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ConSLAM: Periodically Collected Real-World Construction Dataset for SLAM

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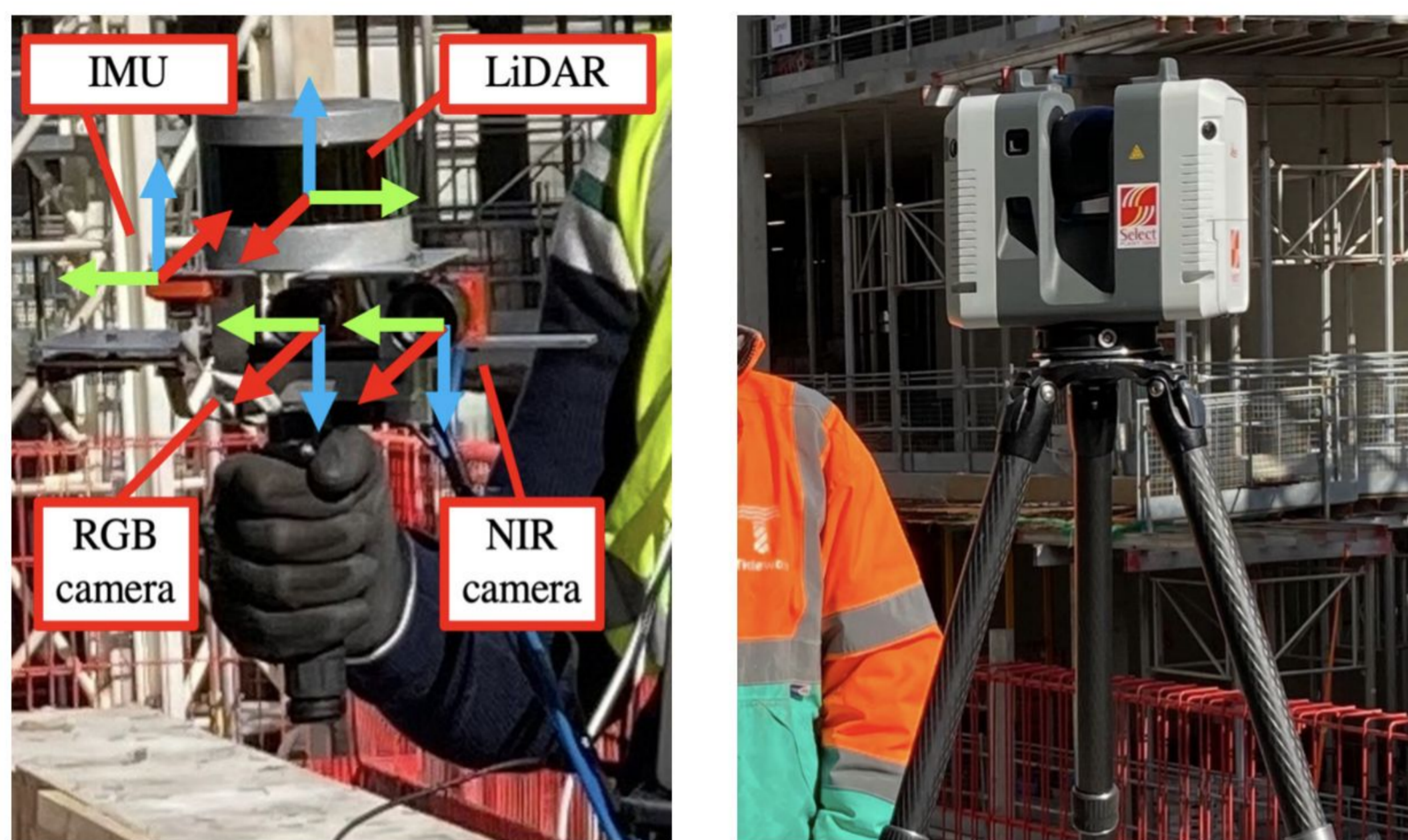
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Challenges

