

Empirical estimation of tracking ranges
and application thereof for smooth transition
between two tracking devices

or

The MultiTracker service

Systementwicklungsprojekt

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Outline

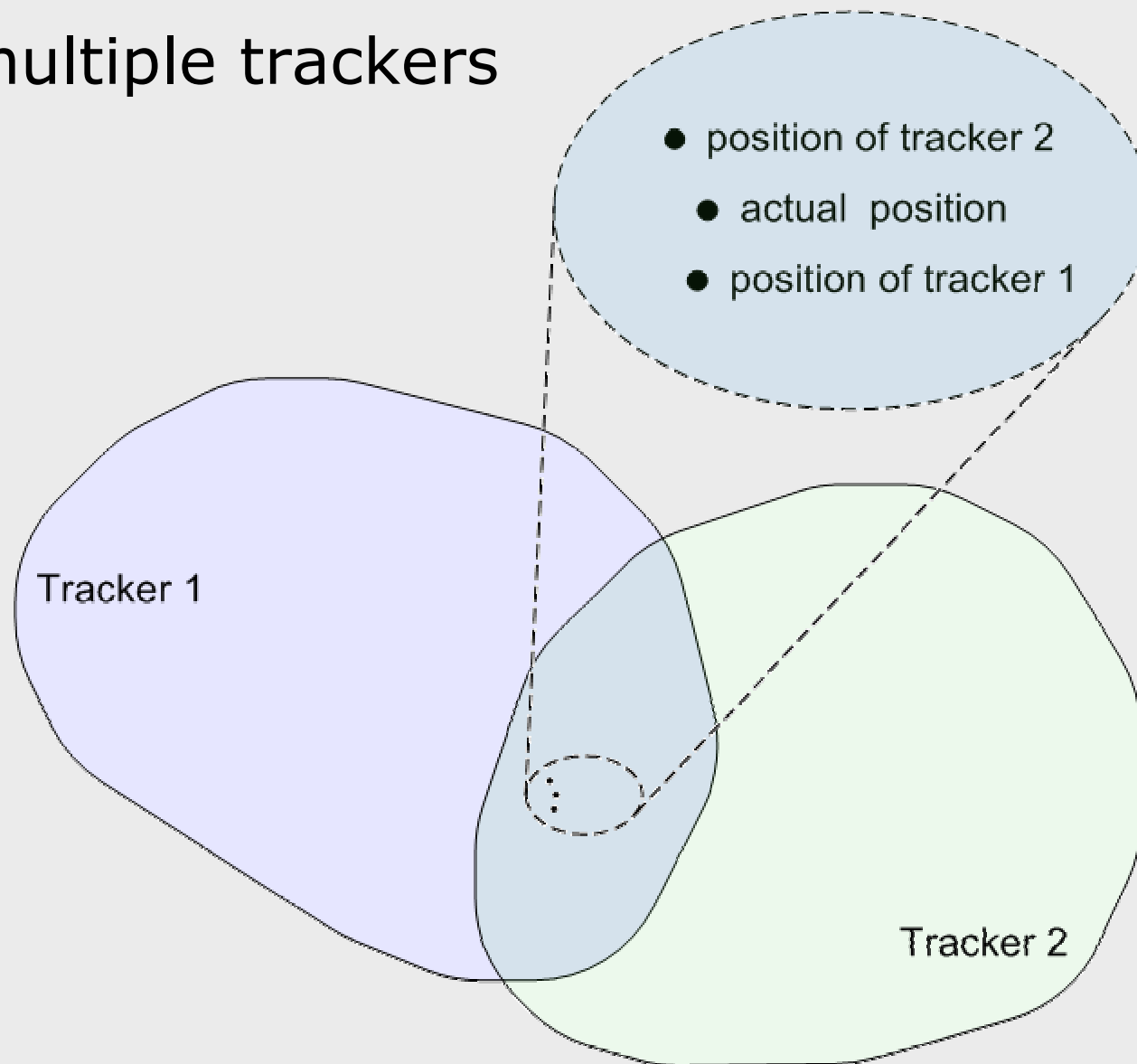
- Motivation
- Requirements
- System design
- Object design
- Transition strategies
 - Convex hull
 - Neural network

