Visual Inertial System for 3D Laser Scanners

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HTW Chur, 28.05.2019

- when it has to be **right**

Leica Geosystems

PART OF HEXAGON

RTC360 Made for Simplest Use

- when it has to be **right**

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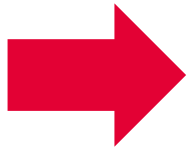
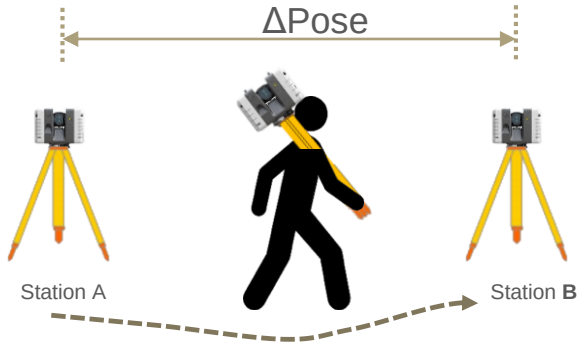
Capturing Reality at an Incredible Speed

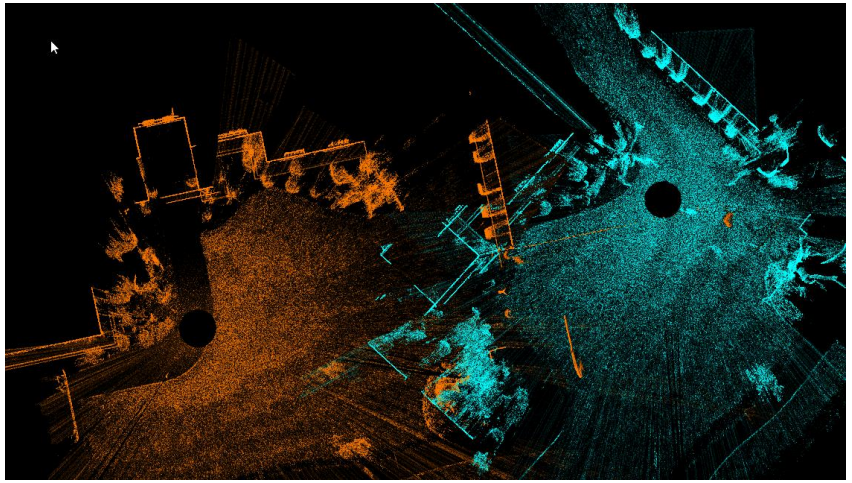
- Scanning at 2 millions of points per second
- Up to 180 million points per scan
- 2.5 minutes scanning and image capturing time
- Up to 200 stations on a work day

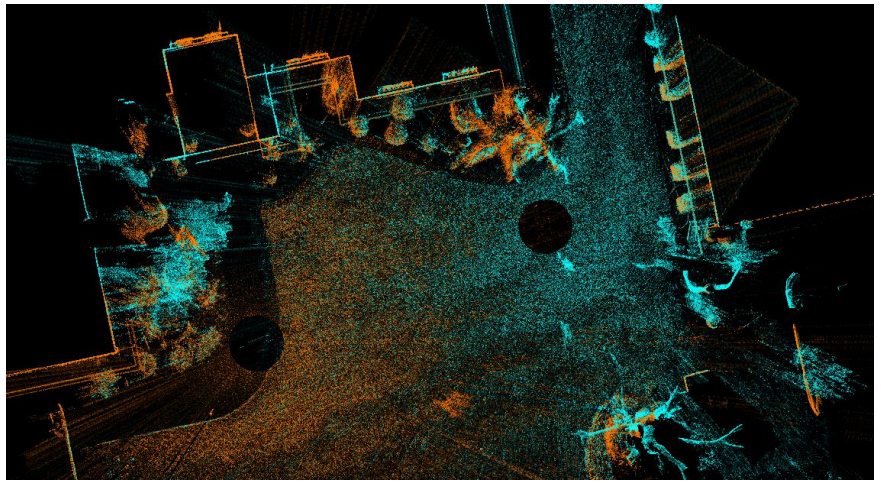
How does it Work?

