

Obstacle Avoidance System For A Quadrotor UAV Using Over Head Mounted Camera, Based On Image Processing Technique

R.D. Prabhashitha¹ and H.A.N.B.Amarasiri²

Department of Science & Technology, Faculty of Science & Technology, Uva Wellassa University, Badulla, Sri Lanka.

Department of Engineering Technology, Faculty of Technological studies, Uva Wellassa University, Badulla, Sri Lanka.

An obstacle avoidance system for a Quadrotor UAV using overhead mounted camera is based on image processing technique. Current robots use various sensors to obtain the locations of obstacles and navigate without colliding. Here, the robot uses an overhead camera to detect obstacles for safe navigation. For this method, the robot does not need to use any additional sensors to detect obstacles. Here, the method uses an image processing technique. The images from overhead web camera are converted to grayscale images and filtered to remove noise and then converted to black and white binary images by using MATLAB software package. Then, objects in the images are identified and centroids are drawn, and a square is drawn around the robot to distinguish in-between. Thereafter, the pixel location of each object is taken from the centroid pixel location and the area of the object is also taken into the algorithm. The navigation is done with the aid of the "depth first search" algorithm. It uses the location of the robot to navigate to the desired node in the image binary matrix. The results of this project were successful. Navigation of a mobile robot using overhead mounted single camera without using additional sensors were done successfully. For Quadrotor, this algorithm was simulated on Robotic Operating System and Dronekit Simulation platform. These platforms were built on Ubuntu operating System and a Python script was used to connect the MATLAB program. Simulation successfully detected the obstacles and had a safe navigation. The conclusion of the research is that, this method is suitable for applying for any mobile robot for a specific range and the method can be used for Quadrotor by defining same parameters as for the mobile robot.

Keywords: Obstacle Detection, Quadrotor, Image Processing, MATLAB, Dronekit