# A test bench to improve registration using RGB-D sensors

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# Introduction

- Current works on ICP/registration focus on limited datasets/specific conditions
- The best solution depends on the application
- Yet there is a lack of benchmark/comparative studies
- Solving this requires:
  - Common datasets
  - Versatile implementation

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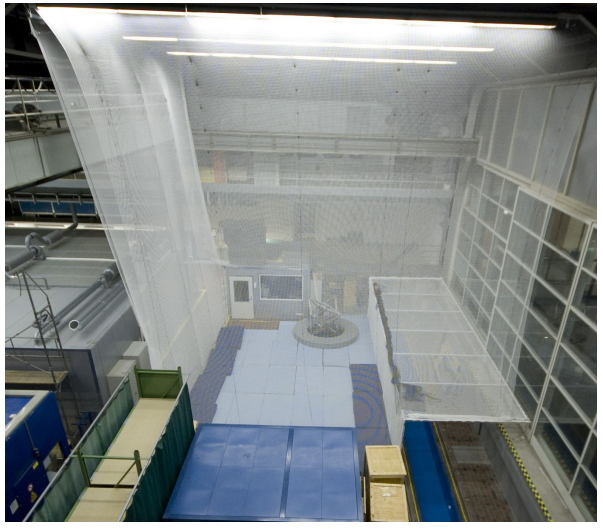
# Common datasets

Datasets with ground truth, using a RGB-D sensor

# Dataset Acquisition Setup

- Vicon
  100 Hz, $<$ 1 mm precision
- Kinect
  hand-held, 30 Hz, 160$\times$120 points
- Laptop
  Thinkpad W510, Intel Core i7 Q820



`http://www.asl.ethz.ch/research/datasets`

access to FMA/Vicon through the courtesy of Prof. D'Andrea

# Experiments

- translations on the three axes, for about 10 s per axis
- rotations on the three axes, for about 10 s per axis
- a free fly motion over the scene, for about 15 s
- slow motion, speed of indoor ground robots (0.3 m/s)
- medium motion, speed of agile robots (0.5 m/s)
- fast motion, a challenging speed (1.3 m/s)

# Example of Acquisition: Free Fly

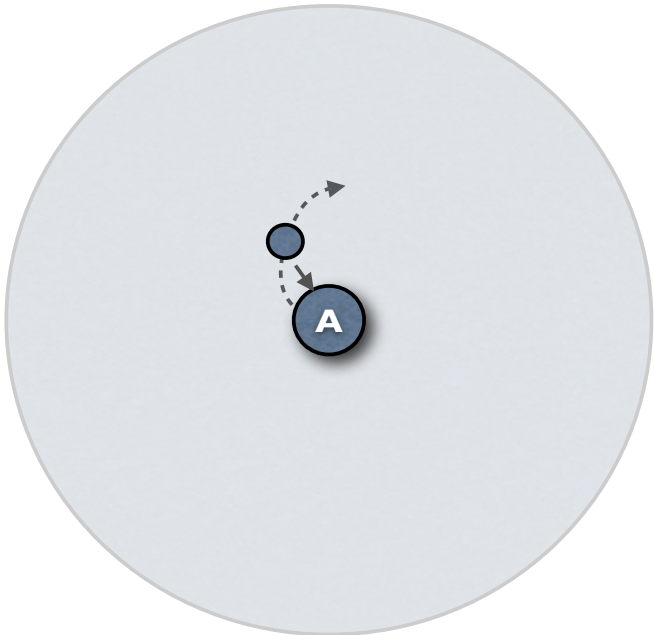
Video of free fly: slow, medium speed and fast

