

Pre-Calibration

GNSS/INS Integration

- Using IE, obtain GNSS obs in inertial frame (Georeferenced)
- Ideally, done through IE command line (automation)

LiDAR Data Cleaning

- Using (unknown) program, visualize/edit LiDAR data and remove outliers/blunders from dataset
- Find way to automate, if possible.

LiDAR Feature Detection

- Determine useful features for calibration (walls, 3D corners, etc.)
- Create Sparse dataset for faster calibration?

Pre-BA Check

- GNSS/INS integrated position for each epoch
- Cleaned LiDAR data with usable features GCPs?

NO YES

Calibration

System Calibration using Integrated System Orientation

OBSERVATIONS (input):

1. GNSS/INS integrated position for each epoch (CTL)
2. LiDAR points (CTL)

UNKNOWNNS (output):

1. EOP's (of each epoch for LiDAR?)
2. 3D coordinate of tie points
3. Lever Arm Offset (3D vector INS to LiDAR center)
4. Boresight Angles (3D rotation matrix, INS to LiDAR Center)

Equations*:

Rotation (Boresight):

$$R_{Cj}^g * R_{Cj}^c = R_{bj}^g$$

Translation (Lever Arms):

$$r_{bj}^g = r_{Cj}^g + R_{Cj}^g * r_{Cb}^c$$

*Assuming the same equations as with a still photo, we haven't learned LiDAR yet.

Check using Check Points
(if possible)

FAILS
CRITERIA

PASSES
CRITERIA

Post-Calibration

Create dense point cloud