The problem

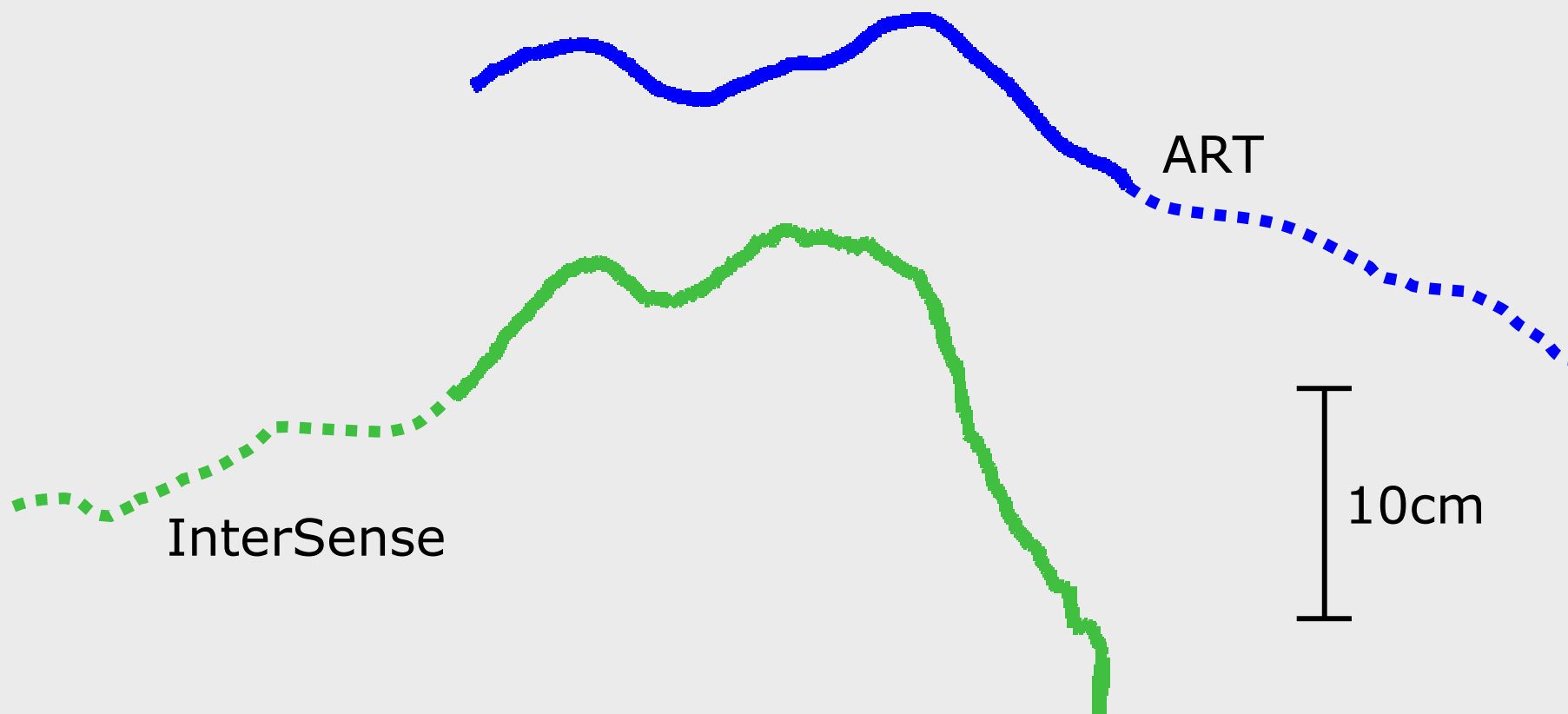
- Tracking is essential for AR
- Trackers have limited working areas
 - ART: 4 x 4 metres
 - IS-600: 3 x 3 metres
- Not sufficient for many applications

The solution?