# Versatile implementation

Open-source library providing a modular ICP chain

Tracker

# Tracker = Sequence of ICP + Key Frame



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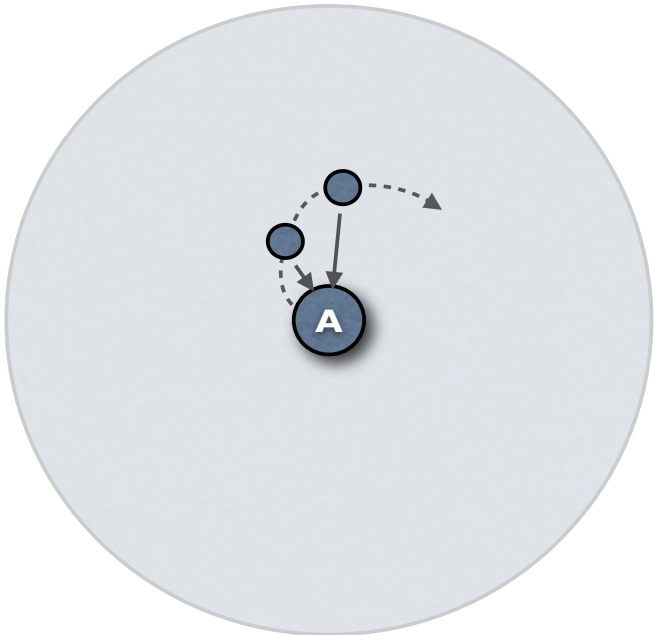

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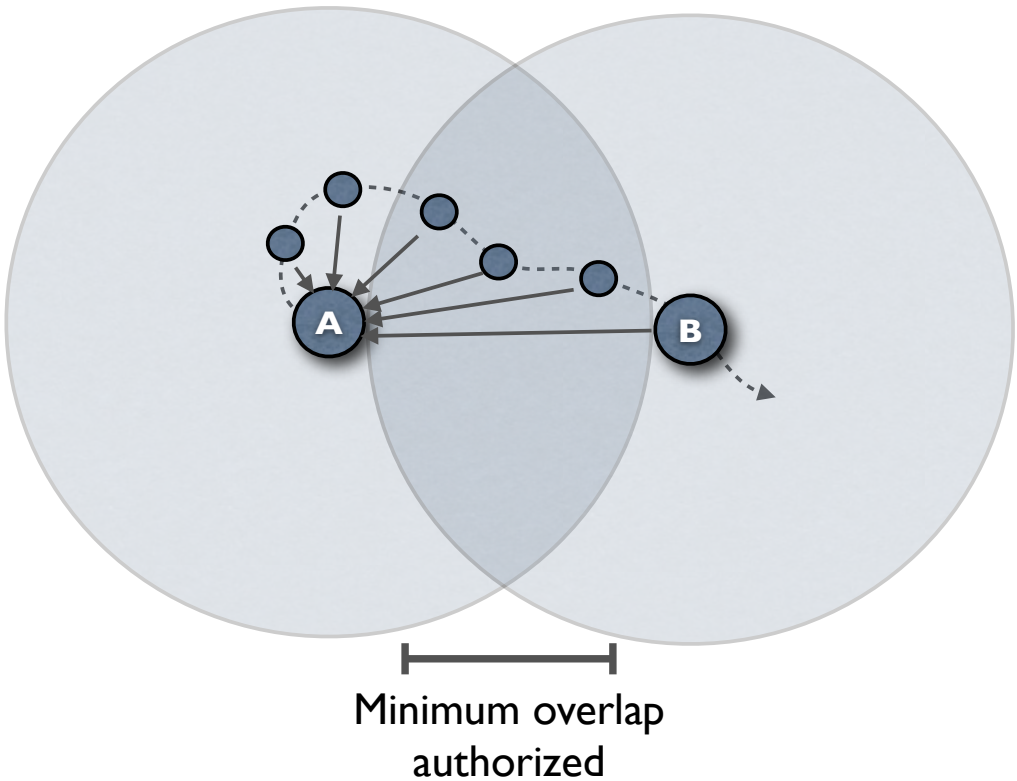

