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Beyond the Beep: Optimizing Flight Controller Performance for Reliable Ultrasonic Sensing

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Abstract : This study investigates the relative effectiveness of various flight controllers for drone obstacle avoidance. To assess ultrasonic sensors' performance in real-time obstacle detection, they are integrated with ESP32 and Arduino Nano controllers. The study determines which controller is most effective for this particular application by analyzing important parameters such as accuracy (mean absolute error), standard deviation, and mean distance range. Furthermore, the study explores the possibility of incorporating state-driven algorithms into the Arduino Nano configuration to potentially improve obstacle detection performance. The results offer significant perspectives for enhancing sensor integration, choosing the best flight controller for obstacle avoidance, and maybe enhancing drones' general environmental navigation ability.

Keywords : ultrasonic distance measurement, accuracy and consistency, flight controller comparisons, ESP32 vs arduino nano
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