

Paper Summary

ORB-SLAM:

ORB-SLAM is a real-time monocular SLAM system that uses ORB features for all tasks—tracking, mapping, loop closing, and relocalization. It runs three parallel threads to handle camera tracking, local map optimization, and loop detection. The system builds a covisibility graph to focus computation and uses a sparse "Essential Graph" for efficient pose graph optimization during loop closure. It uses an automatic map initialization method that selects between a homography or fundamental matrix based on scene geometry. ORB-SLAM aggressively adds keyframes for robustness but removes redundant ones to keep the map compact. It achieves great accuracy among monocular SLAM systems on datasets like TUM RGB-D and KITTI.

V-LOAM:

V-LOAM combines visual odometry and lidar odometry to estimate 6-DoF motion with low drift. Visual odometry runs at high frequency using camera images and provides motion priors for lidar scan matching. Lidar odometry corrects visual drift and registers distortion-free point clouds to a map at low frequency. The system extracts edge and planar features from lidar scans for matching and builds a consistent global map. Sensor poses are updated by integrating low-rate lidar output with high-rate visual motion estimates. V-LOAM ranks first on the KITTI odometry benchmark and is robust to fast motion and poor lighting.