Real-time laser based SLAM for multiple heterogeneous robots in indoor environements

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ABSTRACT

We present in this paper a fast and accurate 2D laser based SLAM for indoor environements. The approach does not presuppose the availability of odometry data and hence is suitable for a large number of robots like UGVs, UAVs or humanoid robots. We use a Rao-Blackwellized particle filter to track the robot position with the number of particle used kept very low. This number increases in case of ambiguity like when traversing corridors. 2D robot pose can be accurately retrieved using a fast scan matching method. We also present an implementation of our algorithm in case of cooperative exploration using UAV and ground robots. Altitude invariant features like walls are extracted and given more weight during the scan matching process. Using this approach we show how fused maps even at different altitudes remain reliable enough to be used by either ground or aerial robots.

KEYWORDS: Slam, Scan Matching, Multiple Robots.