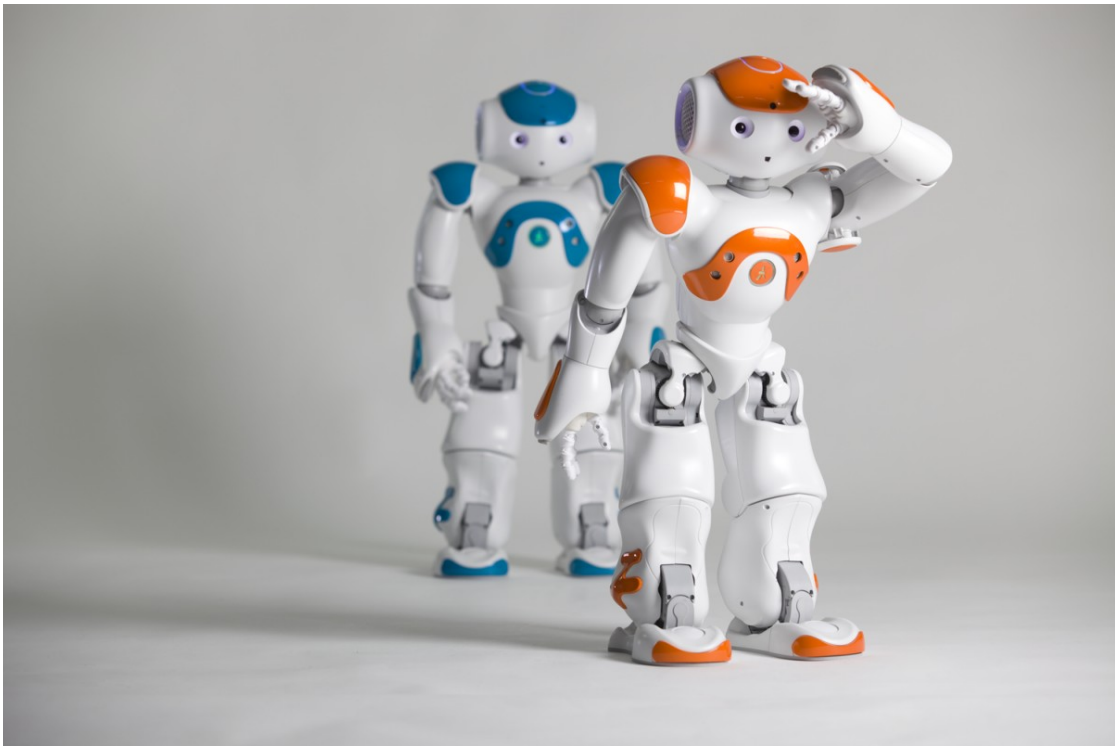
Collaborative Visual SLAM

Multi-Agent Visual Odometry and SLAM with humanoid robots.



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January 25, 2013

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4 Pipeline

In this section, the pipeline of our proposed system is described stepwise.

Figure 1: Schematic overview of the pipeline of the system

4.1 Calibration

4.2 Feature Extraction

In this section, we concisely describe the feature extraction methods that were used in the system to extract features. In total three feature extractions methods were applied, namely, Binary Robust Invariant Scalable Keypoints (BRISK) [Leutenegger et al., 2011], Oriented FAST and Rotated BRIEF (ORB) [Rublee et al.,] and Fast Retina Keypoints (FREAK) [Ortiz, 2012].

4.2.1 Binary Robust Invariant Scalable Keypoints

BRISK relies on an easily conïňĄgurable circular sampling pattern from which it computes brightness comparisons to form a binary descriptor string. The unique properties, rotation and scale invariance, of BRISK can be useful for a wide spectrum of applications, in particular for tasks with hard real-time constraints or limited computation power: BRISK ïňĄnally offers the quality of high-end features in such time-demanding applications.

4.2.2 Oriented FAST and Rotated BRIEF

[Insert]

4.2.3 Fast Retina Keypoint

[Insert]

4.3 Feature Matching

FLANN FEATUREMATCHER

References

[Leutenegger et al., 2011] Leutenegger, S., Chli, M., and Siegwart, R. Y. (2011). Brisk: Binary robust invariant scalable keypoints. In *Proceedings of the 2011 International Conference on Computer Vision*, ICCV '11, pages 2548–2555, Washington, DC, USA. IEEE Computer Society.

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[Rublee et al.,] Rublee, E., Rabaud, V., Konolige, K., and Bradski, G. R. Orb: An efficient alternative to sift or surf. In Metaxas, D. N., Quan, L., Sanfeliu, A., and Gool, L. J. V., editors, *ICCV*, pages 2564–2571. IEEE.