

Waypoint Navigation of Quad-rotor MAV Using Fuzzy-PID Control



**Goh Ming Qian, Dwi Pebrianti, Luhur Bayuaji,
Nor Rul Hasma Abdullah, Mahfuzah Mustafa,
Mohammad Syafrullah and Indra Riyanto**

Abstract Quad-rotor Micro Aerial Vehicle (MAV) is a multi-rotor MAV with four propellers which propel the MAV up to the air and move around. It has high maneuverability to move around, such as roll, pitch and yaw movements. However, line of sight and radio control effective range are the major limitation for the MAVs which significantly shorten the travel distance. Therefore, we proposed a waypoint navigation quad-rotor MAV based on Fuzzy-PID controller in this paper. User can set mission with multiple waypoint and the Fuzzy-PID controller will control MAV autonomously moving along the waypoint to the desired position without remotely controlled by radio control and guidance of pilot. The results show Fuzzy-PID controller is capable to control MAV to move to the desired position with high accuracy. As the conclusion, Fuzzy-PID controller is successfully designed for waypoint navigation in quad-rotor MAV. The result shows that the overshoot percentage (%OS) of the designed Fuzzy-PID controller for x position is 2.17% while y position is 0.93%. Additionally, the steady-state error for x position and y position are 0.54% and 0.56% respectively. Therefore, the performance of Fuzzy-PID controller is better than PID controller.

G. M. Qian (✉) · D. Pebrianti (✉) · N. R. H. Abdullah · M. Mustafa
Faculty of Electrical and Electronics Engineering, Universiti Malaysia Pahang,
Pekan, Malaysia
e-mail: gohmingqian@gmail.com

D. Pebrianti
e-mail: dwipebrianti@ump.edu.my

L. Bayuaji
Faculty of Computer Science & Software Engineering, Universiti Malaysia Pahang,
Gambang, Malaysia

D. Pebrianti · L. Bayuaji · M. Syafrullah
Magister of Computer Science, Universitas Budi Luhur, South Jakarta, Indonesia

I. Riyanto
Faculty of Engineering, Department of Electronics Engineering, Universitas Budi Luhur,
South Jakarta, Indonesia