Our Approach to Increase Productivity









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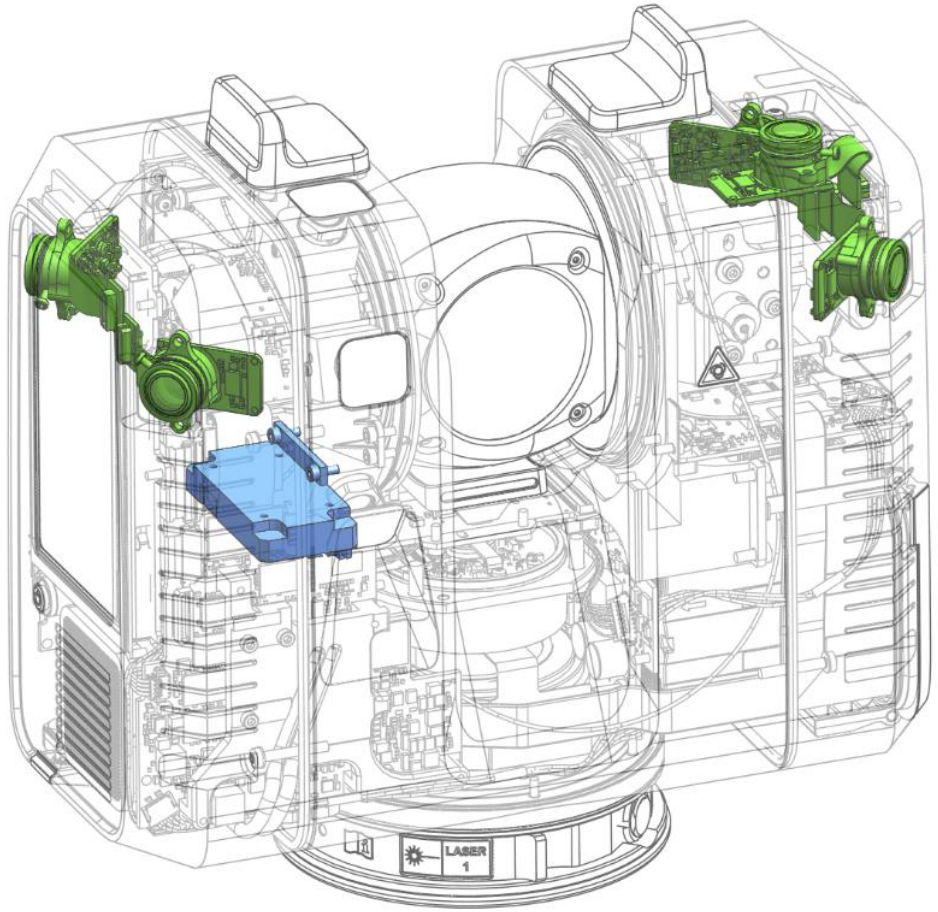
What does it Take to Run VIS?