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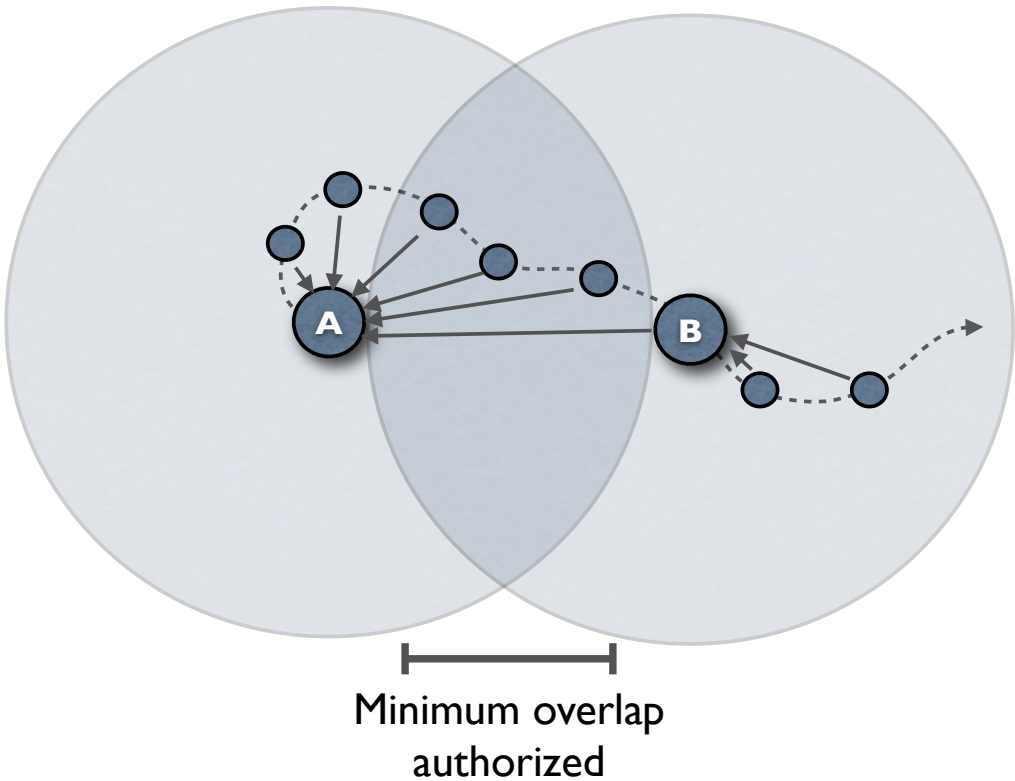

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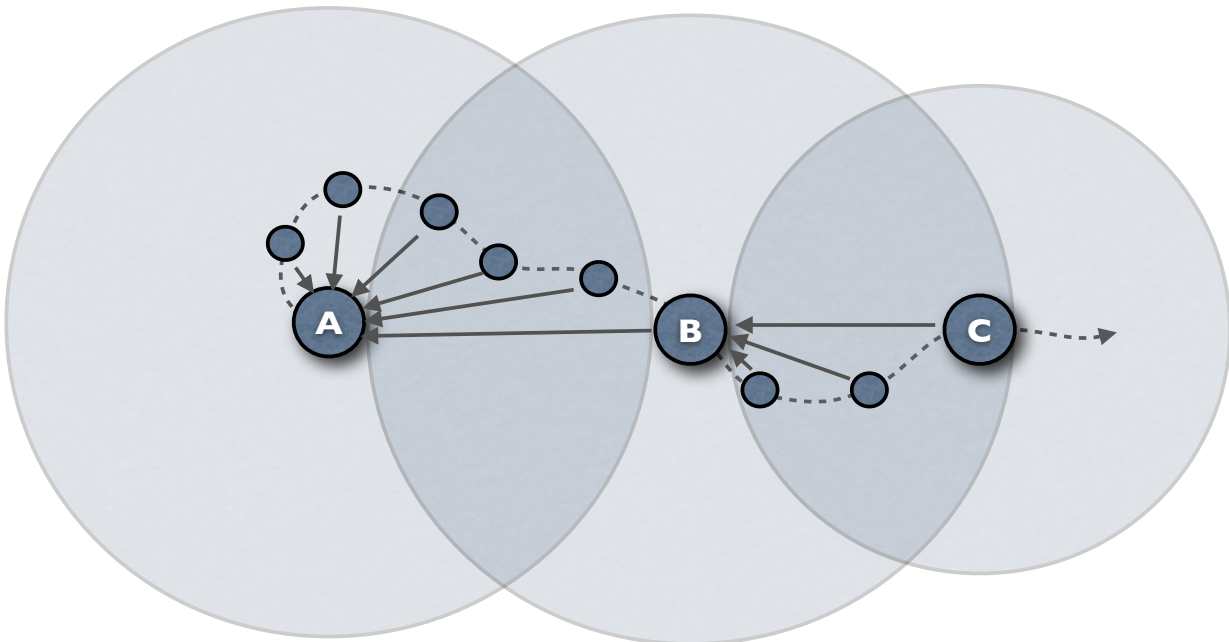