- Use multiple trackers

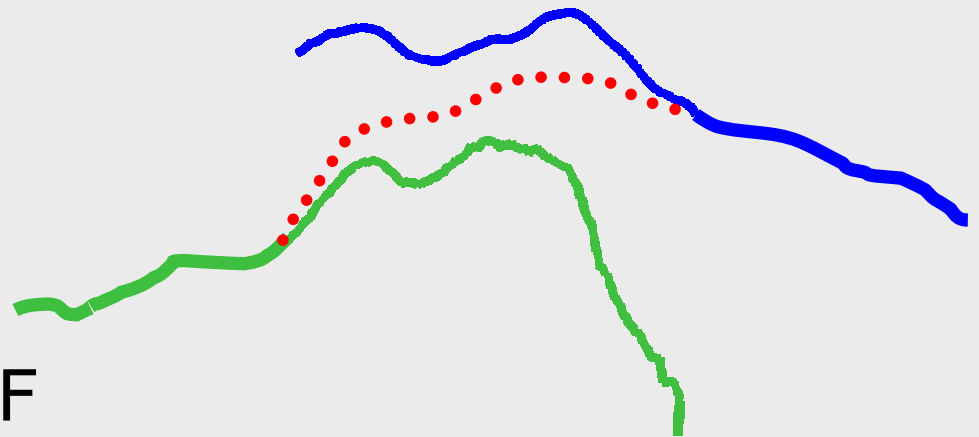


Tracking inaccuracies

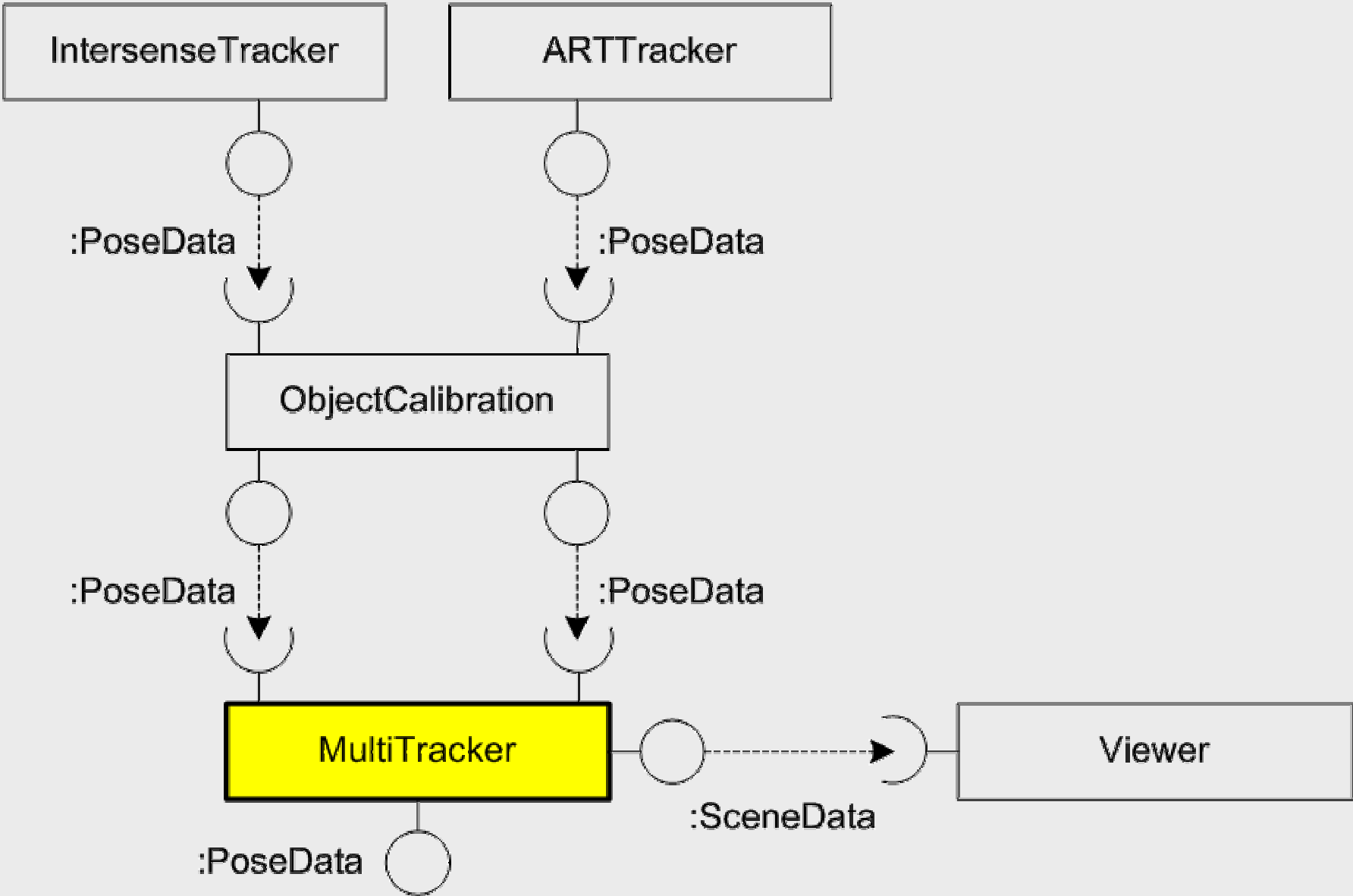


Requirements

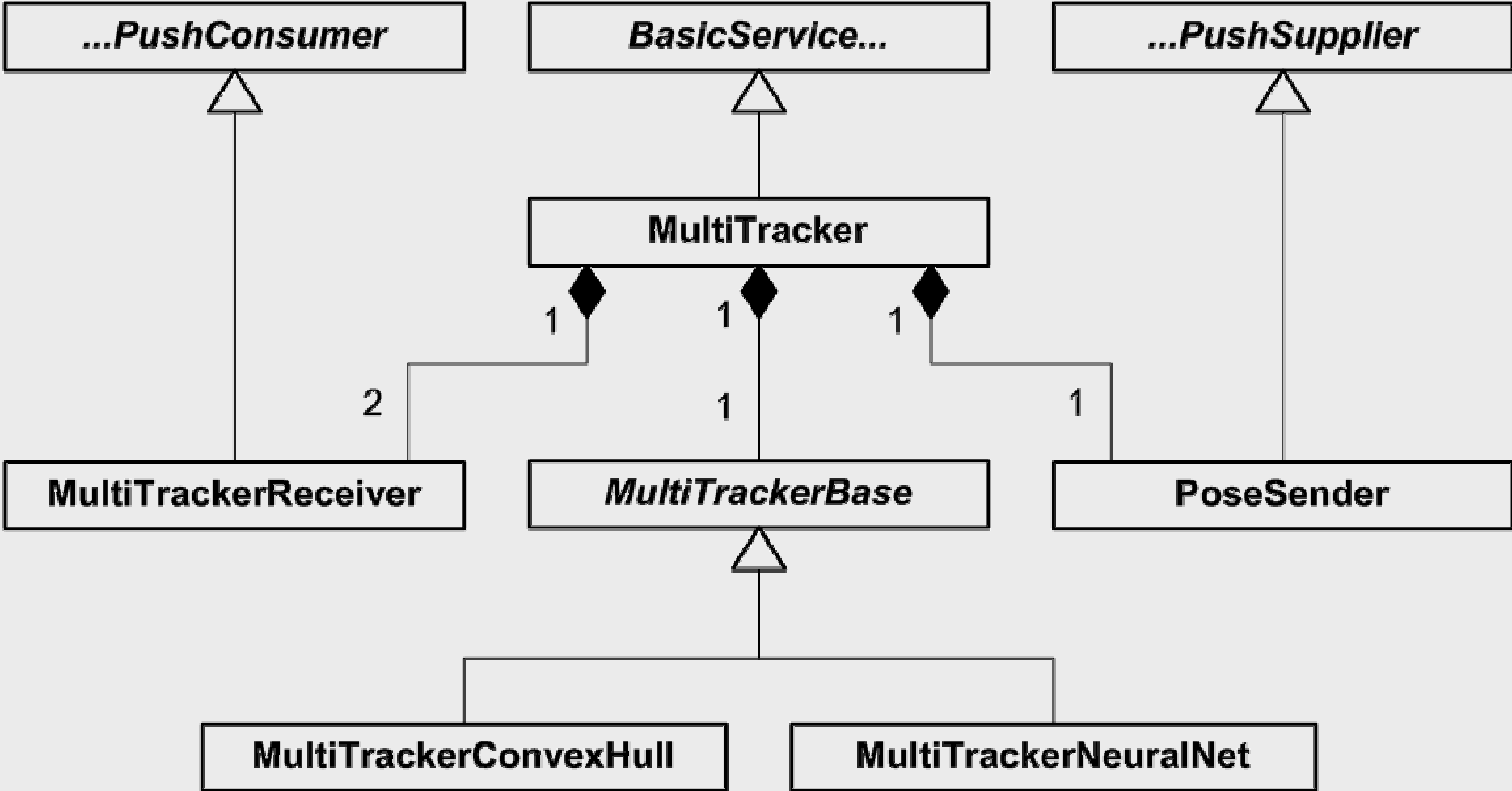
- Combine two trackers to increase tracking area
- Assumption: Overlapping tracking areas
- Challenges:
 - Smooth transition
 - Capable of learning
- Embedded into DWARF
 - The MultiTracker service