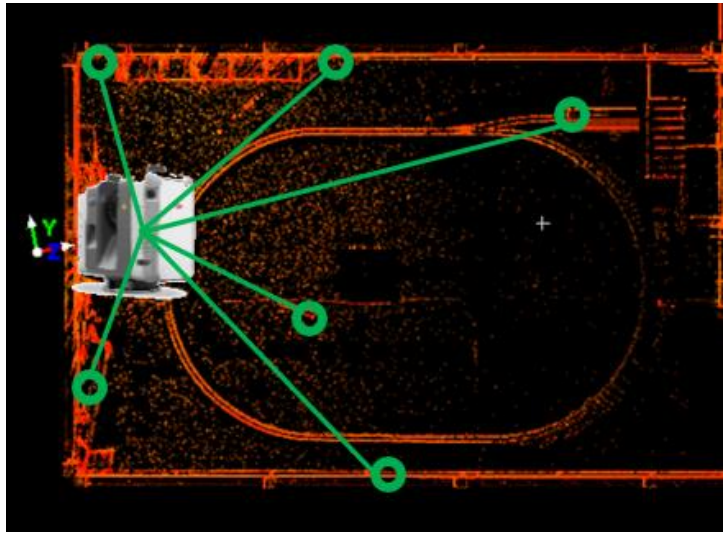


Challenges

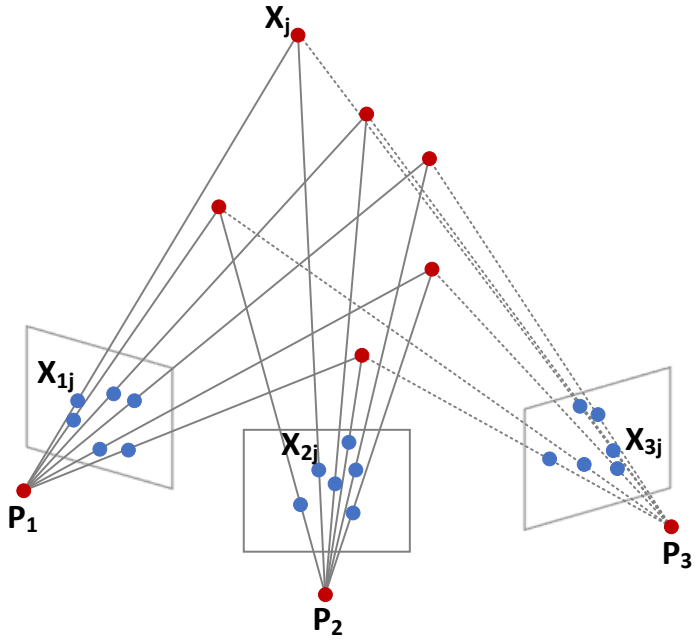
- Complexity
- Stability
- Calibration
- Synchronisation

