

Design of Eight- Axis Anti-collision system for UAV

S.L. Pradeep Kumar, KIT-Kalaignarkarunanidhi Institute of Technology.

Abstract:

Anti-collision technologies are critical for ensuring the survival and safety of UAVs. The UAV is exceptionally reliable, stable, and resistant to damage. With the increased number of UAV flight activities, anti-collision technologies that avoid collisions between UAVs and other objects have received much attention. Anti-collision technologies are critical for ensuring the survival and safety of UAVs. The eight-axis UAV detects the damaged propeller when there is an abrupt change of attitude and enters fault handling mode. For various destruction scenarios, the eight-axle UAV uses the existing undamaged paddles to keep the UAV stable in the air and land slowly to protect the UAV after clearing the obstacles.

Keywords: *Eight axis, obstacle clearance, 6050 chip.*

A closed-loop control strategy is used in traditional PID motor motion control. Because of the direct load on the motor caused by the disturbance, controlling the motor to meet the system's rapid response requirements is challenging.

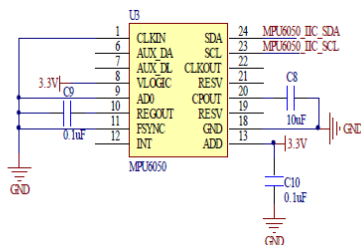


Fig.1 Design of four-axis attitude detection chip circuit.

The MPU-60X0 includes a 3-axis MEMS gyroscope, a 3-axis MEMS accelerometer, and a digital motion processor that can be expanded. Gyroscopes and accelerometers use three 16-bit ADCs to convert measured analog quantities into digital quantities that can be exported. The user can adjust the sensor's measurement range to accurately track fast and slow motions.

Implemented Circuit Design:

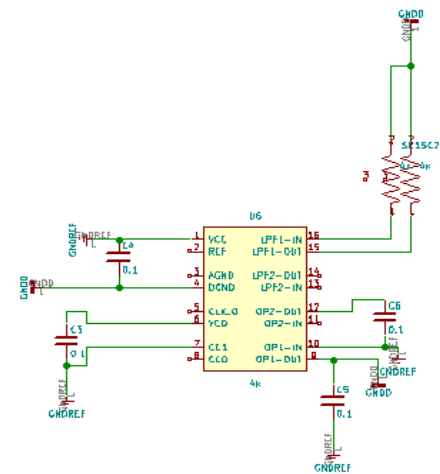


Fig.2 Implemented circuit diagram.

Implemented Waveforms:

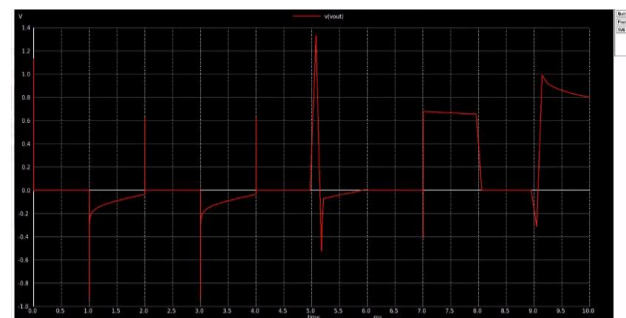


Fig.3 Implemented waveform.

References:

1. Liu, M., Zhou, G., Jin, C., & Lu, A. (2018, July). An anti-collision four-axis UAV design based on PID fuzzy controller. In *IOP Conference Series: Materials Science and Engineering* (Vol. 392, No. 6, p. 062198). IOP Publishing.
2. Wei, Z., Meng, Z., Lai, M., Wu, H., Han, J., & Feng, Z. (2021). Anti-collision technologies for unmanned aerial vehicles: recent advances and future trends. *IEEE Internet of Things Journal*.
3. Allen, C., Ewing, M., & Keshmiri, S. (2013, November). Multichannel sense-and-avoid radar for small UAVs. In *Proceedings of IEEE/AIAA 32nd Digital Avionics Systems Conference (DASC)*.

KicadToNgspice-2

Analysis Source Details Ngspice Model Device Modeling Subcircuits Microcontroller

Select Analysis Type

☐ AC ☐ DC ☒ TRANSIENT

Transient Analysis

Start Time 0 Sec

Step Time 0.00001 Sec

Stop Time 0.0001 Sec

Convert

Welcome: KicadToNgspice-2

[INFO]: The current project is /home/sumanto/Documents/esim/full_adder/test2
[INFO]: Kicad to Ngspice Conversion is called
[INFO]: Current Project is /home/sumanto/Documents/esim/full_adder/test2
[INFO]: The current project is /home/sumanto/Documents/esim/full_adder/test2

Add parameters for DC source v1

Enter value(Volts/Amps): 1.8

Add parameters for pulse source v2

Enter initial value(Volts/Amps): 0

Enter pulsed value(Volts/Amps): 1.8

Enter delay time (seconds): 0.1n

Enter rise time (seconds): 0.1n

Enter fall time (seconds): 0.1n

Enter pulse width (seconds): 1m

Enter period (seconds): 2m

Convert