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MULTI-ROBOT COOPERATIVE EDGE DETECTION USING KALMAN FILTERING

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ABSTRACT—This paper presents a design and implementation of cooperative edge detection of multiple mobile robots in an indoor environment. We propose a method to fuse sensory data from two mobile robots at different locations based on Kalman filtering techniques. To demonstrate the proposed method, we constructed two mobile robots for experimental purpose. A USB Web camera was put at the front of each robot for environment recognition. Image acquisition and processing are performed onboard the robot exploiting a Linux-based embedded platform. Processed scenic range data from robots are transferred through wireless Ethernet to a robot-home server, where a global representation of the environment is maintained. The constructed map can be accessed at a remote site for tele-operation of the robots through Internet. Each robot can update its knowledge of the world by downloading the map from the server. Experimental results of two-robot cooperative sensing in a test environment are presented to demonstrate the effectiveness of the proposed method.

Key Words: Multiple robots, Map-building, Kalman filtering, Cooperative sensing, Sensor data fusion, Edge detection, Image processing

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