Overview of the VIS Components

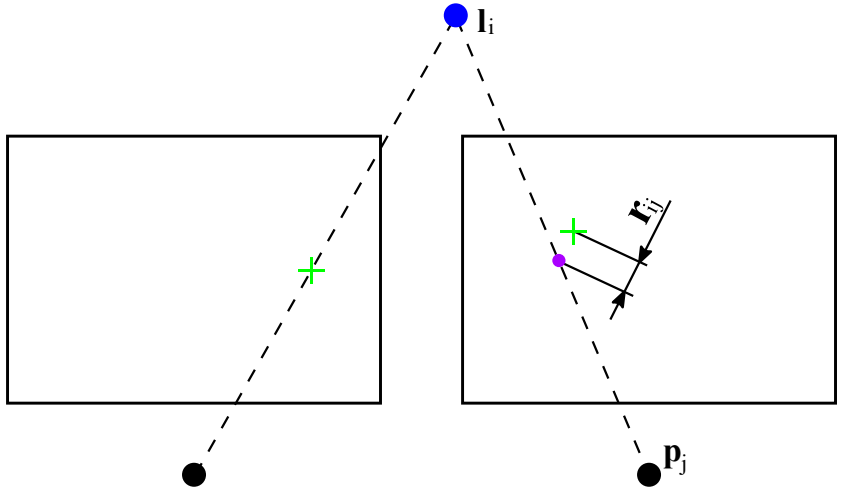
Before pick-up: Initialisation



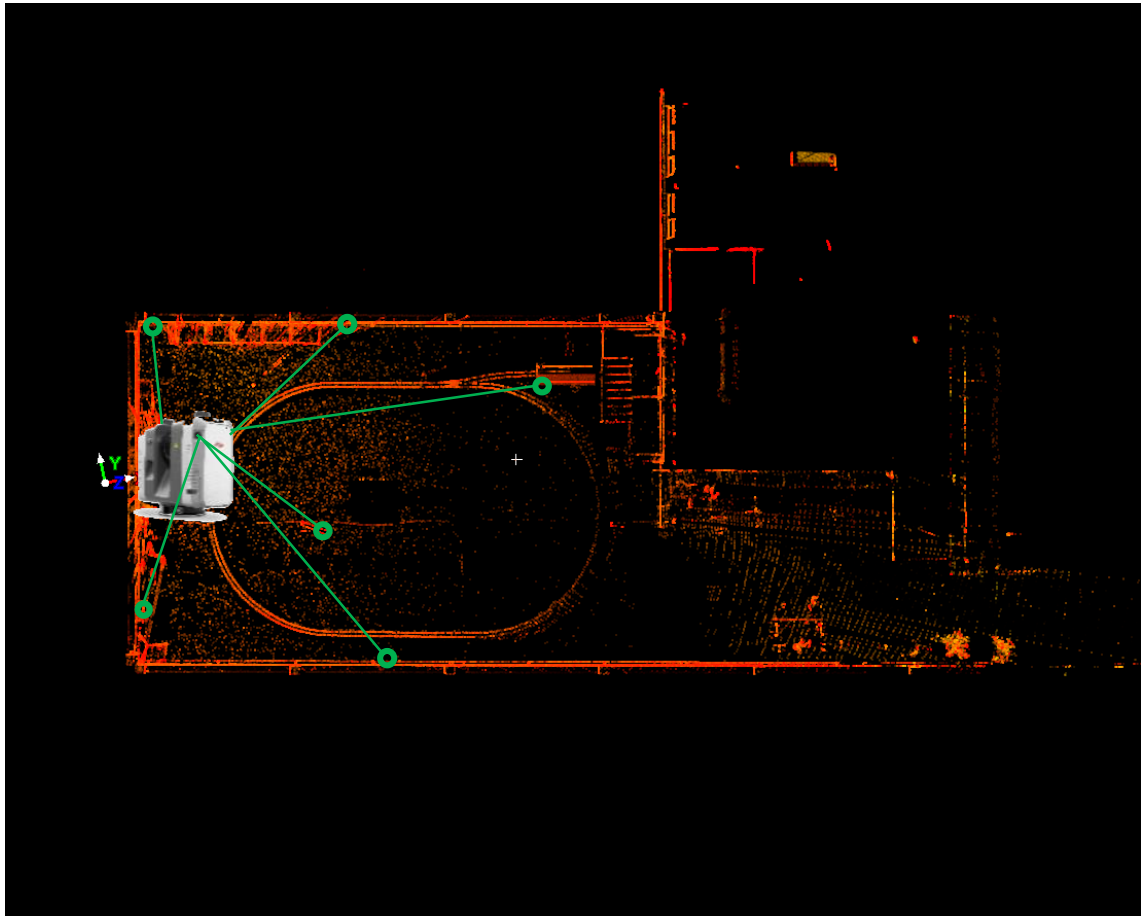
