

Harald Pfifer

Chair of Flight Mechanics And Control

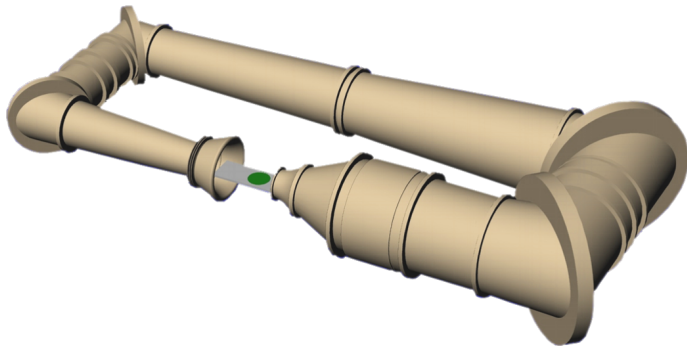
URBANSens - Energieoptimales Fliegen im urbanen Raum unter Ausnutzung von lokalen Windverhältnissen



Chair of Flight Mechanics and Control

- founded 2021
- 8 researchers, 3 technicians and 1 admin

The Wind Tunnel



- Göttinger style with open test section
- Test section length: 4.4m or 3.65m with running belt
- Nozzle diameter: 2m or 3m
- Free stream velocity: 1.5m/s to 60m/s

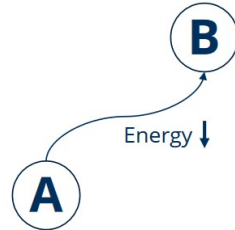
URBANsens

Energy Optimal Flight Path:

- local wind conditions
- real-time weather data (ground stations and onboard)
- real-time update of the flight path

Constraints:

- fixed wing UAV
- urban environment
- fast optimization algorithm required



The Project

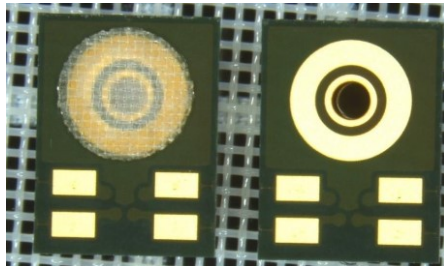
Partners:



Sensor Development:



Radar @ RuhrUni



MEMS Microphones @ Infineon

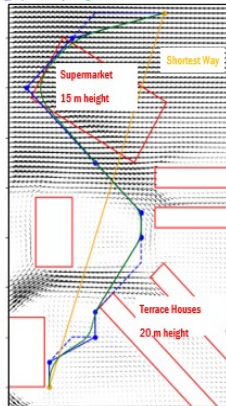
Path Planning



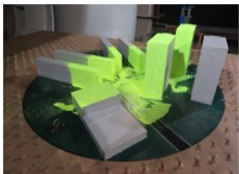
City Scenario



Energy Optimal Way + Flight Path



Flight Path Optimization



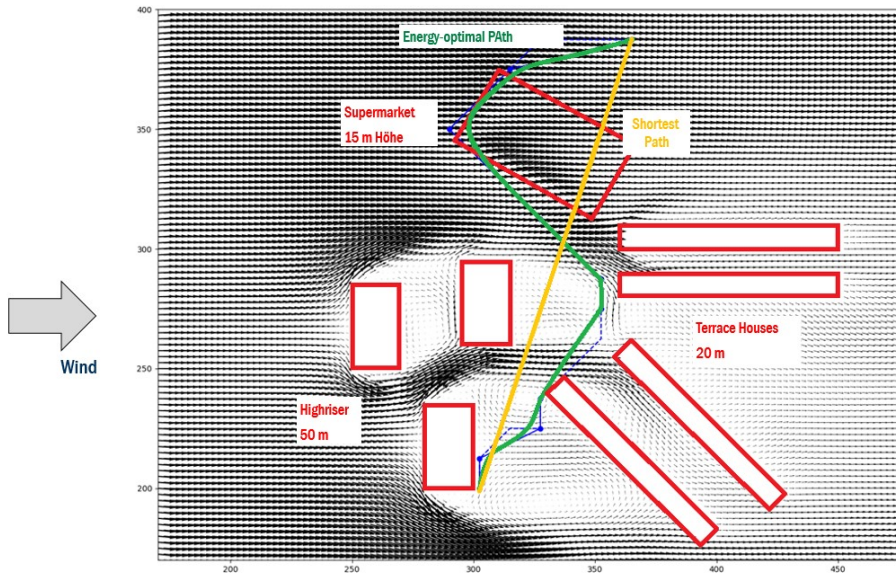
Flow Visualisation in Windtunnel



Flight Testing © Boulder Flight Systems

Energy optimal flight paths for UAV in urban environment

Optimal Flight Path



Summary

28% to 47% energy savings depending on wind strength!

Still, a lot of work to do before flight testing (sensors, obstacle avoidance, robustness,...)

Gefördert durch:



Bundesministerium
für Wirtschaft
und Klimaschutz

aufgrund eines Beschlusses
des Deutschen Bundestages