System design

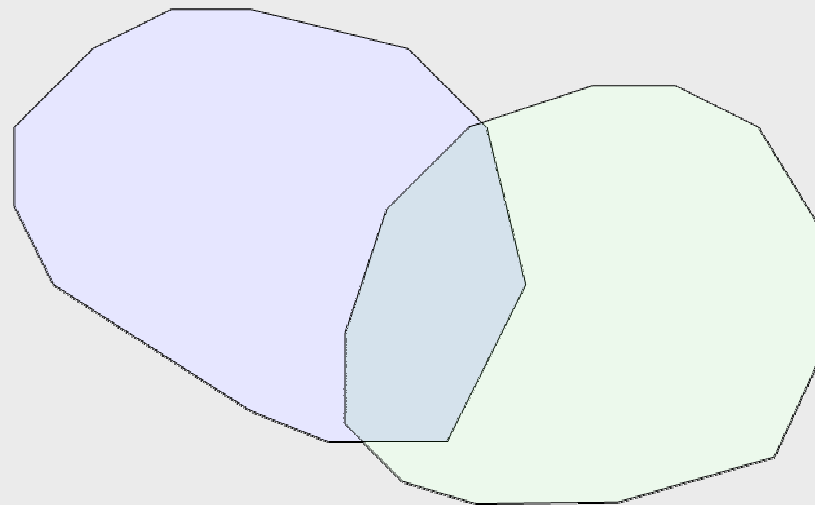


Object design



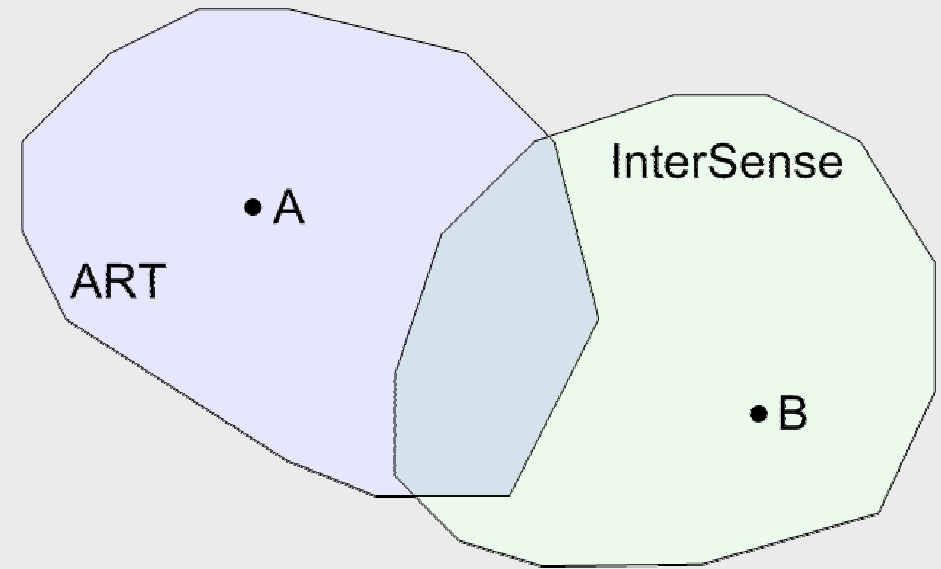
Convex hull transition strategy

- Estimate tracking areas out of tracking data
- Assumption: Tracking areas are convex
- Represent tracking areas as convex hulls
- Learning phase:
 - Collect tracking data
 - Compute convex hull for each tracker (incrementally)