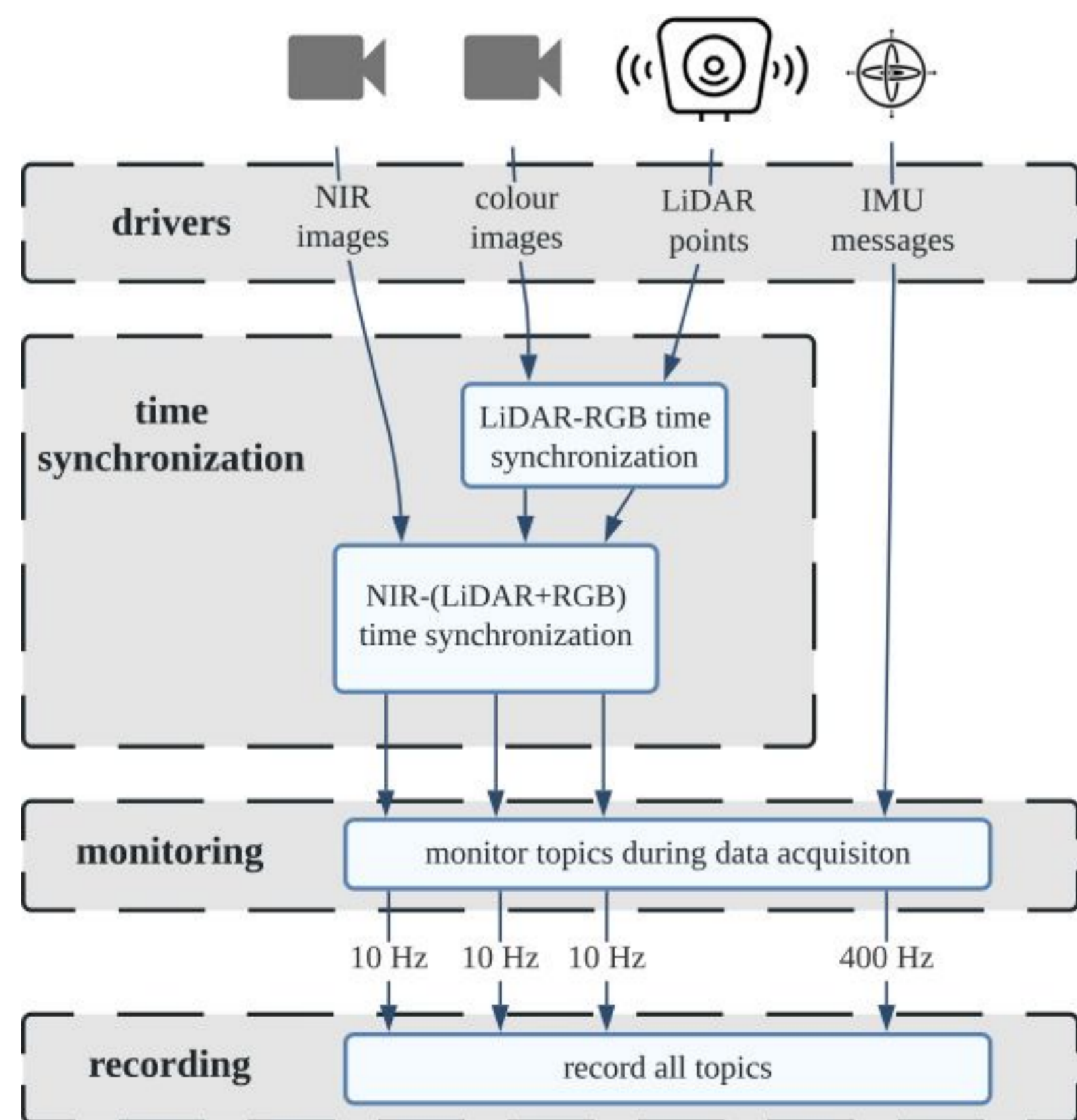
- The digitization of the geometry of existing infrastructure assets is a crucial step for creating an effective *Digital Twin*
- SLAM algorithms utilized by mobile scanners are not yet accurate enough to meet the requirements of demanding use cases in the construction industry
- Available datasets for SLAM algorithms were not collected on construction sites hence we do not know what their performance there is
- There is no dataset collected periodically which would reflect real-world use cases such as progress monitoring

Our Approach

We used our prototypical hand-held scanner to collect the five sequences of data and a static Terrestrial Laser Scanner (TLS) to collect corresponding ground-truth scans.

