ABSTRACT

Position Estimation for Mobile Robot
Using Low-cost Accelerometer and Gyroscope

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This paper describes the system with which the current position and orientation of a mobile robot can be estimated with an accelerometer and a gyroscope manufactured by a micro electro-mechanical system and piezoelectric technology without various type sensors. A low-cost, solid-state accelerometer and gyroscope for plane motion robotics application is evaluated. We are presenting the discrete Kalman filter for estimating the position of a moving robot after modeling the integration process. Position estimation with an accelerometer is usually more susceptible to initial drift offset due to the double integration process involved in position estimation. After we calibrated drift offset manually, we abstracted quantitative data of the robot's motion which was defined as no motion for several seconds. The position data that we obtained using the Kalman filter that we designed showed that the accelerometer could be a reasonable solution as an inertial measurement unit on the plane.

Key words : accelerometer, gyroscope, Kalman filter, inertial measurement unit

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