Noise and Risk-aware Path Planning for UAVs in Urban Environment

Introduction

Unmanned Aerial Vehicles (UAVs), commonly known as drones, are being seen as the most promising type of autonomous vehicles in the context of Intelligent Transportation System (ITS) technology. Urban Air Mobility (UAM) aims to utilize the urban airspace for efficient transportation of goods and passengers, thereby reducing ground traffic congestion. However, public acceptance of UAVs is mainly limited by concerns over safety and noise pollution caused by UAV operations. Therefore, addressing UAV noise is crucial for the successful implementation and acceptance of UAM services. Among others, an interesting approach to UAV noise containment, as well as ground risk mitigation, is the optimization of the UAV aerial path with respect to the noise footprint and ground risk. The aim of this thesis is to develop a path planning algorithm able to generate aerial paths minimizing both the ground risk and the noise footprint generated by the UAV operations. A set of simulation tools regarding noise-aware path planning and risk-aware path planning developed by the research group may be made available as a starting point.

Expected Outcome of Thesis

The expected outcome of the thesis is defined as follows:

- → Definition of a noise footprint generation model for multi-rotor UAVs operating in urban areas.
- → Design of a path planning method oriented towards noise footprint and ground risk containment for UAV-based operations in populated urban areas.

A Few References from the Literature

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