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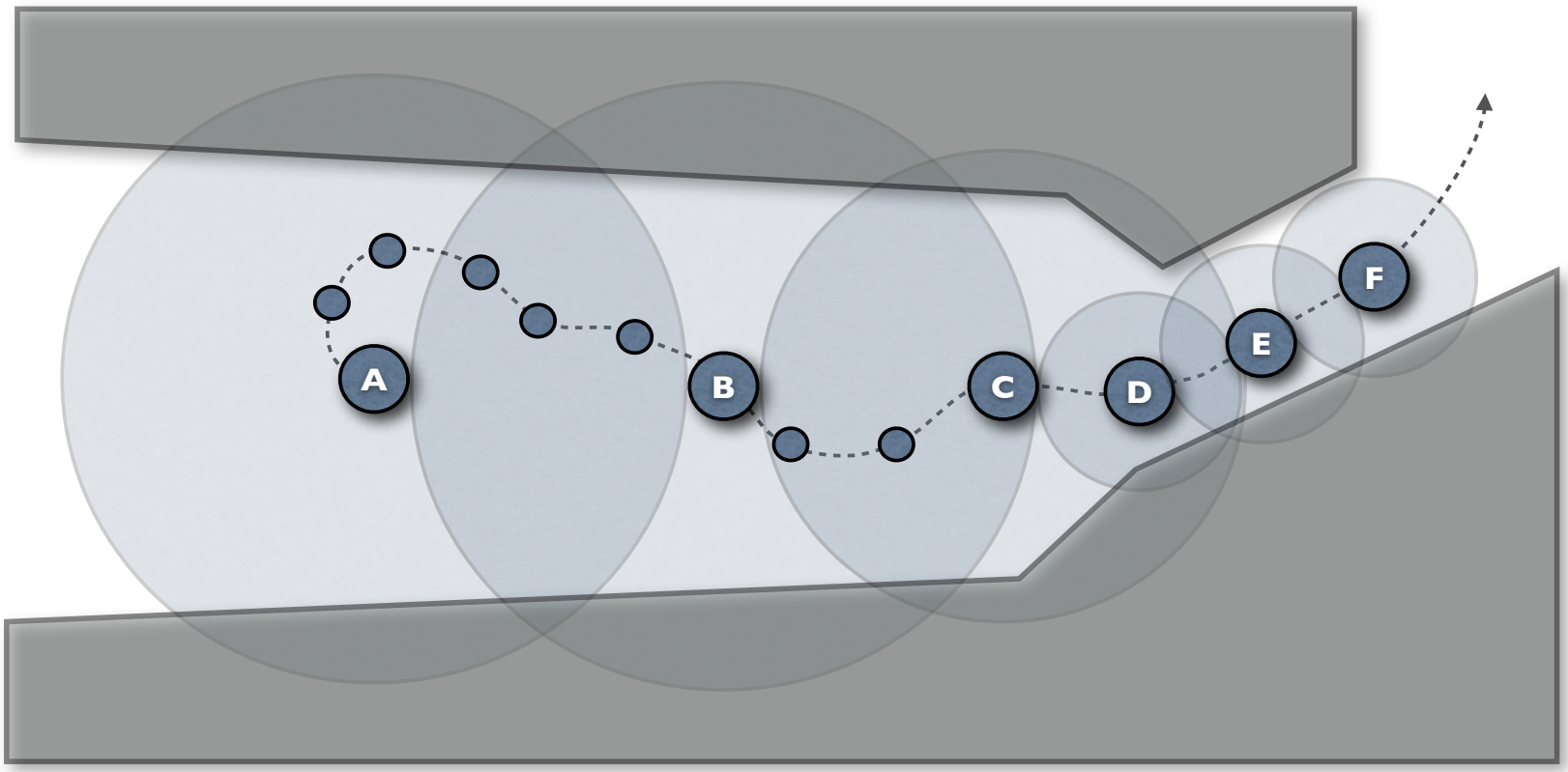
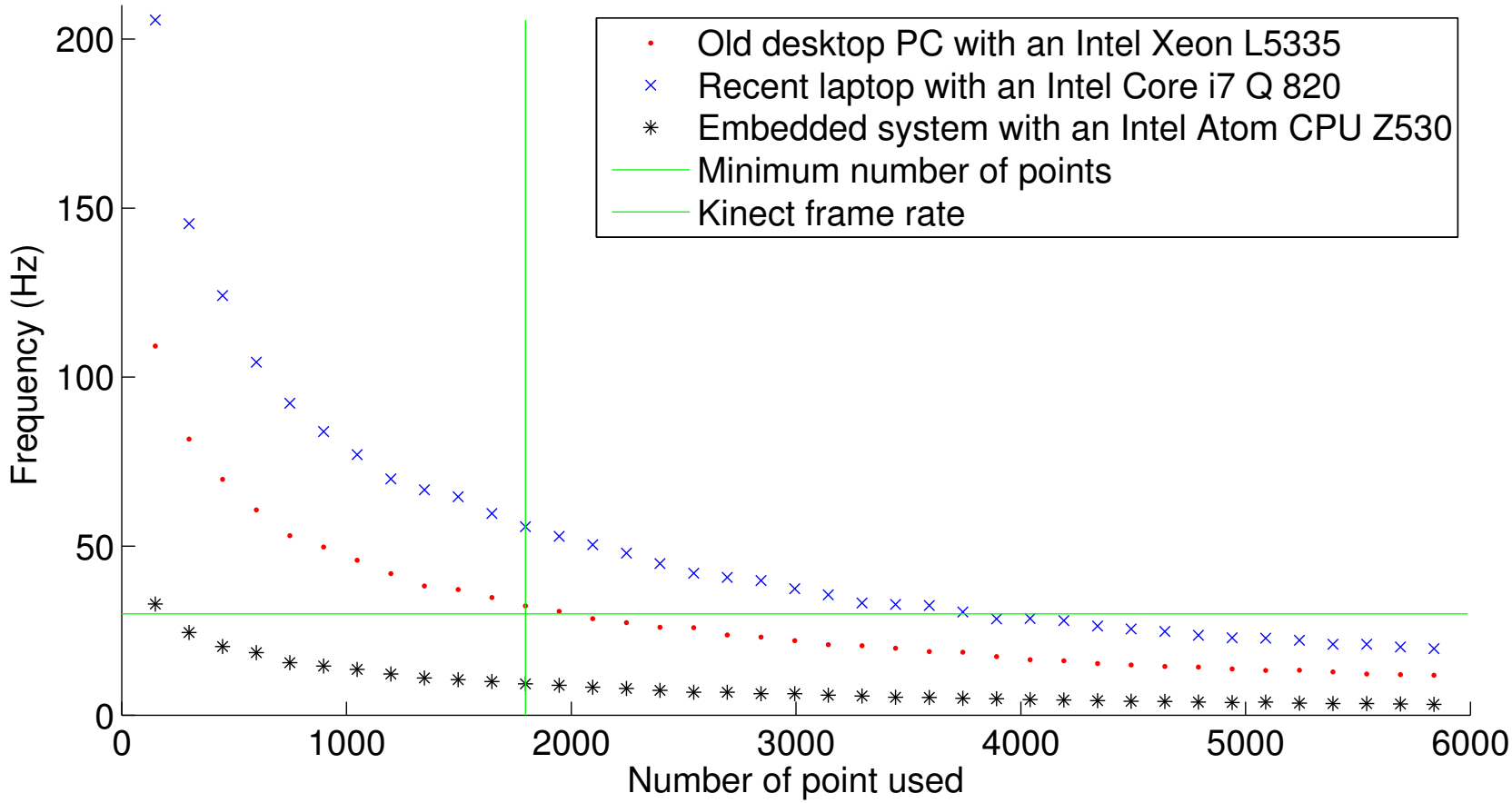