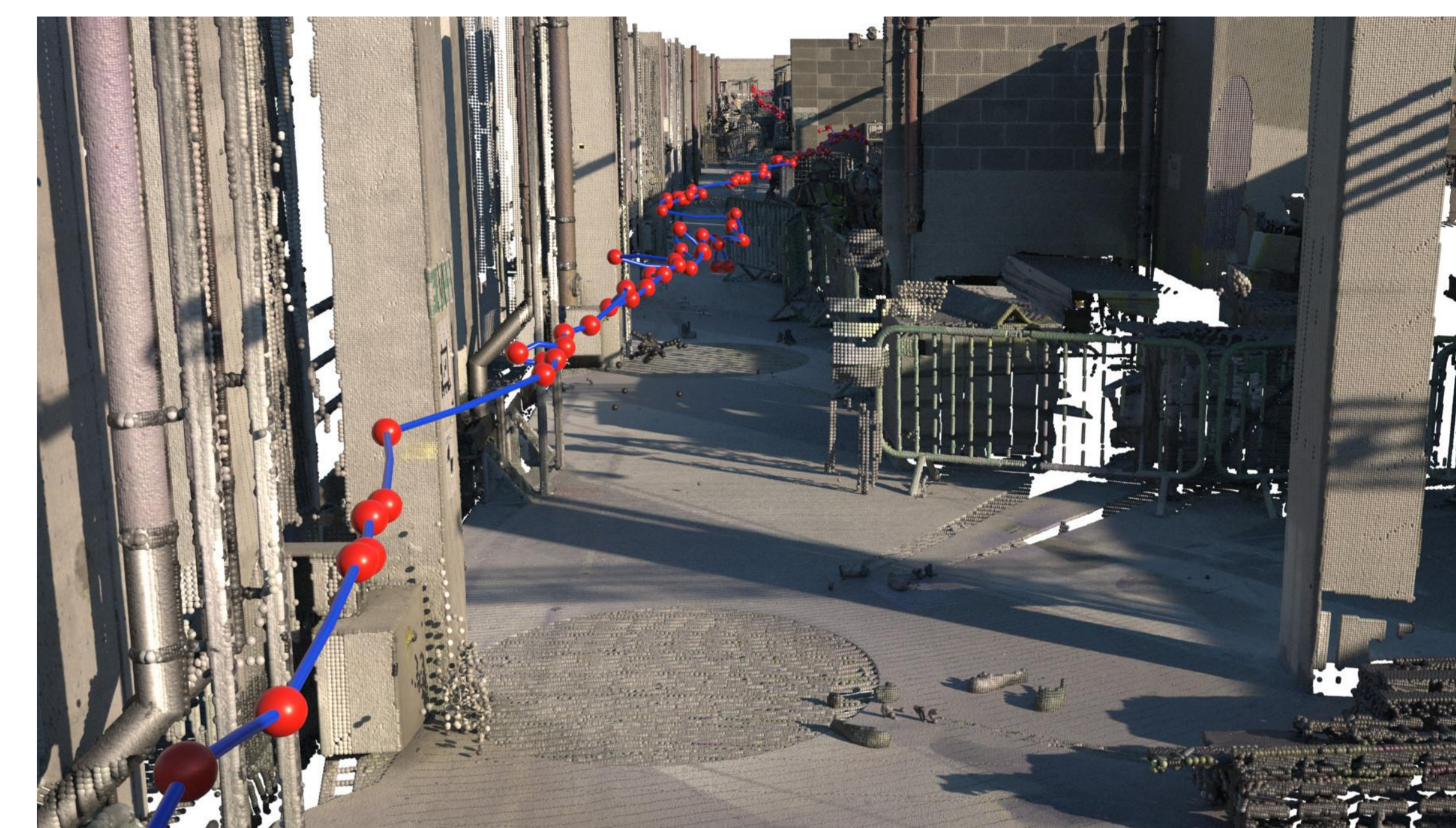
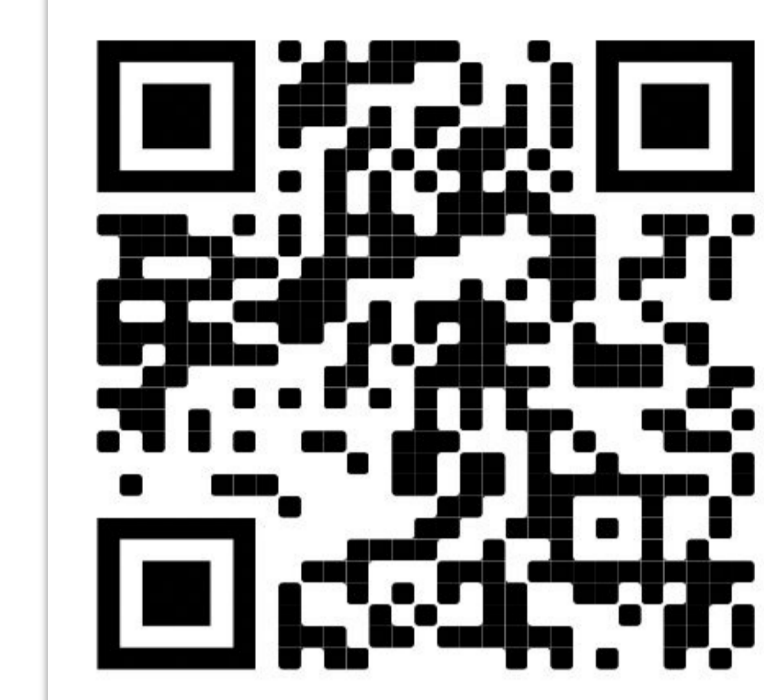
