

Manipulating Objects in Unstructured Environments

Dov Katz & Oliver Brock

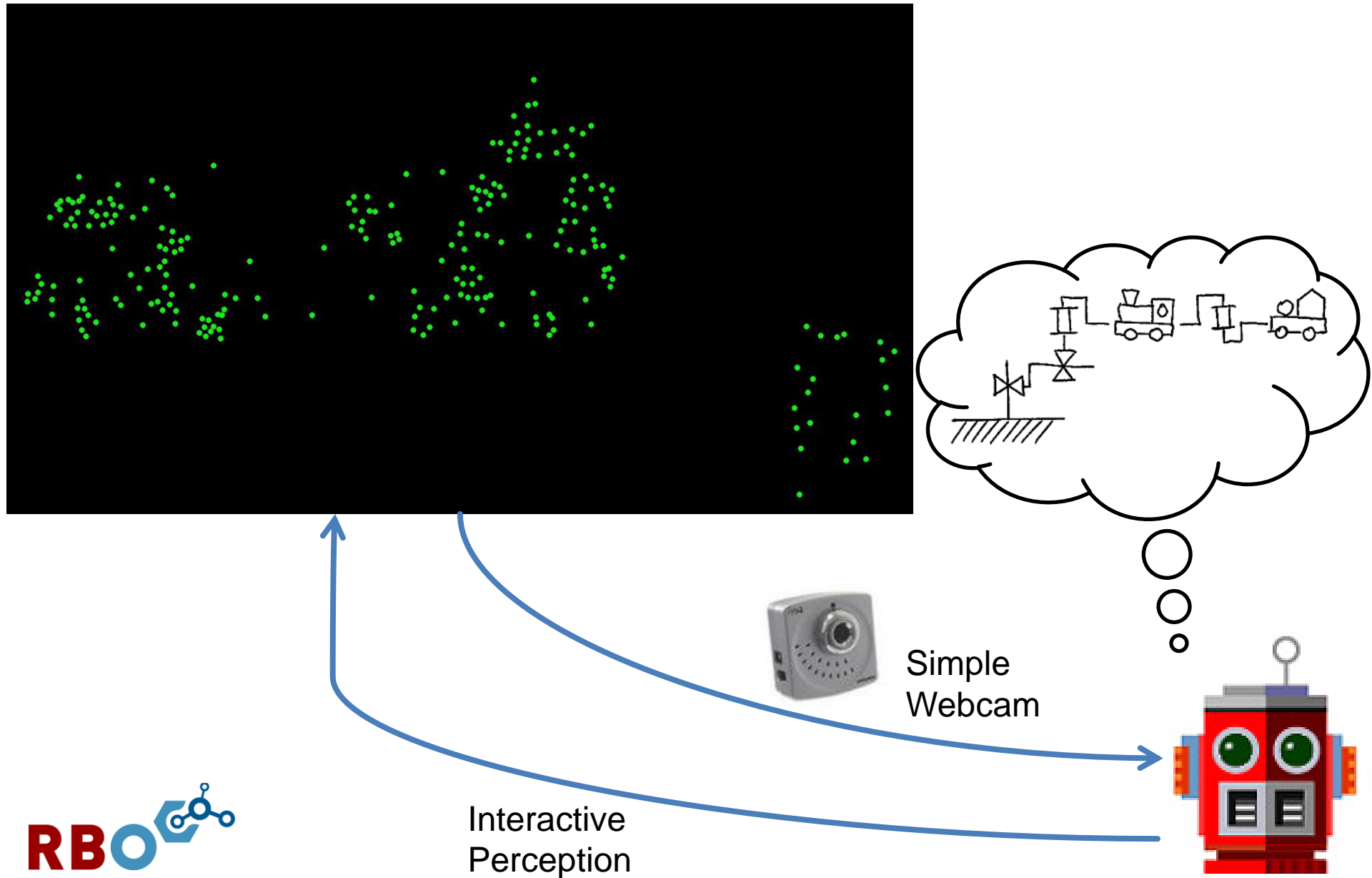
Manipulating **Novel** Objects



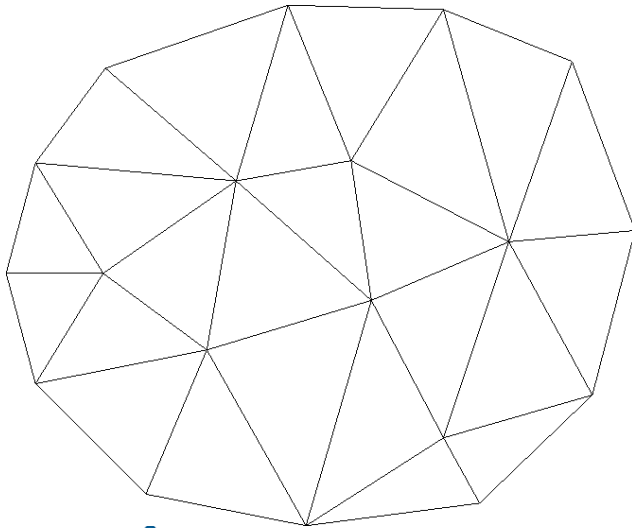
