



FAKULTÄT FÜR
INFORMATIK

Kickoff Software/Team Project Swarm Lab

Prof. Mostaghim, Christoph Steup
Chair of Intelligent Systems

Organization

- Time and location:
 - Start: 14.10.2015
 - End: 17.02.2016
 - Lab: G29-035
- Contact:
 - Christoph Steup: steup@ovgu.de
 - Simulation - Lukas Mäurer: Imaeurer@st.ovgu.de
 - Copter - Sebastian Mai: sebastian.mai@st.ovgu.de
- Meetings:
 - Individual meetings for each group: every week (time will be set by the lecturer)
 - Get together meetings for all: every two weeks (Wednesdays 13:00 – 14:30 G29-035)

Teams

- 4 teams of maximum 4 students
- Team organization: one team leader and two or three members
- Team leader:
 - Distributes the subtasks and takes care of the entire process
 - Communicates with the lecturer
 - Responsible for the documentation
- Presentations must be done by all the members
- Prerequisites:
 - Courses: PKES + TI2 | Swarm Intelligence | Control Theory
 - Programming: C/C++ | Python | Lua fluently
 - Enthusiasm and teamwork

Evaluation

You must deliver

- Working Prototype
 - Code
 - Documentation
 - Project management
 - A talk of maximum 20 minutes on February 17th , 2016
 - Video or Demo depending on task
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- Bachelor students may get a “ungraded certificate”
 - Master students get an individual grade

Topics

- Robust Take-Off and Landing
- Robust Multi-Copter Flight
- Simulation: Effects of Environment on the Swarm Behaviour
- Simulation: External control of Swarms of Copters

Robust Take-Off and Landing

- Evaluation of current behaviour on single copter
- Identification of problems
- Scripting of Take-Off and Landing routines
- Evaluation on multiple copters
- Goal: Take-Off and Landing with 90% success in 10 trials each
- Using FINkenII or FINken3
- Existing Software: <https://github.com/ovgu-FINken/paparazzi>



Robust Multi-Copter Flight

- Evaluation of copters' sensors in multi copter scenarios
- Evaluation of current control in multi-copter scenario
- Finding solutions for sensors
- Dual copter scenario implementation
- Goal: Copters do not crash against each other, ground or wall for one battery life cycle

Effects of Environment on the Swarm Behaviour

- Modelling environment in simulation
- Obstacles: Walls, Floor, Ceiling
- Noisy sensors
- Virtual Ranging
- Existing Software:
 - <https://github.com/ovgu-FINken/paparazzi>
 - <https://github.com/ovgu-FINken/simulation>
- Goal: realistic behaviour of the copters against the environment

External control of Swarms of Copters

- Virtual Copters in Simulation Environment
- Control of copters formations using external input
- Tasks:
 - Model Beamer based input
 - Model Light sensor
 - Create swarm behaviour for copters to react to input
- Goal: Beamer projected attraction and repulsion
- Simulation: <https://github.com/ovgu-FINken/simulation>