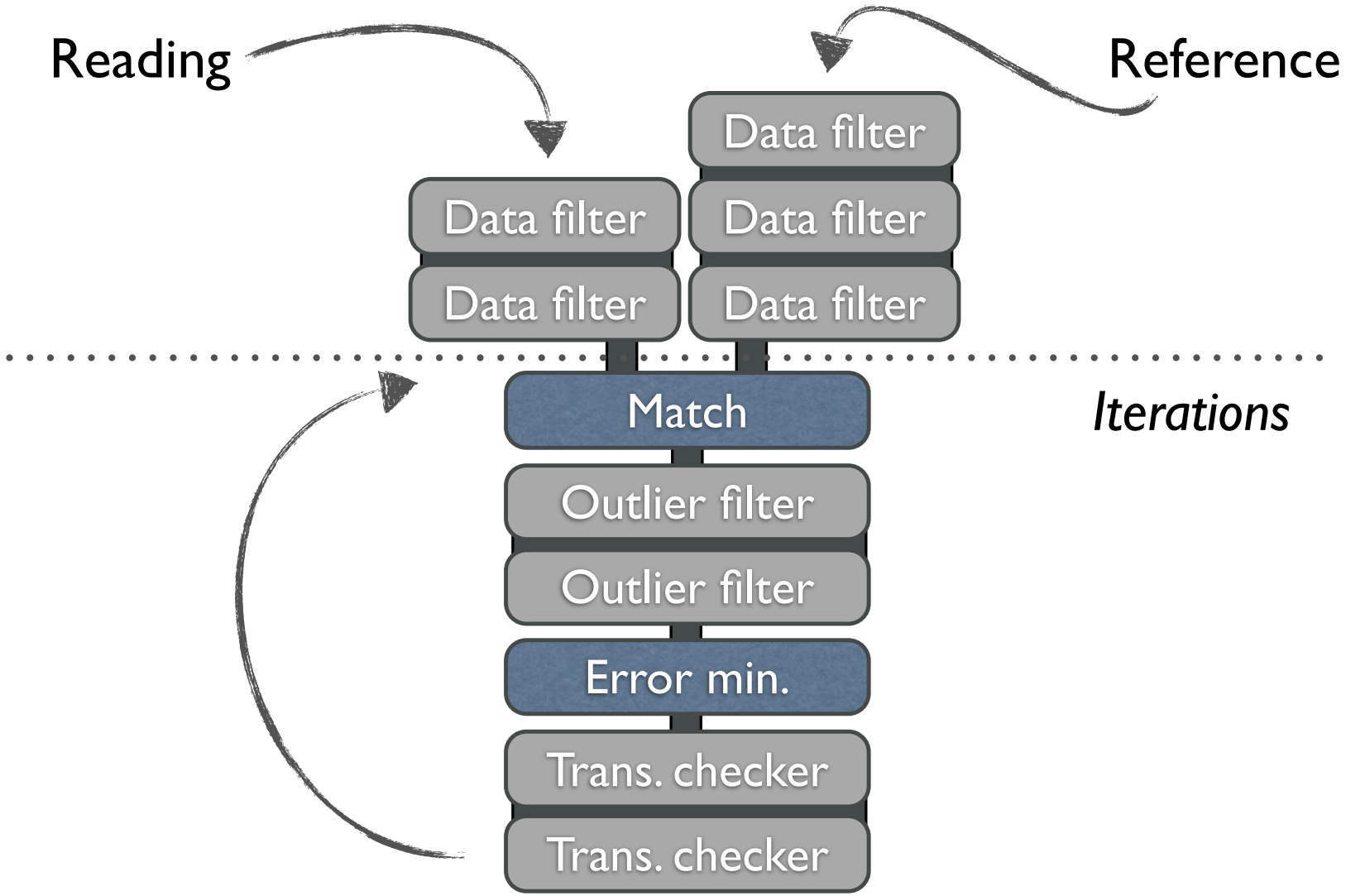


