

3DOF Control

Controlling 3 degrees of freedom

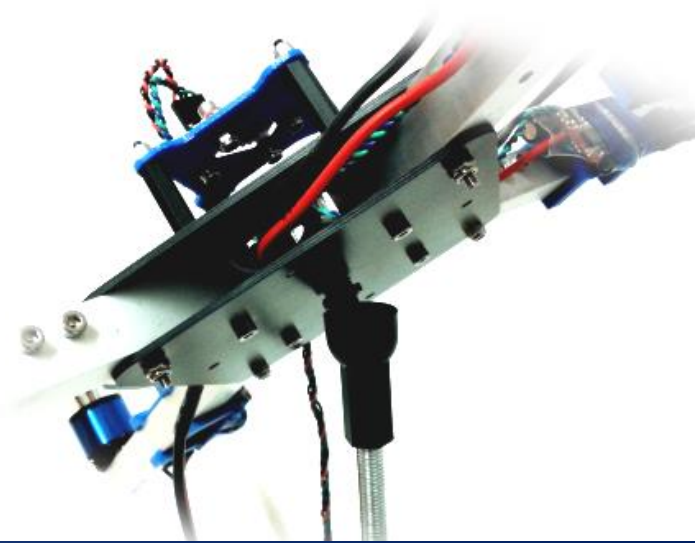




Content

Time scope: 1-3h

- 3DOF Control
- Safety Instructions
- Exercises & Hints





3DOF Control

3DOF Control:

- DOF = Degrees of Freedom
- 3 DOF Control (Roll, Pitch, Yaw) is the complete control of a quadrotor, enabling it to fly.
- A quadrotor that can be controlled stably on the 3DOF QCS Axial Joint is able to fly with almost the same controller.
- The only left-over: Remote control and hover gas are missing -> The gas must be controllable in flight which **MUST NOT** interfere with the controlling negatively!





Safety instructions

Safety instructions:

- Check the system and retighten all parts (screws/propellers/motors/arms/joints/bolts/nuts) if necessary before every start!
- Only connect and start the motors under the supervision of your teacher!
- Keep a safety distance of at least 50cm to any propeller.
- Take care for your neighbor and yourself! Be ready to turn the system off immediately in case of emergency!



Emergency Stop:

- Unplug / Shut down Power
- Unplug TWI Cable
- Shut down MCU



Exercises

Required hardware:

- EVK1100
- Micro USB cable for power and flashing
- QCS in 3DOF Control Mode

Required software:

- AVR Studio 32 (with Tool Chain and FLIP Driver)
- EMQ Framework (Code)
- Documents:
 - EMQ_Framework.pdf



Exercises

Exercise:

Extend your program so that a control of all rotatory axes is possible and the quadrotor would be able to fly stable. Use the 3DOF – QCS – Axial Joint for your tests.

IMPORTANT SAFETY INSTRUCTION: Before starting the 3DOF set up, switching from 2DOF to 3DOF, set ALL PID Parameters to their half value! When starting the system in the 3DOF set up, make sure that the system does not perform strong unexpected movements by holding it with one hand on the safety ring or on a quadrotor leg.

For yours and the safety of others, DO consult your teacher / supervisor before you start the system! The 3DOF-QCS systems are NO TOY and can cause severe injuries when used improperly!