Movement: Structure from Motion

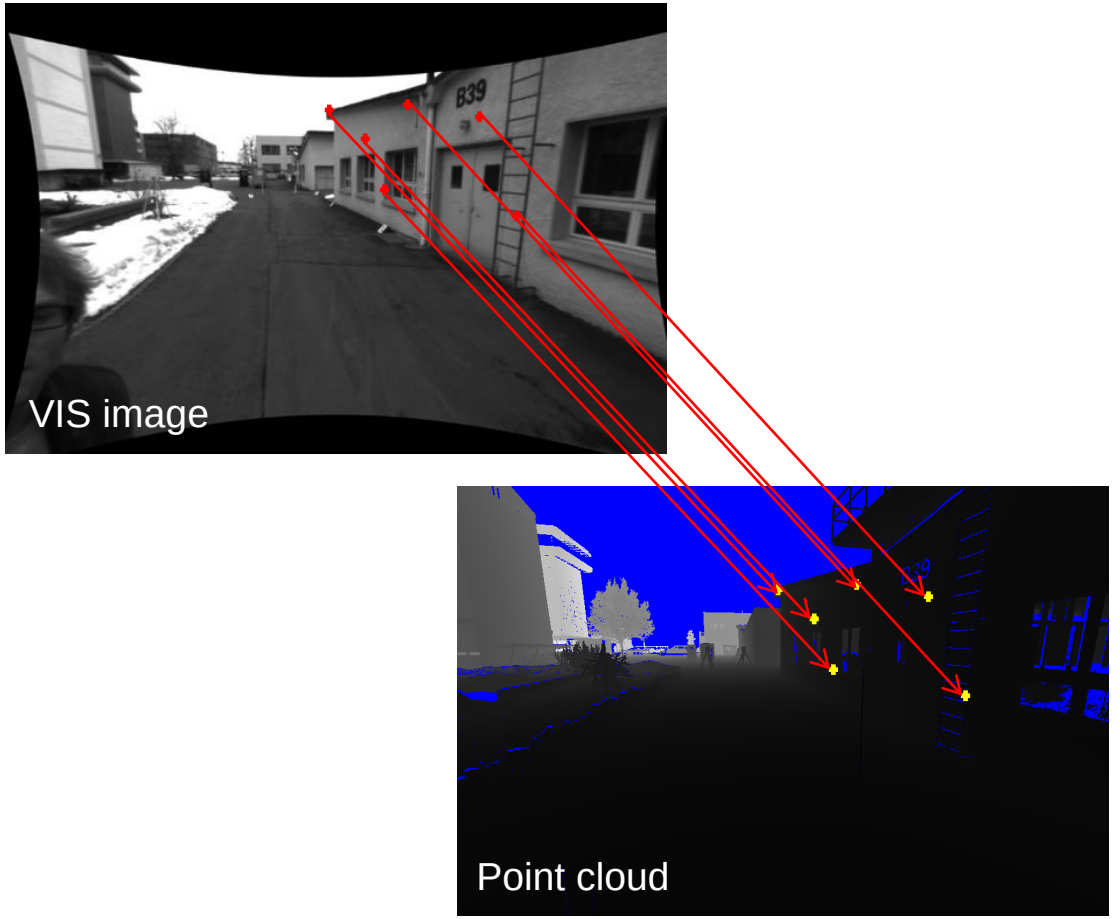


Post-processing: Bundle Adjustment

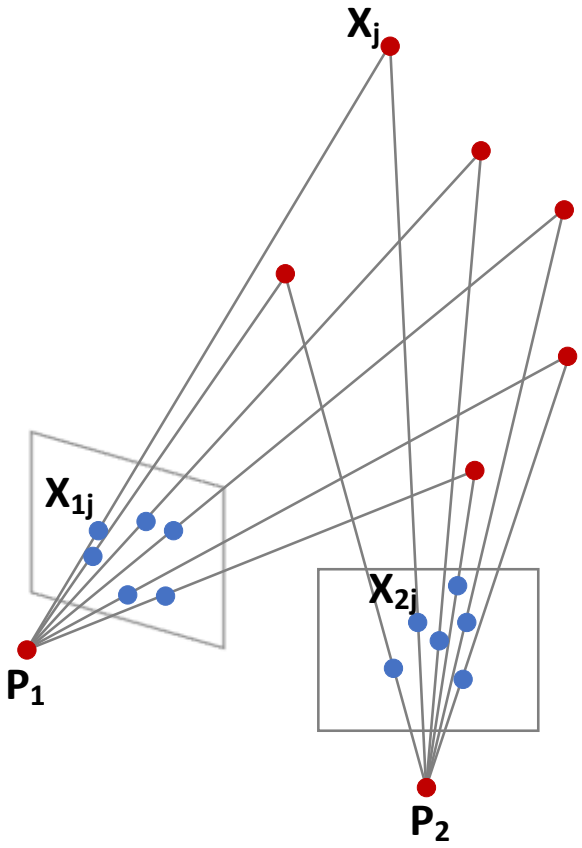