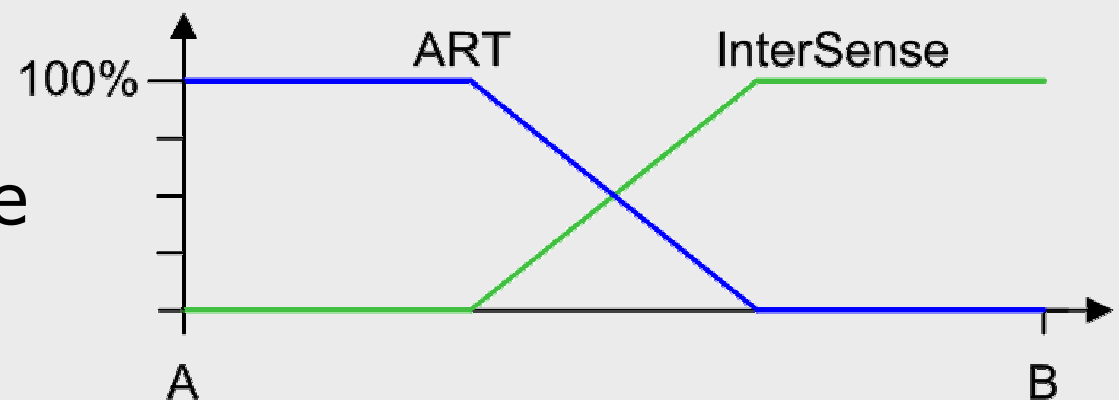


Convex hull strategy – Application phase

- Mix trackers based on the distance to the tracking boundary

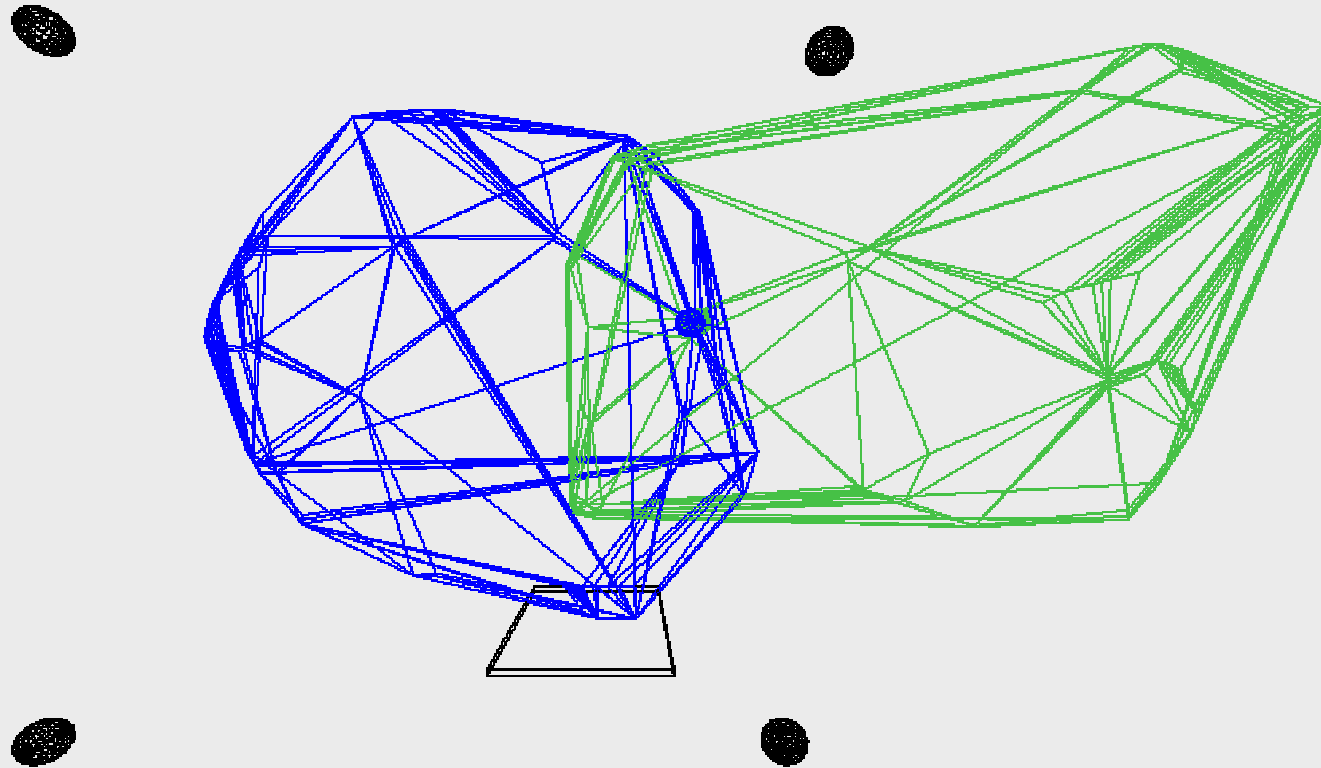


- Fade out ART
- Fade in InterSense
- Smooth transition



Convex hull strategy – Results (1)

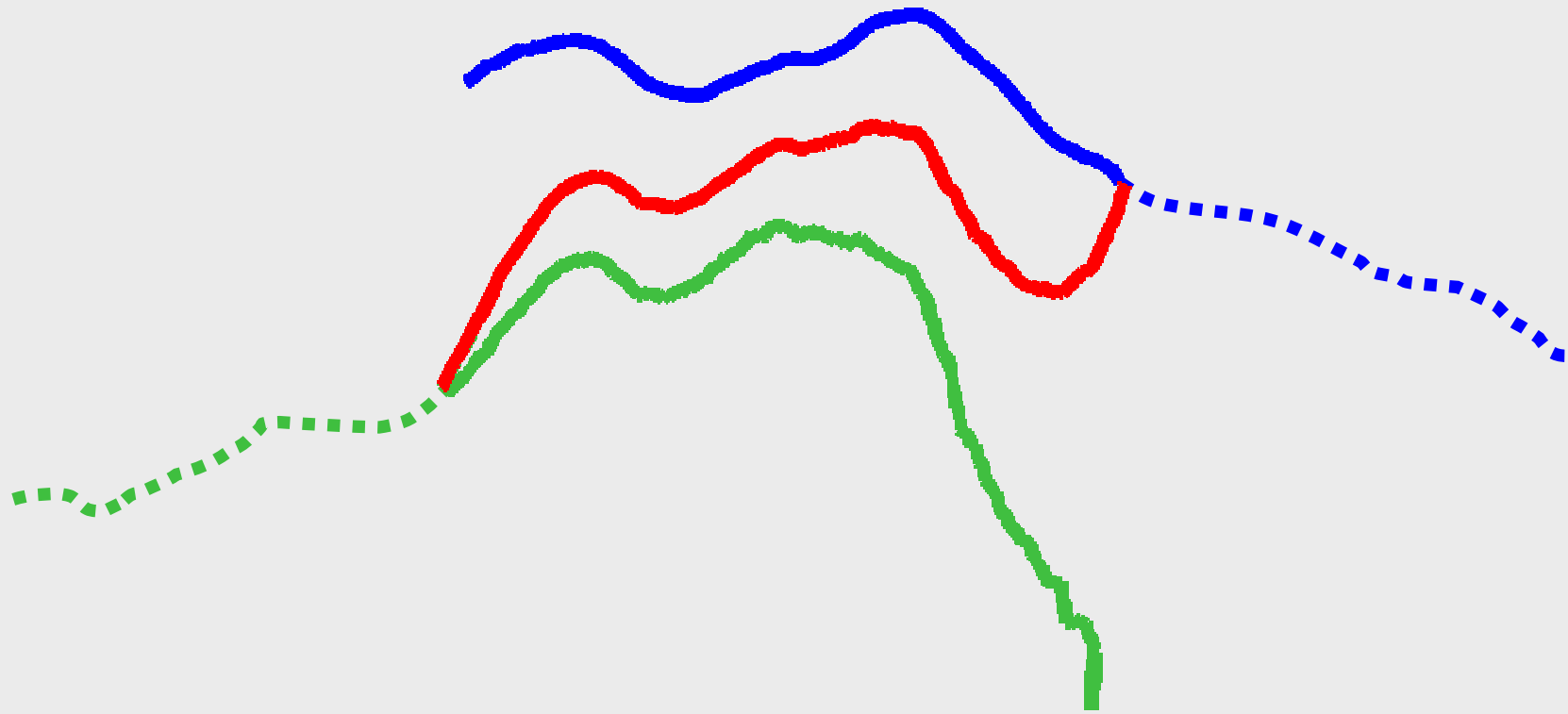
- Strengths:
 - It works!
 - Efficient (even for online learning)