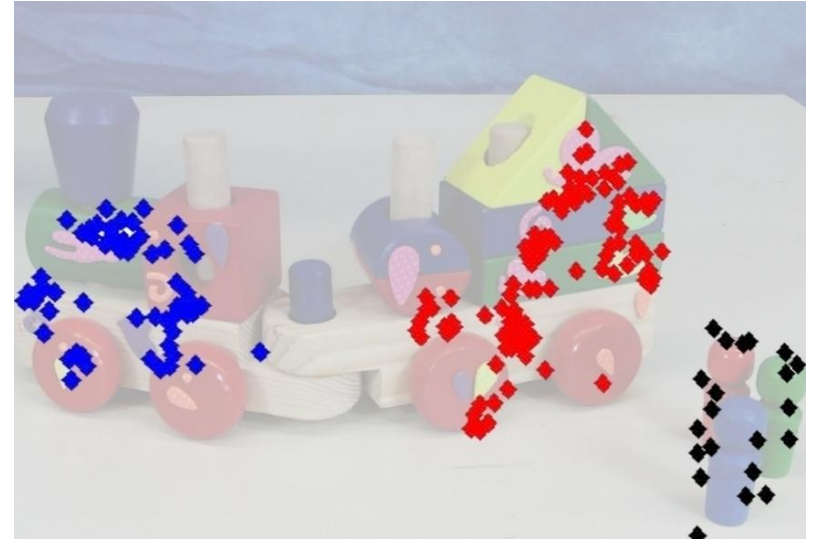
Perceiving Objects



Problem Definition & Challenges

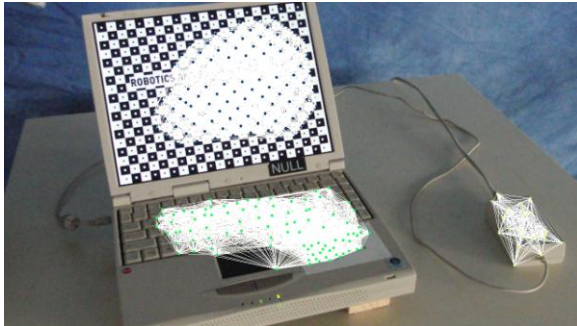
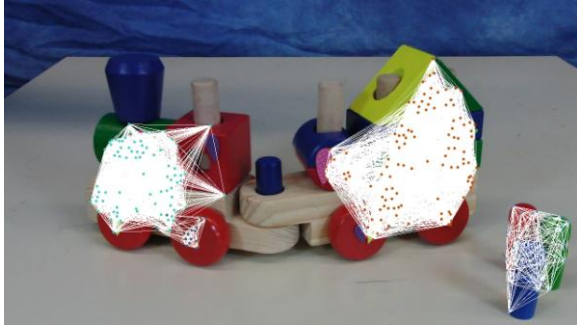


