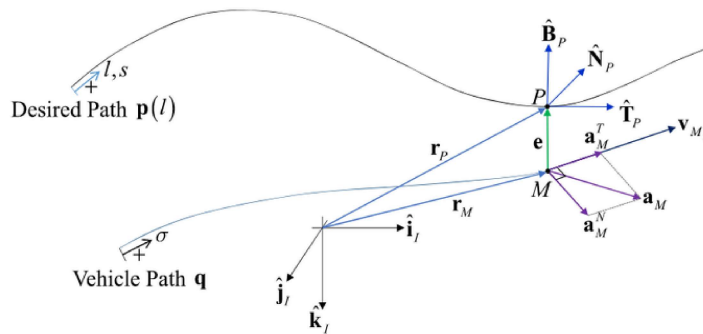


Unified Path Following Guidance for VTOL Vehicles

Bachelor Thesis

Supervisors



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Description

Small Unmanned Aerial Systems (sUAS) has become a crucial tool for various mapping, inspection, search and rescue missions. VTOL (Vertical Takeoff and Landing) type vehicles in particular, have recently gained popularity due to its versatility of taking off and landing in confined spaces, and its long endurance during cruise flight. Due to different maneuverability conditions of the two vehicle states, state of the art methods use two distinct guidance laws for hovering and cruising flight modes. However, this can result in suboptimal behaviors when the vehicle is operating in between the two flight modes, such as transitioning or flying in high wind.

This project aims to develop a unified path following guidance algorithm that can be used for both flight modes in VTOL vehicles. The maneuverability of the vehicle in different flight modes will be considered. Wind, which can significantly influence the vehicle performance will also be considered. During the project the proposed guidance law will be evaluated against state of the art methods. Further, this project will also allow multicopter and fixed wing type vehicles to share a single guidance controller enabling more robust operations of vehicles.

Work Packages

- Evaluation of state of the art guidance methods
 - Literature review and quantitative evaluation of different guidance methods
 - Evaluation of maneuverability of fixed wing and multicopter vehicles in wind
- Software Integration
 - Integration of proposed method into an autopilot
 - Experiments, evaluation, write-up

Requirements

- Highly motivated students
- Knowledge of C++ / Python is a plus
- Experience with PX4 / ROS is a plus