Convex hull strategy – Results (1)

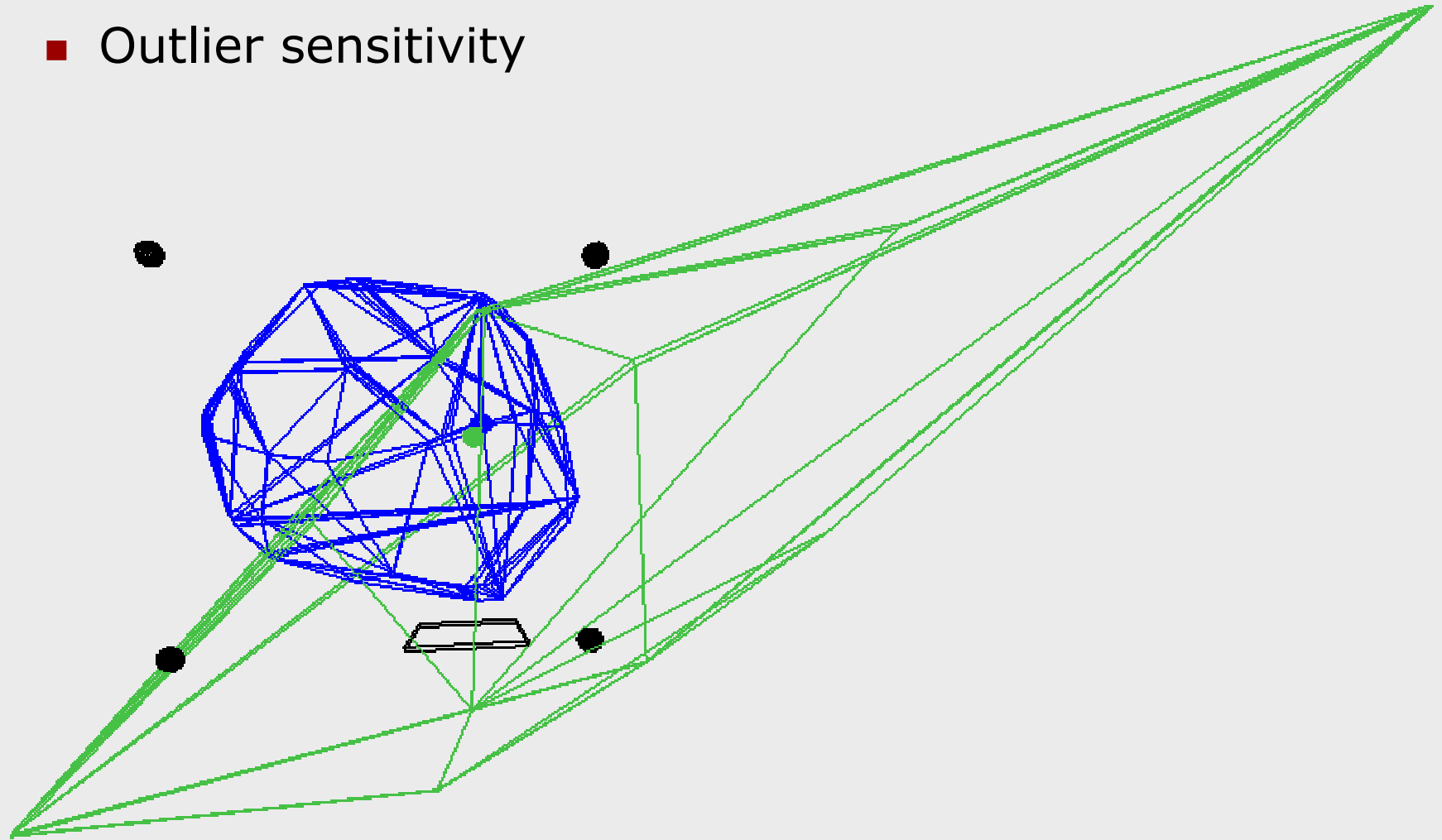
- Strengths:

