



Niklaß, M.; Dzikus, N.; Swaid, M.; Berling, J.; Lührs, B.; Lau, A.; Terekhov, I.; Gollnick, V.
A Collaborative Approach for an Integrated Modeling of Urban Air Transportation Systems.
Aerospace 2020, 7, 50.

Master Thesis:

Conceptualization and Design of an Urban Air Route/Corridor Network and Path Planning

Task-Description:

New air-taxi prototypes promise fast urban transport solutions. Initial operational concepts are published (SESAR U-SPACE), but a concrete solution of an urban air mobility (UAM) is missing. The goal of the project ULTRAS is to provide an integrative proposal of a UAM system using the Hamburg Metropolitan Area as example. Especially, the safe separation of airborne vehicles is to be addressed. One possibility is to introduce urban airways or corridors, which the vehicles have to follow. The publication “Designing airspace for urban air mobility: A review of concepts and approaches – A. Bauranov, J. Rakas (2021)” serves as an introduction to the field. For this thesis, the Institute of Air Transportation Systems provides a toolchain of daily urban air traffic for data input and evaluation capabilities. Hamburg’s urban airspace should be traversed by airways, which are to be tailored to vertiports, flight levels and potential sectors while avoiding no-fly-zones. Airways should be designed in a way that traffic is safely manageable but also efficient. Trajectories should be planned on the route network, with e.g. Dijkstra/A* algorithms. The scenario should be evaluated by e.g. number of conflicts and detours. Following tasks should be worked on:

- Become acquainted with concepts for Urban Air Traffic Management
- Literature research about urban airways requirements and concepts
- Conceptualize urban airways
- Implement a tool to create 3D airways
- Implement a tool to find shortest pathes on the airways
- Evaluate results for selected scenarios
- Discussion and documentation

Requirements:

- Studies in Aviation Engineering, Traffic Engineering, Automation, Operations Research, etc.
- Motivation and ability to work independently and collaboratively
- High language proficiency of English or German
- Good programming skills (Matlab or Python preferred, but not necessary)
- Knowledge about Air Traffic Control / Air Traffic Flow Management
- Accurate and reliable working style

Begin and duration:

From now on, for approximately 6 months.

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