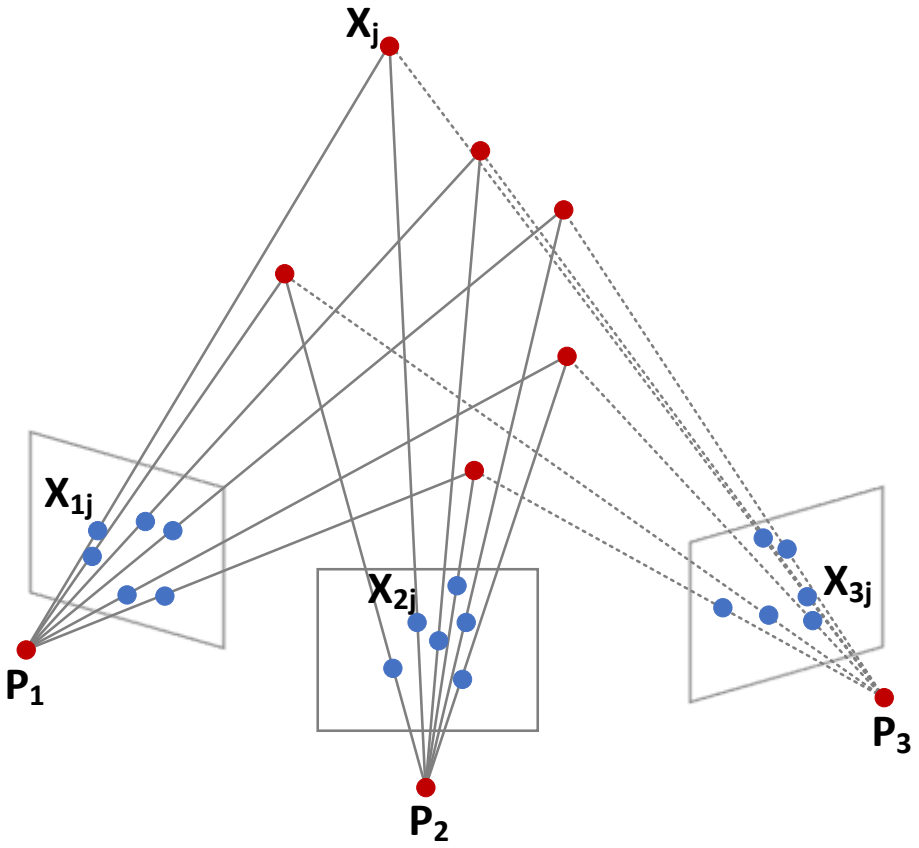
Initialisation using Point Cloud





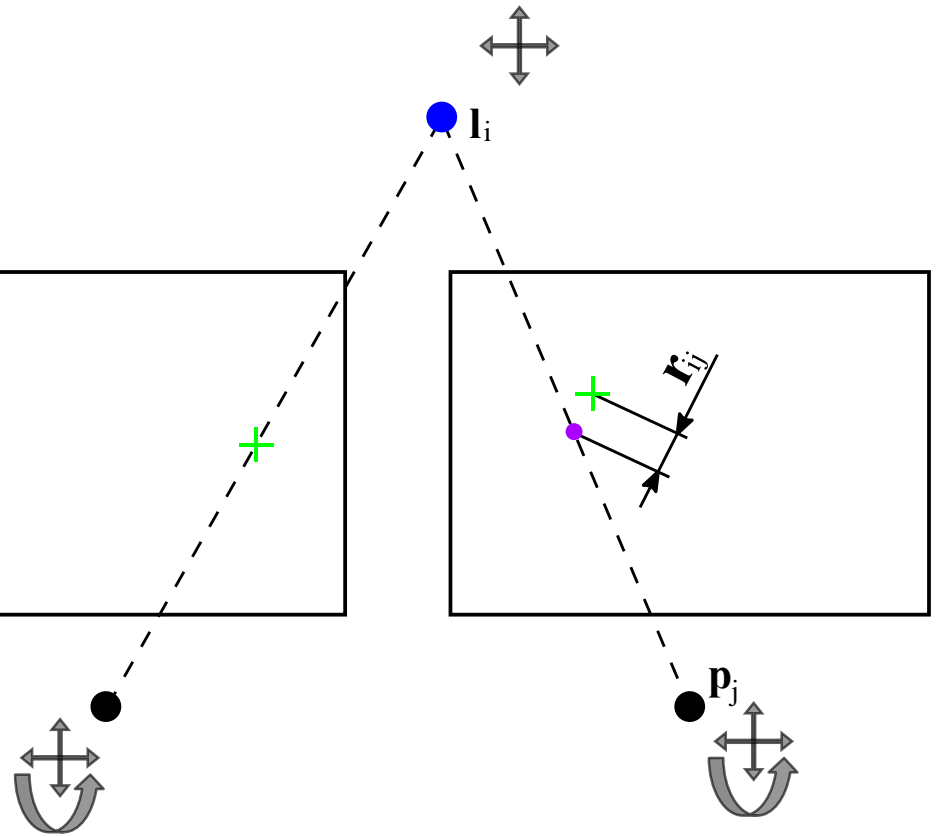
Structure From Motion



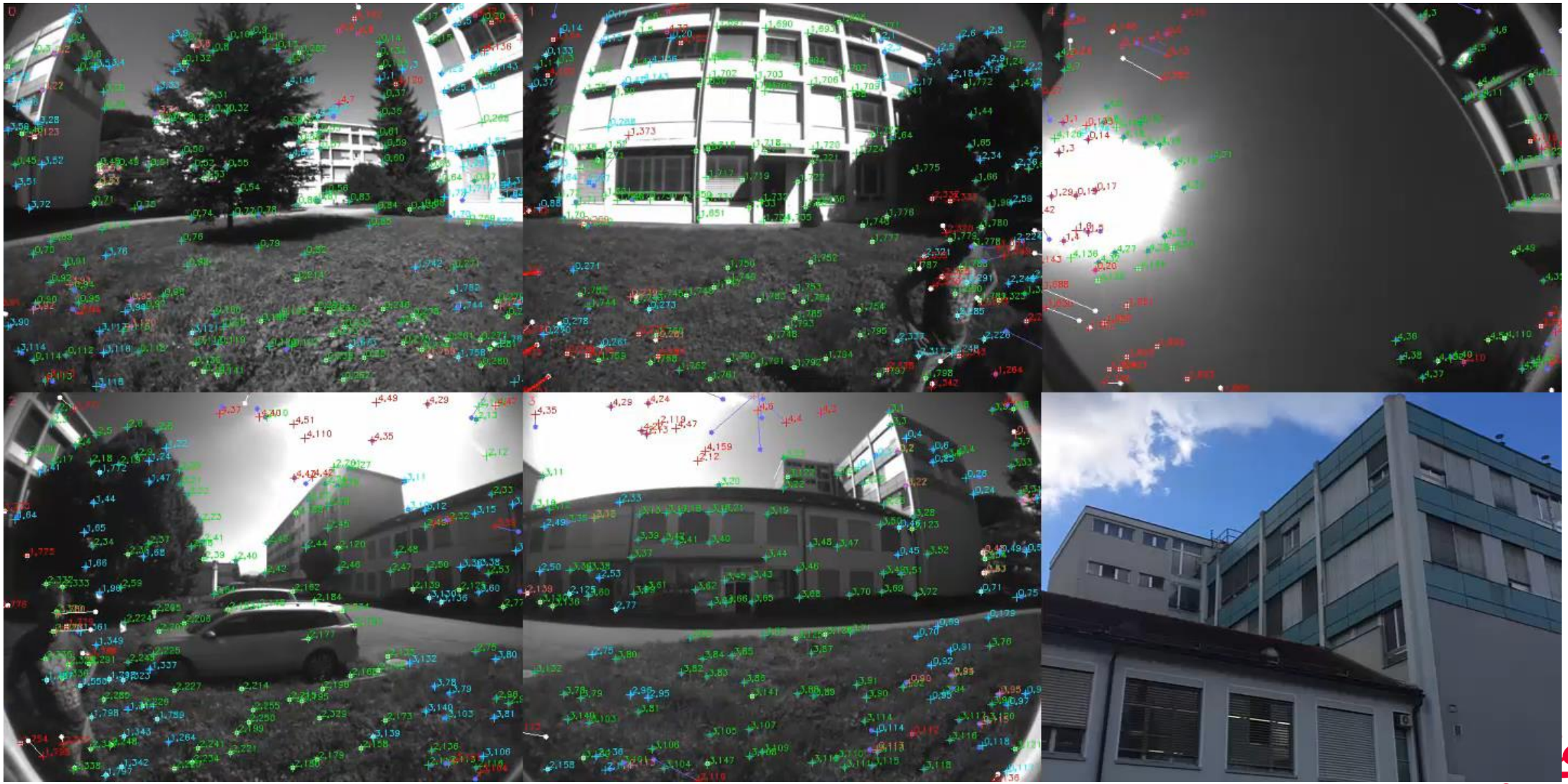


Bundle Adjustment

$$\arg\min_{\mathcal{L},\mathcal{P}} \sum_i \sum_j \rho\left(\|\mathbf{r}(\mathbf{l}_i, \mathbf{p}_j)\|^2\right)$$



