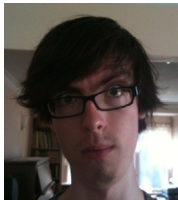


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# Falcon

## Flight Controller



The falcon flight controller is a complete solution for **aerial vehicle motion control**. It is designed to provide stability control suitable for **autonomous robotics applications**.



**Gyroscopes and Accelerometers** measure how the platform is moving



**A TI Piccolo Processor** estimates platform orientation based on sensor data



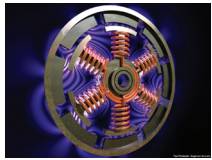
**An Atmel Xmega Microcontroller** controls propellor speed according to sensor data to stabilize the platform



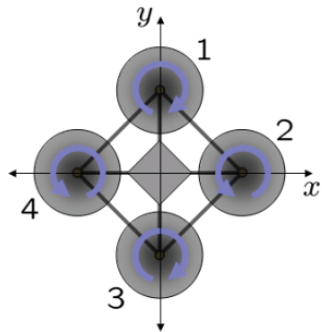
**A Brushless DC Motor Controller** controls comutation of four motors

## Thank You!

To everyone who has helped to make this project possible.



The **Propulsion System** consists of four propellers arranged as follows:

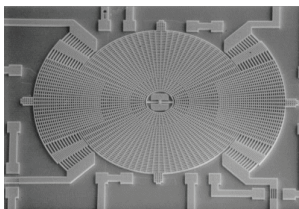


**Platform Motion** is controlled by the speeds of the motors:

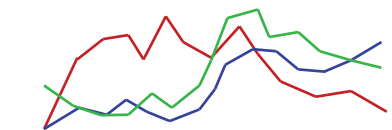
**Roll:** 4 faster than 2

**Pitch:** 3 faster than 1

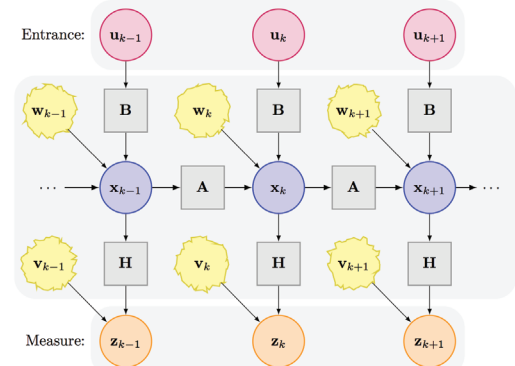
**Yaw:** 4&2 faster than 1&3



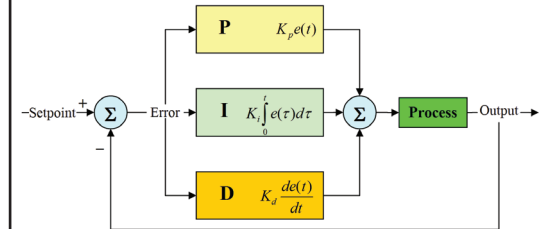
MEMS **Gyroscopes and Accelerometers** measure platform rotation and acceleration



Data from MEMS sensors is sampled with a 16-bit **Analog to Digital Converter** at 1kHz.



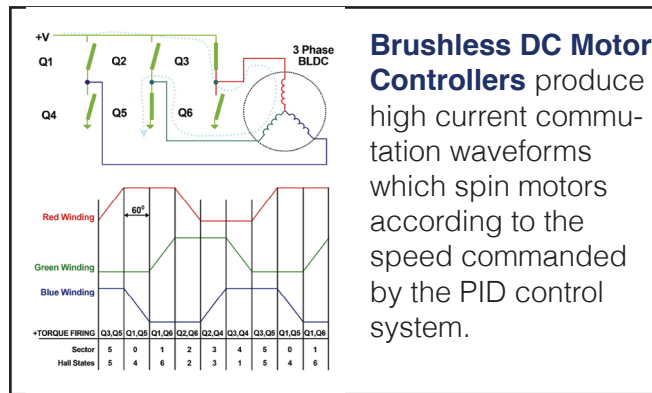
A **Kalman Filter** combines noisy data from accelerometers and gyroscopes to estimate the platform orientation.



A **PID Feedback Control System** is set to maintain orientation based on the orientation estimate.



A **human or Computer Pilot** sets the desired orientation.



**Brushless DC Motor Controllers** produce high current commutation waveforms which spin motors according to the speed commanded by the PID control system.



## The Falcon System

### System Requirements Achieved

- 1kHz Update Rate
- 3 Cell Li-Poly Power Source
- Up To 15A Per Motor
- Weight: <100g
- USB Computer Interface
- Integrated Wireless Kill Switch
- Locking Connectors