The Field Robotics Center

Seminar Series

Fri, May 24 **NSH 1507** **11AM – 12PM**

Food and Drinks will be served

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Mission Planning and Execution for the Unmanned Rotorcraft ARTIS

Abstract: One focus of unmanned systems research is to further reduce the dependency on human supervision and control during mission execution. On a task-based level and thus similarly to a human pilot, the system on board should be able to accept goal directed tasks from which it automatically formulates executable plan sequences. Task-based navigation for unmanned rotorcraft is an interesting problem, especially in a priori incomplete environment such as complex obstacle fields. This is especially true when there is limited computing power on board small unmanned aerial vehicles where at the same time most environment information is acquired online or changed during flight.
An overview of approaches used in our Mission Planning and Execution (MiPlEx) framework will be presented that are under development at DLR's fleet of Autonomous Rotorcraft Testbeds for Intelligent Systems (ARTIS). MiPlEx implements planning with uncertainties and combinatorial optimization, such that the task planning layer can be combined down to motion planning's control output layer on board our rotorcraft. It also comprises common conceptual interfaces for use with conventional operator interfaces. In particular, MiPlEx comprises an online sampling-based roadmap motion planner for multi-query path planning in 3D terrain. Evaluations of this concept for sensor-based navigation in urban scenarios are presented and current research questions highlighted. Furthermore, computer vision-based experiments for payload directed command missions are presented which close the loop between perception and control for different mission management phases. As a result, task-based command and control of our unmanned rotorcraft is achieved. Future directions will involve conceptual refinements of our decoupled architecture, in order to boost flight performance and increase mission execution safety aspects (e.g. involve more uncertainties during the planning phases explicitly).

Speaker Bio: Florian Adolf is a research scientist at the DLR Institute of Flight Systems in Braunschweig, Germany, where he is the group lead for mission planning and execution systems at the department of Unmanned Aircraft Systems. He joined DLR in 2005 to research automated guidance and decision making systems for use on board unmanned aircraft. Of particular research interest are sampling based motion planners for unmanned rotorcraft to automate mission planning tasks as well as a behavior-based mission plan execution.
Florian Adolf graduated from the Dept. of Computer Science at Trier University of Applied Sciences in 2003. He received a Master of Science in Autonomous Systems from the Department of Computer Science at Bonn-Rhein-Sieg University of Applied Sciences in 2005.




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