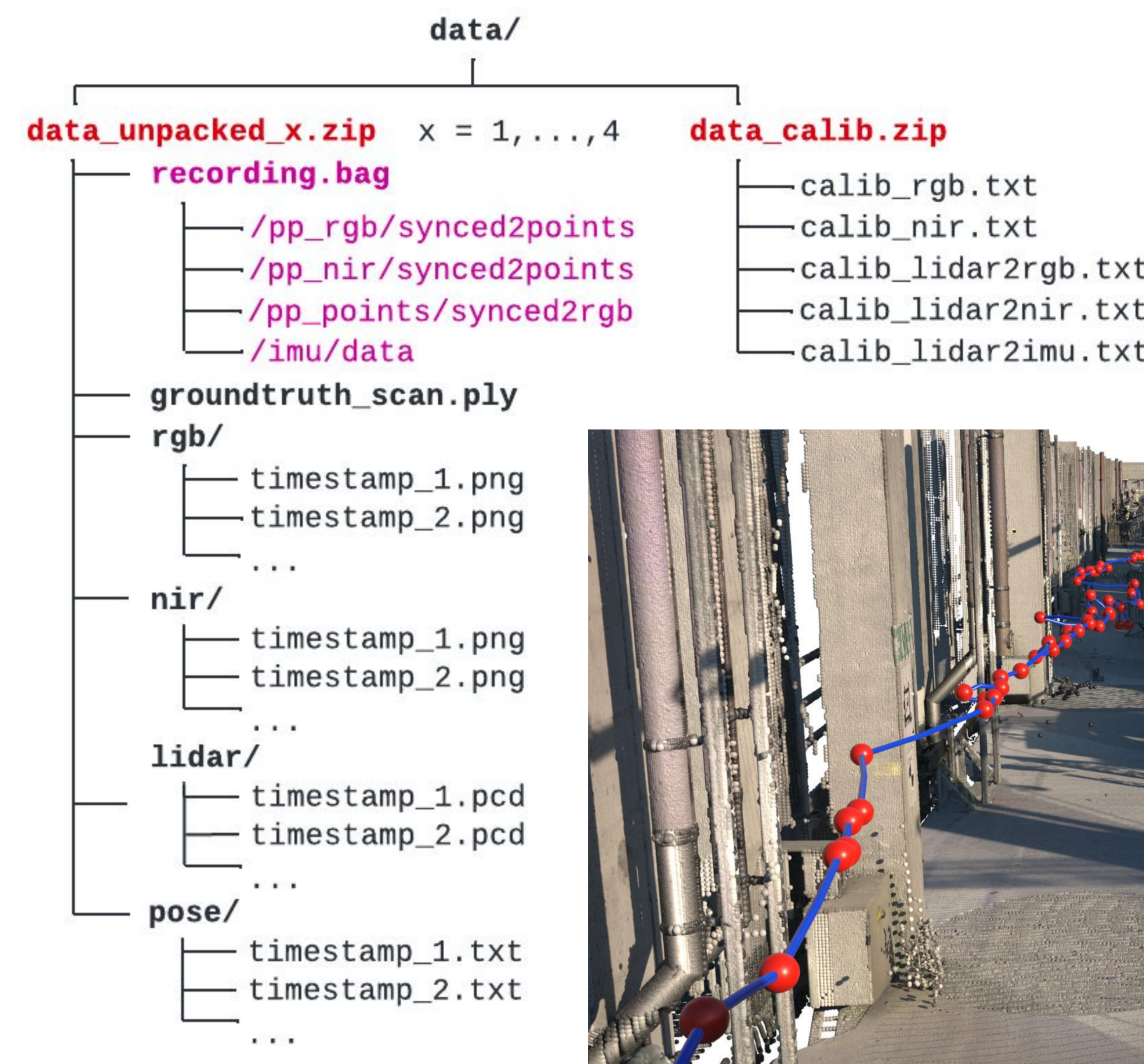


