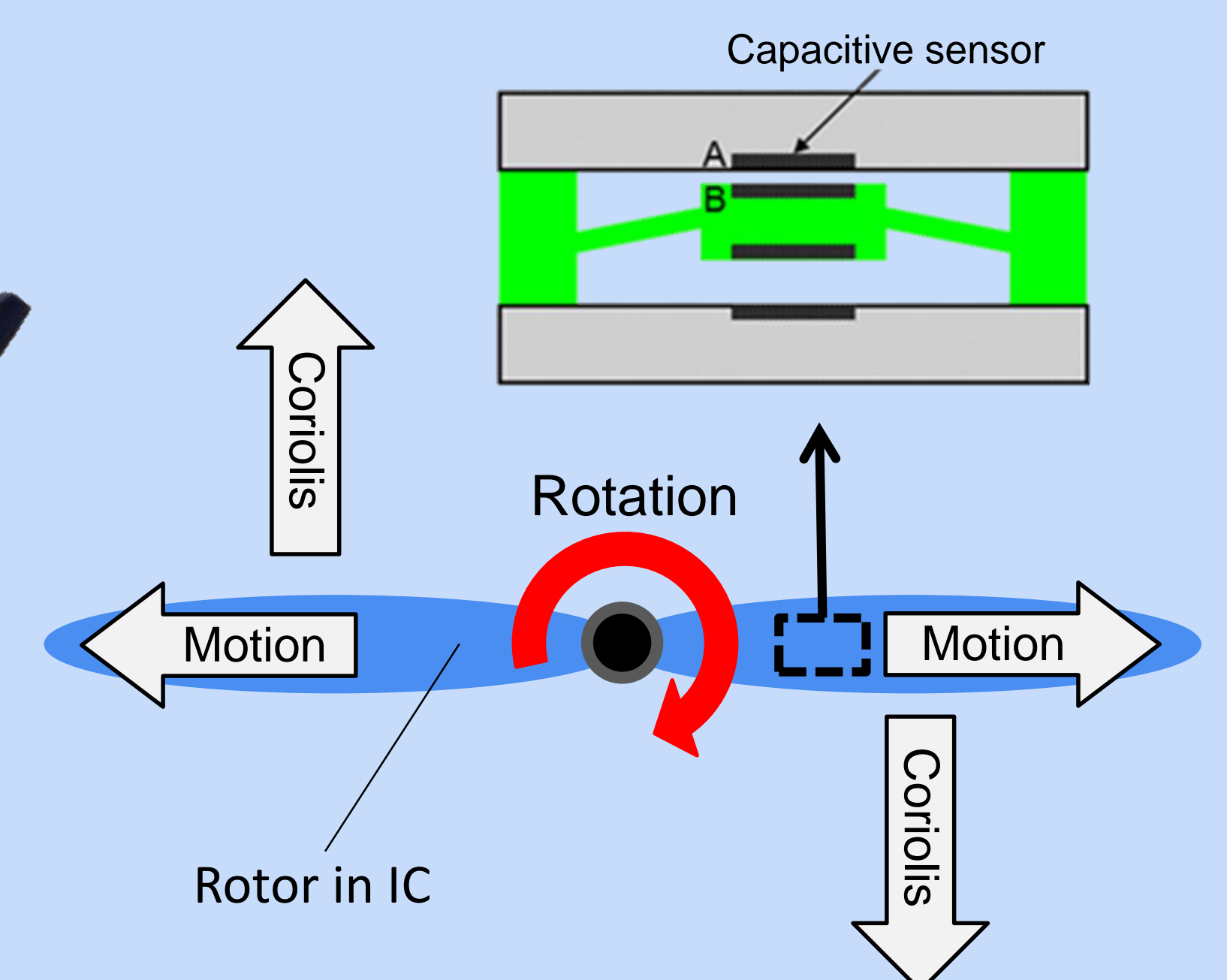


Brushless Motor

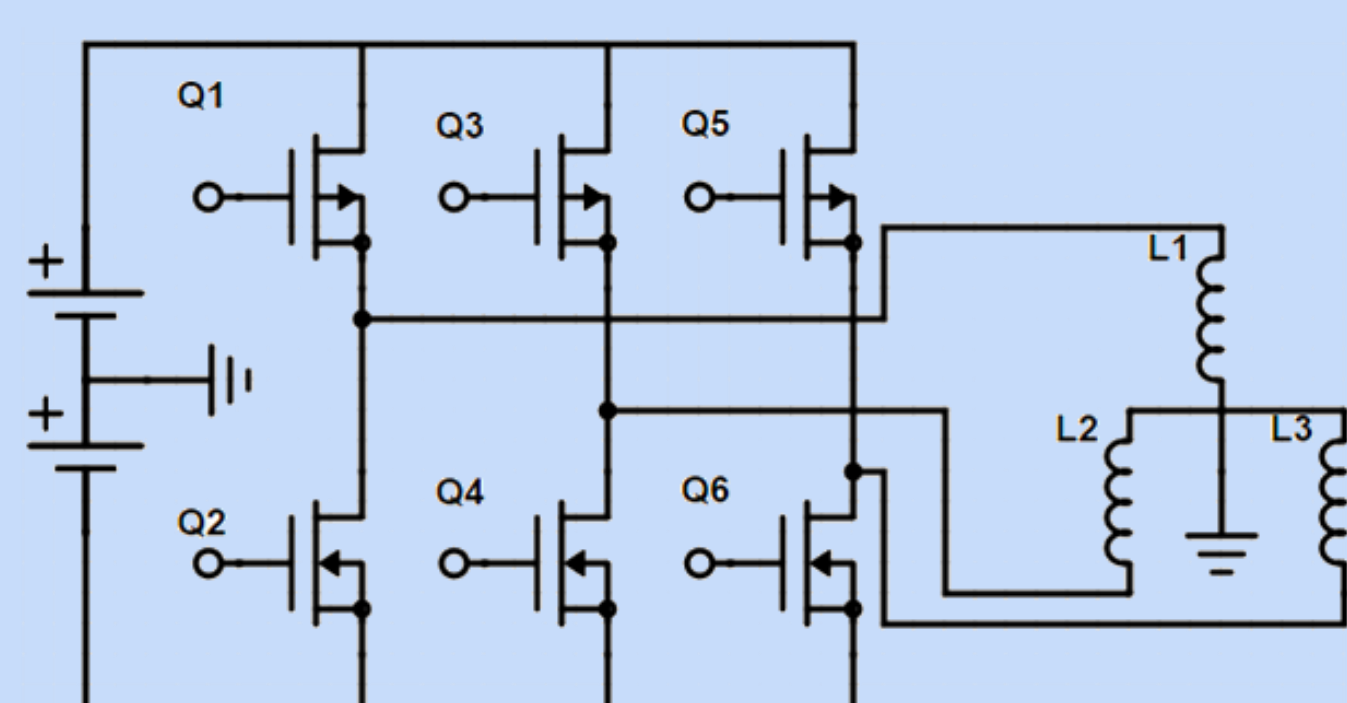


How it Sense Acceleration and Rotation?

Linear acceleration and rotation induced forces change the capacitor gap widths of the corresponding sensors. The induced voltage changes are measured for monitoring acceleration and rotation.

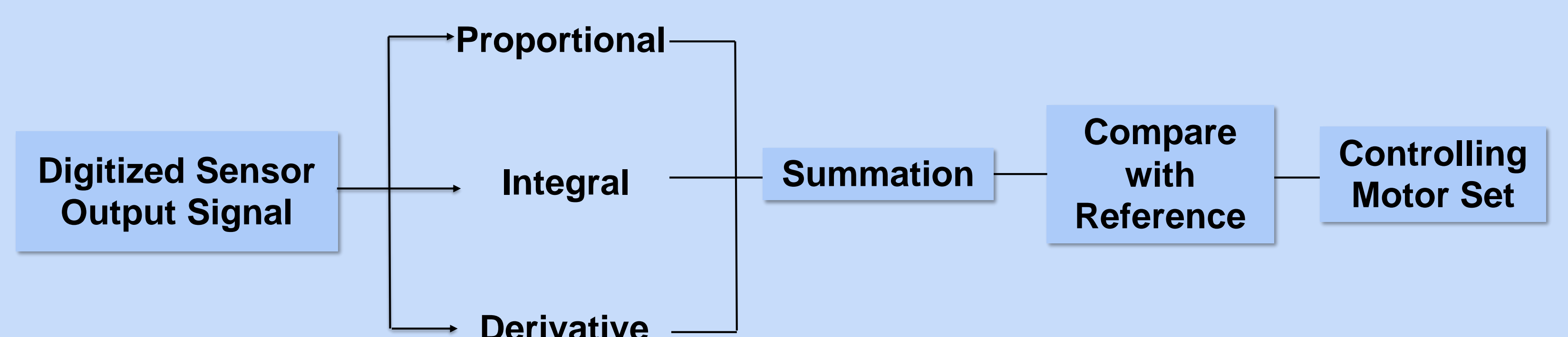


Motor Drive



To control the motor, the ESC which is composed of six MOSFET is necessary. The positive and negative signals are sent into the coil in order with the phase of 60°.

Flight Feedback Control



Conclusion

The major point of the quadcopter is PID control. With some components (Arduino card, brushless motors, ESC, sensor, and Bluetooth mode) and programming of Arduino and VB, we can finish a quadcopter that is controlled by computer remotely.

Reference

<http://cse.nichijou.blogspot.tw/2014/03/Quadcopter-2.html>
http://www.eettaiwan.com/ART_8800701519_480502_TA_e52a9104.HTM
<http://tds.ic.polyu.edu.hk/mtu/atm/pid/t1/p2.htm>