Survey-Grade Lidar Systems Utilizing Sensor Fusion for Static and Kinematic Lidar Data Acquisition

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SUMMARY

Lidar enables rapid acquisition of dense 3D data with mm-accuracy for precise surveying of objects like buildings by static laser scanning as well as of large areas by means of airborne laser scanning. Lidar is frequently combined with additional sensors like cameras, inertial sensors and GNSS receivers to provide precisely georeferenced and colourized data. In kinematic lidar, the fusion of lidar data, inertial sensor data, and GNSS data is mandatory and a subsequent rigorous optimization with appropriate error modelling ensures coherent point clouds in regions of overlapping lidar data. However, also terrestrial laser scanning benefits immensely from sensor fusion, as we demonstrate for automatic registration of a large number of static data sets. By offering ROS (Robot Operating System) drivers for specific terrestrial laser scanner systems, the lidar point cloud data from real-time on-board registration can be further complemented with additional sensors in a straightforward manner.