# Deep Reinforcement Learning for Drone Control

## Project Summary

The goal of this project is to design a Deep Reinforcement Learning (DRL) algorithm for drone control in complex scenarios such as acrobatic maneuvers and/or under extreme wind disturbance. Training is performed in the AirSim simulation environment before transferring the controller to Pixhawk 4 Mini QAV 250 drone hardware in the Autonomous Systems Lab.

## Project Type

- BA Thesis (3-6 months)
- MA Thesis (6 months)
- Praktikum (3 months)

## Required Qualifications

- Prior experience with Neural Networks
- Basic programming skills in Python

## Contact

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## Detailed Description

Quadcopters are employed in an increasing number of applications. Traditional control approaches provide already robust automated flight navigation in stable environments. RL is a valuable tool to account for non-linear dynamics. The goal of this project is to apply DRL so that the drone (agent) learns an optimal control policy under, for example, previously unknown harsh environments by interacting with them in simulation and in real world deployment.

AirSim RL Environment

Holybro QAV 250 Drone

## References

- Koch W. et al., "Reinforcement Learning for UAV attitude control" in ACM Transactions on cyber-physical systems, 2019.
- Hwangbo J. et al., "Control of a quadcopter with reinforcement learning," in IEEE Robotics and Automarion Letters, 2017.