



GRID-EDGE-DEPTH MAP BUILDING EMPLOYING SAD WITH SOBEL EDGE DETECTOR

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Abstract - This paper presents a new method of a map building which is suitable for a wheeled robot. The 2D map represents the obstacle's position and distance in the environment. The information of the obstacles obtained from a calibrated stereo camera. The stereo images size were 320x240 pixels. Hereafter the images were rectified and the disparity map was built using a Sum of Absolute Difference (SAD) algorithm. The depth map was calculated using disparity map, focal length, and baseline parameter values. In order to detect the obstacles, Sobel edge detection was implemented. The edge detection image was compared and substituted with the depth map which is resulting edge-depth map. The edge-depth map was divided into 25 grids (5 grids horizontal and 5 grids vertical). Finally, the minimum depth of detected obstacles for each grid was calculated. This process was resulting in a grid-edge-depth map (GED map). The proposal has been tested with a mobile robot in 5x3 meters living environment. Finally, experimental results are presented. The average error of feature points in the previous study was 5.40 cm, whereas in this study is 3.82 cm. There has been a decrease in the measurement gap of 29.26% from the previous study.

Index terms: Disparity, grid-edge-depth map, SAD, Sobel, stereo camera, wheeled robot