VIS in action



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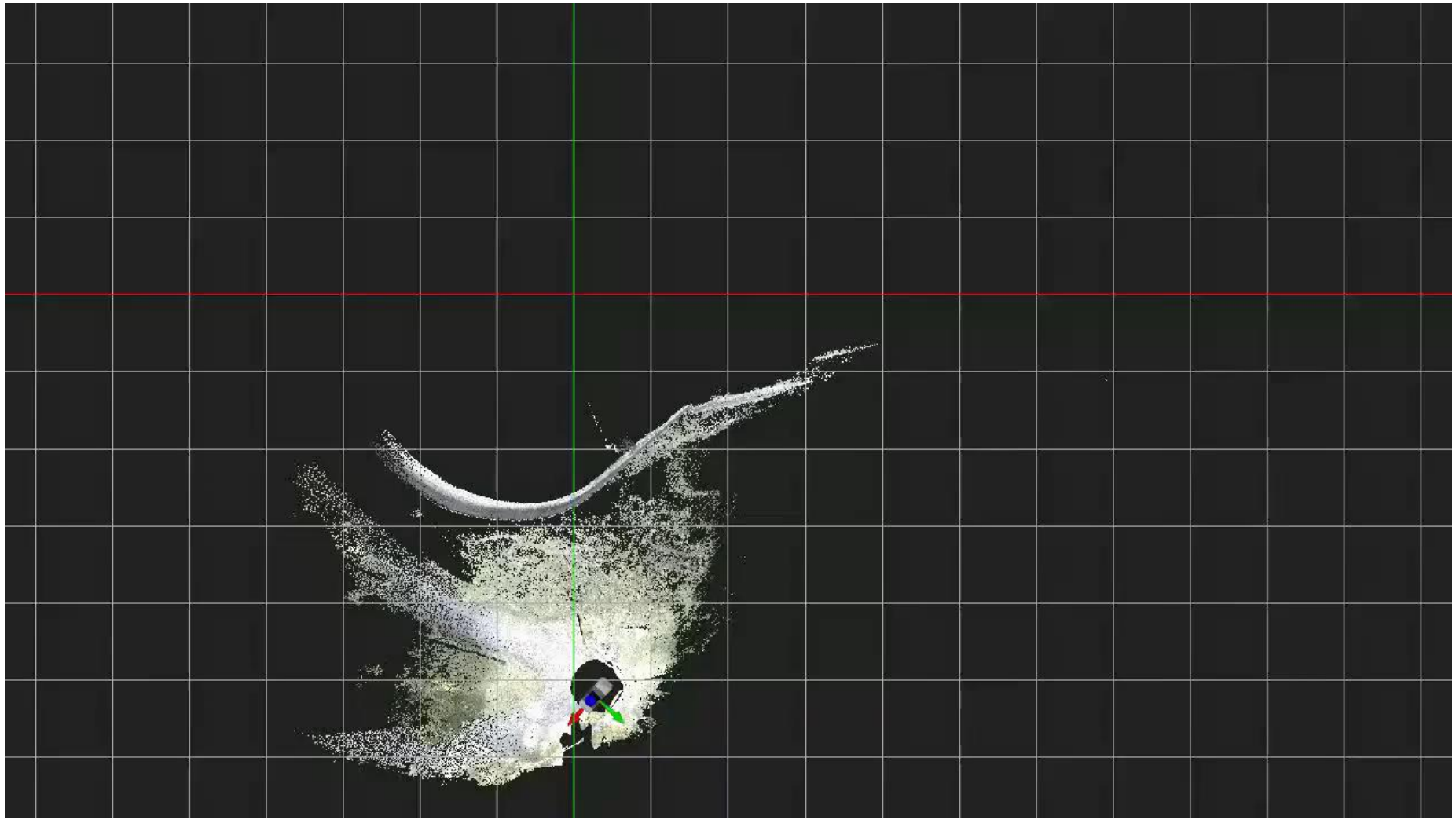
RTC360 in Action



Summary

- With the RTC360 we built the fastest laser scanner on the market
- We created a unique reality capture workflow based on VIS

- Take home message:

  smart algorithms like VIS help to save a lot of time and money