Sensor Fusion of Laser & Stereo Vision Camera for Depth Estimation and Obstacle Avoidance

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ABSTRACT

Laser Range Finders (LRF) have been widely used in the field of robotics to generate very accurate 2-D maps of environment perceived by Autonomous Mobile Robot. Stereo Vision devices on the other hand provide 3-D view of the surroundings with a range far much than of a LRF but at the tradeoff of accuracy. This paper demonstrates a technique of sensor fusion of information obtained from LRF and Stereovision camera systems to extract the accuracy and range of independents systems respectively. Pruning of the 3D point cloud obtained by the Stereo Vision Camera is done to achieve computational efficiency in real time environment, after which the point cloud model is scaled down to a 2-D vision map, to further reduce computational costs. The 2D map of the camera is fused with the 2D cost map of the LRF to generate a 2-D navigation map of the surroundings which in turn is passed as an occupancy grid to VFH+ for obstacle avoidance and path-planning. This technique has been successfully tested on 'Lakshya'- an IGV platform developed at Delhi College of Engineering in outdoor environments.