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Electronic Image Stabilization for Mobile Robotic Vision Systems

By Michael John Smith

Biblioscholar Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x7 mm. This item is printed on demand - Print on Demand Neuware - When a camera is affixed on a dynamic mobile robot, image stabilization is the first step towards more complex analysis on the video feed. This thesis presents a novel electronic image stabilization (EIS) algorithm for small inexpensive highly dynamic mobile robotic platforms with onboard camera systems. The algorithm combines optical flow motion parameter estimation with angular rate data provided by a strapdown inertial measurement unit (IMU). A discrete Kalman filter in feedforward configuration is used for optimal fusion of the two data sources. Performance evaluations are conducted by a simulated video truth model (capturing the effects of image translation, rotation, blurring, and moving objects), and live test data. Live data was collected from a camera and IMU affixed to the DAGSI Whegs mobile robotic platform as it navigated through a hallway. Template matching, feature detection, optical flow, and inertial measurement techniques are compared and analyzed to determine the most suitable algorithm for this specific type of image stabilization. Pyramidal Lucas- Kanade optical flow using Shi-Tomasi good features in combination with inertial measurement is the EIS algorithm found to...



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