# Experimental Vision-Controlled Quadrotor Trajectory in Restricted Environments



Zizilia Zamudio-Beltrán , José Ambrosio-Bastián , Jorge E. Lavín-Delgado, and José de Jesús Rubio

Abstract This article focuses on trajectory tracking using a vision system on a quadrotor in controlled environments. The primary goal is to maintain the desired altitude of the vehicle while following a trajectory identified through vision. Initially, a camera is utilized as a reference to obtain the vehicle's position. Subsequently, the reference line to be followed (red line) is identified, optical flow is applied using the Lucas and Kanade method to determine linear velocity and provide feedback for accurate trajectory tracking. For position and velocity control, a classical and well-established controller, the Proportional Integral Derivative (PID) control with nested saturation, is employed to stabilize the quadrotor. Additionally, experimental results are presented, demonstrating the successful achievement of the desired regulation and trajectory tracking of the vehicle.

Keywords Control · System vision · Quadrotor

#### 1 Introduction

In recent years, there has been considerable interest in the tracking capabilities of Unmanned Aerial Vehicles (UAVs), commonly known as drones. The applications of drones extend across civilian and military sectors, including accessing

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