

Relative position-based collision avoidance system for swarming UAVs using multi-sensor fusion

ABSTRACT

This paper presents the development of a quadrotor unmanned aerial vehicle (UAV) that is capable of quad-directional collision avoidance with obstacles in swarming applications through the implementation of relative position based cascaded PID position and velocity controllers. A collision avoidance algorithm that decides evasive manoeuvres in two dimensional flight by the means of net error calculation was developed. Sensor fusion of ultrasonic (US) and infrared (IR) sensors was performed to obtain a reliable relative position data of obstacles which is then fed into collision avoidance controller (CAC) for generating necessary response in terms of attitude commands. Flight tests performed proved the capability of UAV to avoid collisions with the obstacles and dummy non-flying UAVs that existed at a closer distance in its four primary directions of detections during flight successfully.

Keyword: UAV; Collision avoidance; Relative position; Swarming