- It works!
- Efficient (even for online learning)



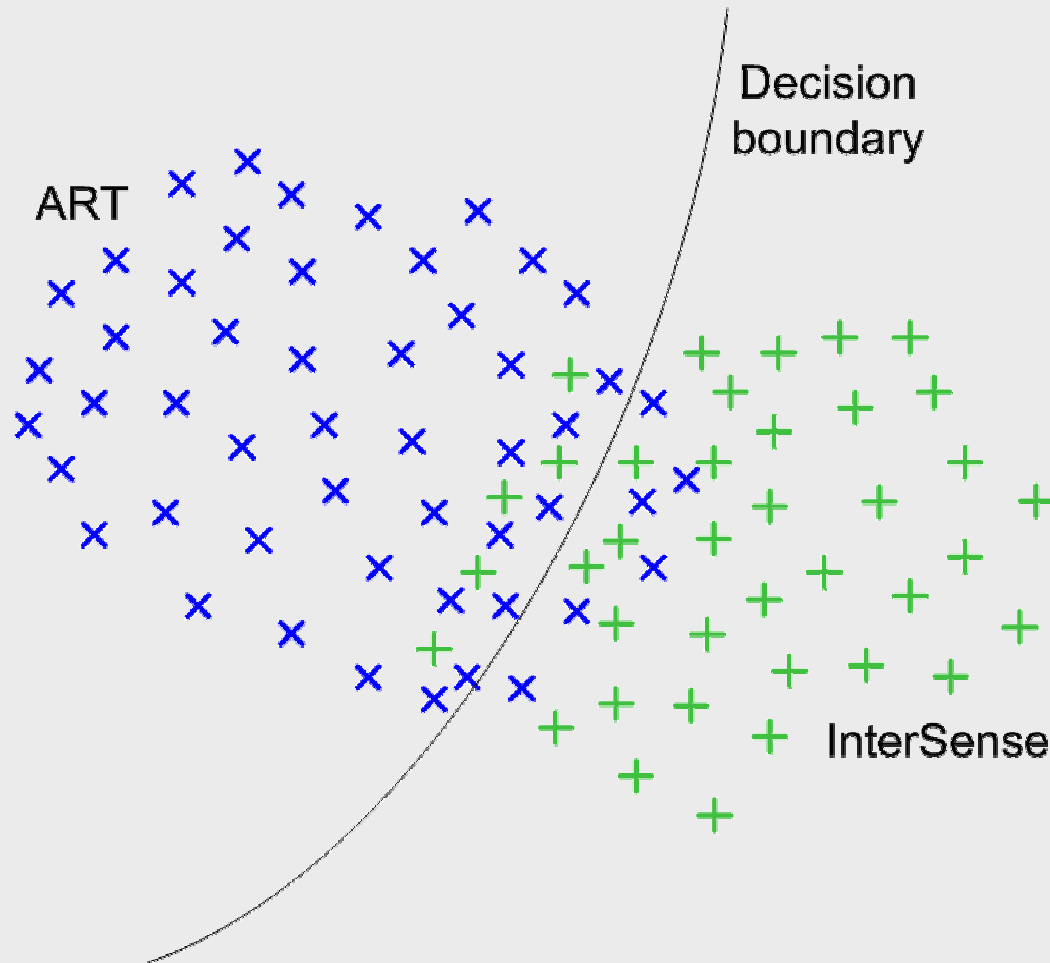
Convex hull strategy – Results (2)

- Weakness:
 - Outlier sensitivity



Neural network transition strategy

- Goal: No outlier sensitivity
- Classification of the tracking data



Conclusion

- Convex hull strategy:
 - Works, but suffers from outlier sensitivity
- Neural network strategy:
 - Doesn't work as expected
- Future work:
 - Outlier detection for convex hull strategy
 - Combination of convex hull and neural net strategy?