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Obstacle detection technique using multi sensor integration for small unmanned aerial vehicle (Article)

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Abstract

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Achieving a robust obstacle detection system for small UAV is very challenging. Due to size and weight constraints, very limited detection sensors can be equipped in the system. Prior works focused on a single sensing device which is either camera or range sensors based. However, these sensors have their own advantages and disadvantages in detecting the appearance of the obstacles. In this paper, combination of both sensors based is proposed for a small UAV obstacle detection system. A small Lidar sensor is used as the initial detector and queue for image capturing by the camera. Next, SURF algorithm is applied to find the obstacle sizes estimation by searching the connecting feature points in the image frame. Finally, safe avoidance path for UAV is determined through the exterior feature points from the estimated width of the obstacle. The proposed method was evaluated by conducting experiments in real time with indoor environment. In the experiment conducted, we successfully detect and determine a safe avoidance path for the UAV on 6 different sizes and textures of the obstacles including textureless obstacles. © 2017 Institute of Advanced Engineering and Science. All rights reserved.

Author keywords

Connecting keypoints. Safe avoidance path Feature keypoints Lidar Textureless obstacles

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