Autonomous Ball-Catching Drone

Project Summary

Design and implement an autonomous UAV capable of intercepting and catching a thrown ball. The drone uses a novel ring-shaped propulsion frame with a central catching net and relies on Vicon-based tracking for sensing and trajectory prediction.

Project Type

- BA Thesis (3-6 months)
- MA Thesis (6 months)
- Praktikum (3 months)

Required Qualifications

- Basic knowledge of control systems and/or robotics
- Experience with ROS, Python or C++
- Interest in UAVs and real-world experimentation
- (Optional) Experience with Vicon systems or motion capture

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Detailed Description

The project focuses on the development of an autonomous ball-catching drone. The UAV features a circular frame where all motors and propellers are arranged in a ring to leave the center open. A flexible net is mounted in the middle to catch incoming objects. A ball will be thrown within a Vicon-equipped test area. The drone must detect the incoming trajectory using external Vicon data (and possibly onboard sensing), estimate the interception point, plan a feasible trajectory, and maneuver to catch the ball mid-air.

References

- D. Carneiro, F. Silva and P. Georgieva, “Robot Anticipation Learning System for Ball Catching,” in Robotics 2021, 10, 113, 2021.
- A. Rodriguez-Ramos, A. Alejandro, et al., “Autonomous Aerial Robot for High-Speed Search and Intercept Applications,” in Field Robotics 2 (2022): 1320-1350.