Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics) 2018 vol.11097 LNAI, pages 249-258

Comparing fiducial markers performance for a task of a humanoid robot self-calibration of manipulators: A pilot experimental study

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Abstract

© Springer Nature Switzerland AG 2018. This paper presents our pilot study of experiments automation with a real robot in order to compare performance of different fiducial marker systems, which could be used in automated camera calibration process. We used Russian humanoid robot AR-601M and automated it's manipulators for performing joint rotations. This paper is an extension of our previous work on ARTag, AprilTag and CALTag marker comparison in laboratory settings with large-sized markers that had showed significant superiority of CALTag system over the competitors. This time the markers were scaled down and placed on AR-601M humanoid's palms. We automated experiments of marker rotations, analyzed the results and compared them with the previously obtained results of manual experiments with large-sized markers. The new automated pilot experiments, which were performed both in pure laboratory conditions and pseudo field environments, demonstrated significant differences with previously obtained manual experimental results: AprilTag marker system demonstrated the best performance with a success rate of 97,3% in the pseudo field environment, while ARTag was the most successful in the laboratory conditions.

http://dx.doi.org/10.1007/978-3-319-99582-3_26

Keywords

AprilTag, AR-601M, ARTag, CALTag, Experimental comparison, Fiducial marker systems, Humanoid robot

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