Abstract

In this paper, the singularity of Euler angles rotation representation in robot pose estimation is overcome. This is accomplished through coordinate system rotating and sign-adjusting of the intrinsic parameter camera matrices. A stereo pair is attached to the robot and the extended Kalman filter is used as a recursive pose estimator. An extensive set of synthetic and real experiments have been carried out under various motion patterns in both singular and nonsingular settings. The approach has proved accurate in face of singularity and stable during Jacobian calculations as well.

References

2. A.B.M. K. Hassan, and E. Zahir, "Optimizing the turning velocity in a line follower robot"
broadcasting using a VTOL unmanned aerial vehicle in GPS-impaired environments”,
over time”, IEEE Transactions on Pattern Recognition and Machine Intelligence, Volume 24, No.
6. A. Azarbayejani, and A. P. Pentland, “Recursive estimation of motion, structure, and focal
length”, IEEE Transactions on Pattern Recognition and Machine Intelligence, Volume 17, No. 6,
(June 1995), 562-575.
on Kalman filtering of stereo images. In Proceedings of the IEEE International Conference on
Control Applications
8. M. E. Ragab, K.H. Wong, “Rotation within camera projection matrix using Euler angles,
quaternions and angle-axes”, ACTA Press International Journal of Robotics and Automation,
Volume 24, No. 4, (Dec. 2009), 312-318.
Cambridge University Press.

Index Terms

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Keywords

Pose Estimation, Stereo, Euler Angles, Extended Kalman Filter.