During scanning, the recorded streams of data were time synchronized and monitored.



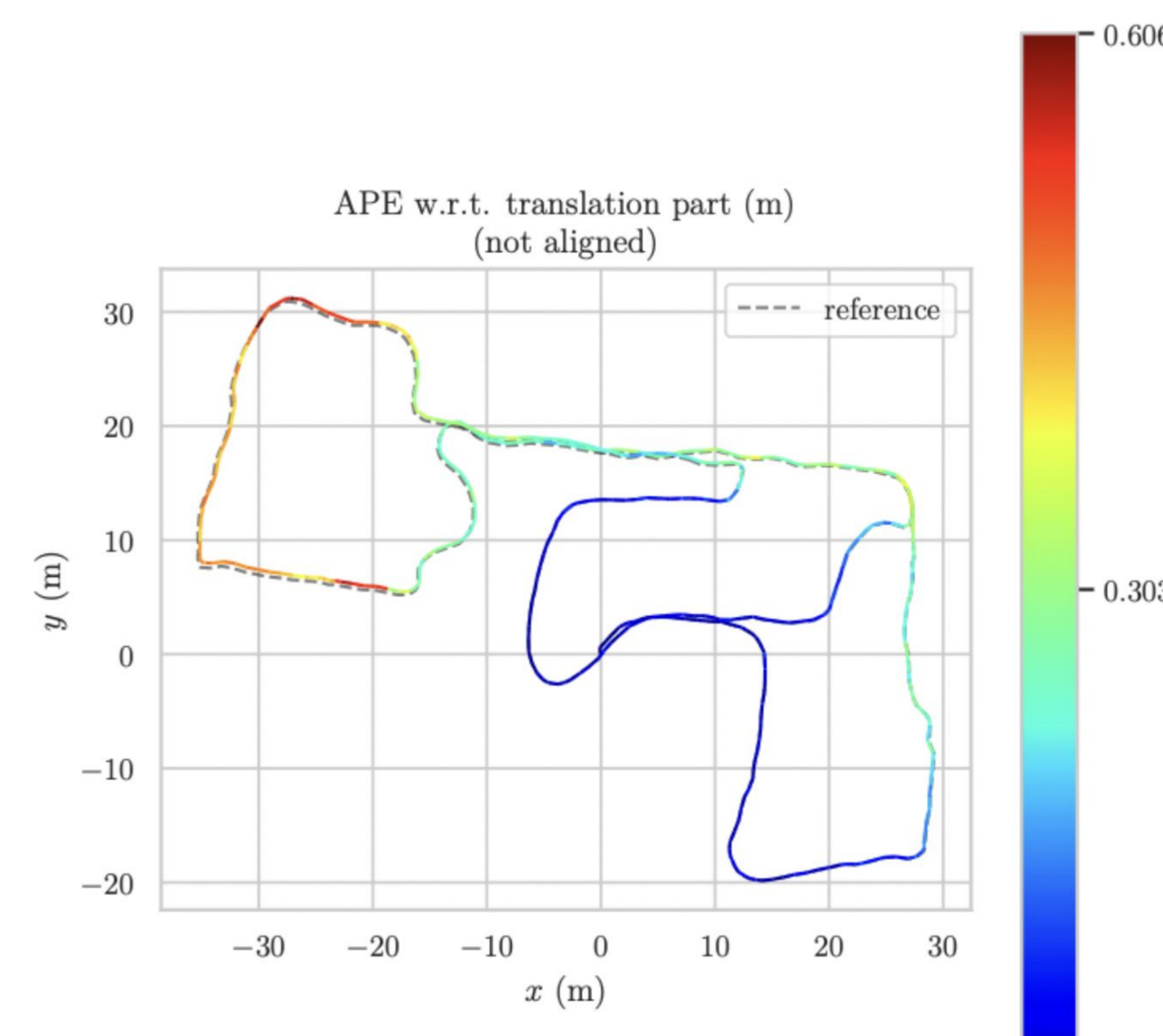
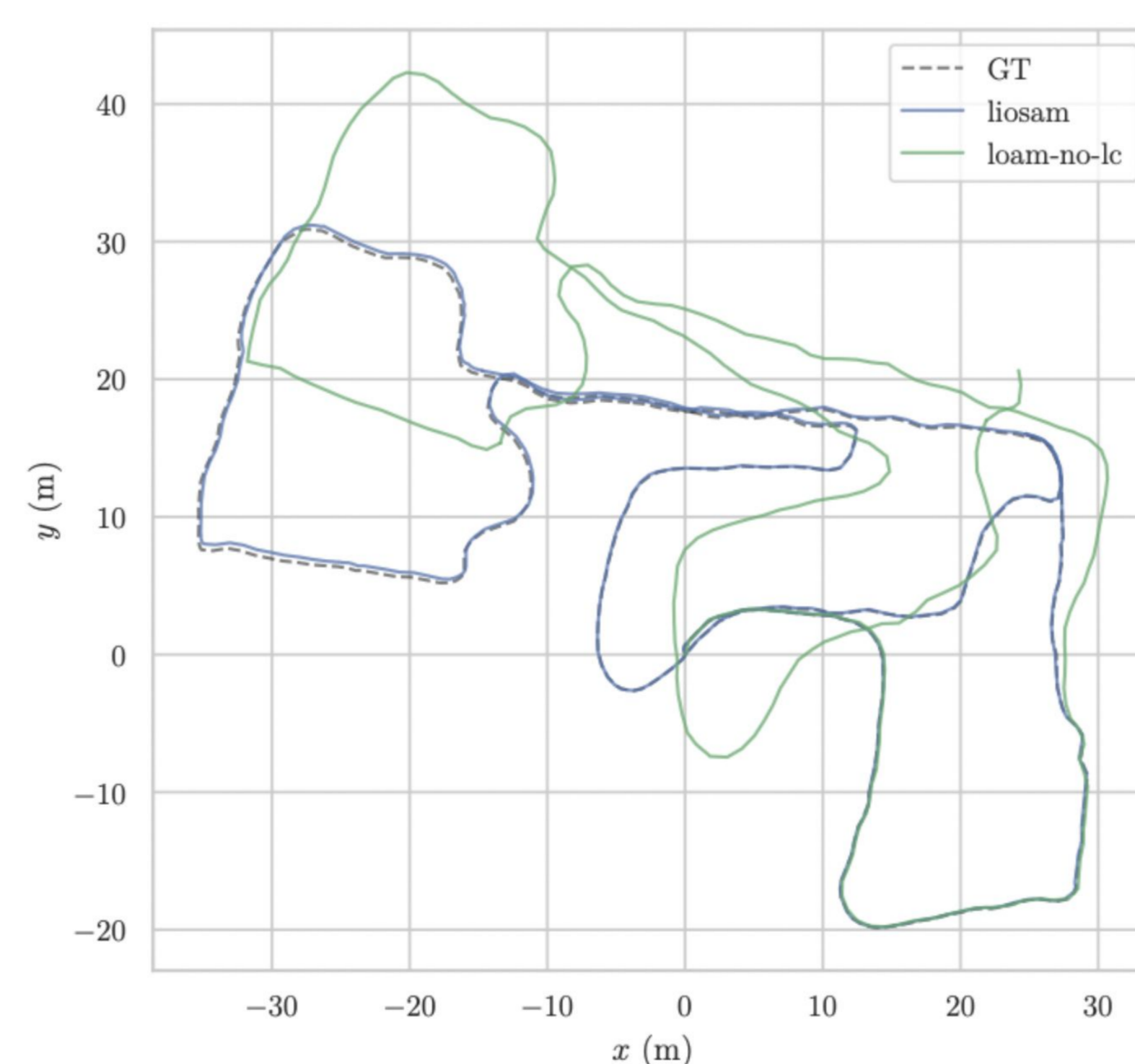
The Dataset

sequence	date	duration (s)	approx. length (m)
1	15/03/2022	436	235
2	26/04/2022	420	225
3	09/06/2022	630	340
4	29/06/2022	506	275
5	03/08/2022	589	320



Practical Application (1/2): Evaluation of SLAM trajectory

We extend a popular software package (evo) to automatically measure the accuracy of SLAM algorithms against our trajectory and we show that A-LOAM and LIO-SAM (two popular odometry/SLAM algorithms) are subject to drift.



Practical Application (2/2): LiDAR projected onto images

LiDAR points can also be projected onto the corresponding images because we provide extrinsic calibration matrices between our sensors.