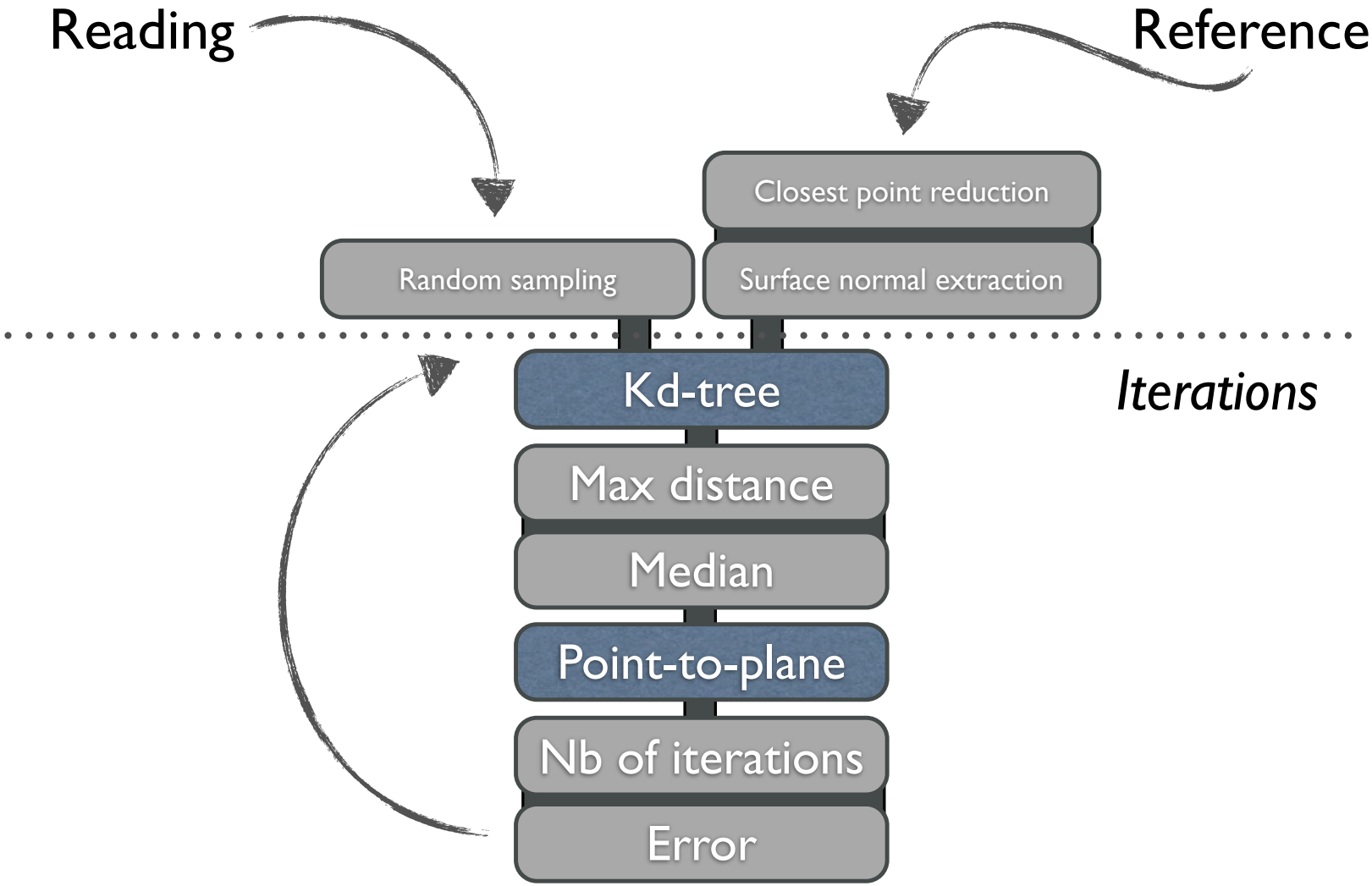
# Tracking Performances



# Modular ICP chain



# Typical ICP chain for Office Environments



# Conclusion

Ongoing work toward standardisation of ICP comparison

- datasets with ground truth
- open-source library providing a modular ICP chain

Tracker as tech demo

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# Live Demo and Questions

Enjoy!

Your questions are welcome!