

Obstacle Detection and Navigation Of a QuadRotor Using Image Processing With Overhead Mounted Camera

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Abstract

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Obstacle avoidance system for a Quadrotor using image processing technique using over head mounted camera. The robots that existing uses various sensors to obtain location of obstacles and navigate without colliding with the them here the robot only uses a camera to detect obstacles and navigate around the obstacles without colliding. By using this method robot does not need additional sensors to detect obstacles. Here the method using image processing technique and the software used is MATLAB software package. Images from overhead web camera converted to gray scale images and filtered to remove any noise and then converted to binary image and objects in the image identified and centroid is drawn and square is drawn around the robot to distinguish in between. Then pixel location of each object taken from the centroid pixel and area of the objects are also taken in to consideration when navigation is done. The navigation part is done by the depth first search algorithm. It uses location of the robot to navigate to the goal node in the image binary matrix. The results of this project was that successful navigation of a mobile robot using overhead mounted single camera without any sensor. And for Quadrotor this algorithm was simulated on Robotic Operating System(ROS) and Dronekit Simulation environments. These environments were built on Ubuntu operating System and a Python script was used to connect MATLAB program. Tests were successful when detecting obstacles and generating navigation path. The conclusion of this research that this method is suitable for applying for any mobile robot for a specific range this method can be used for Quadrotor also by defining same parameters as for the mobile robot.