Design and Control of a Micro Aerial Vehicle

[1]**Olaniyan F.A**, [2]**Emukpere D.T**, [3]**Adelabu M.A.K**
Electrical/Electronic Engineering Department, University of Lagos, Nigeria
{1 – jimiolaniyan@gmail.com, 2 – davidemukpere@gmail.com, 3 - madelabu@unilag.edu.ng}

Abstract

Over the past couple of years, there has been an increase in the use of Unmanned Aerial Vehicles (UAVs) for both military and civilian applications. One of the major challenges of utilising UAVs for civilian purposes, especially in indoor environments, is that of size, as smaller-sized UAVs pose design and control constraints of their own. This paper presents an approach to designing and controlling Micro Aerial Vehicles (MAVs) with a focus on Vertical Take-Off and Landing (VTOL) systems. A comparison of the various existing VTOL systems led to the selection of the quadrotor configuration for this project. A description of both the hardware and software architecture of the system is provided and some of the technical hurdles encountered during assembly and construction are explained. Finally, based on the results of system simulations and flight testing, algorithms for controlling and stabilising the platform using position sensor data, were developed and deployed on the main processing unit, which produced a fully integrated MAV that can demonstrate altitude and attitude (pitch, roll and yaw) movements. The platform, when fitted with a small camera, can be used for reconnaissance in emergency situations, crop yield monitoring in agriculture and pipeline inspection.

Keywords: Micro Aerial Vehicles, Vertical Take-off and Landing, quadrotor, PID control