Rigid Body Segmentation



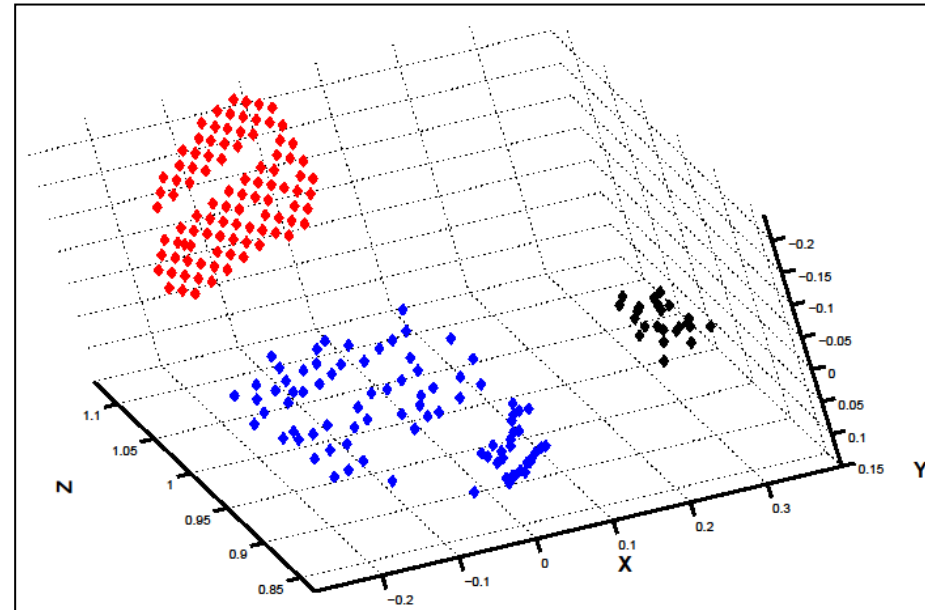
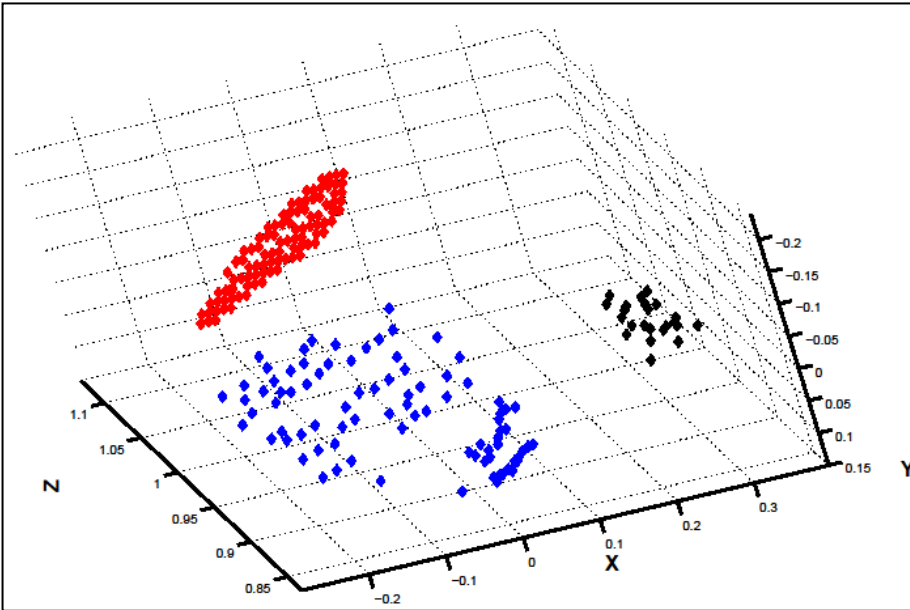
- ▶ vertices = features
- ▶ edges = confidence
 - relative motion
 - distance
 - color segmentation
 - triangulation
 - fundamental matrix

Identifying Rigid Bodies



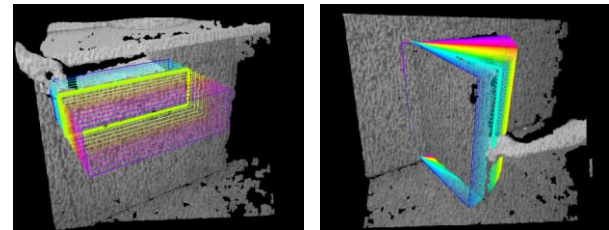
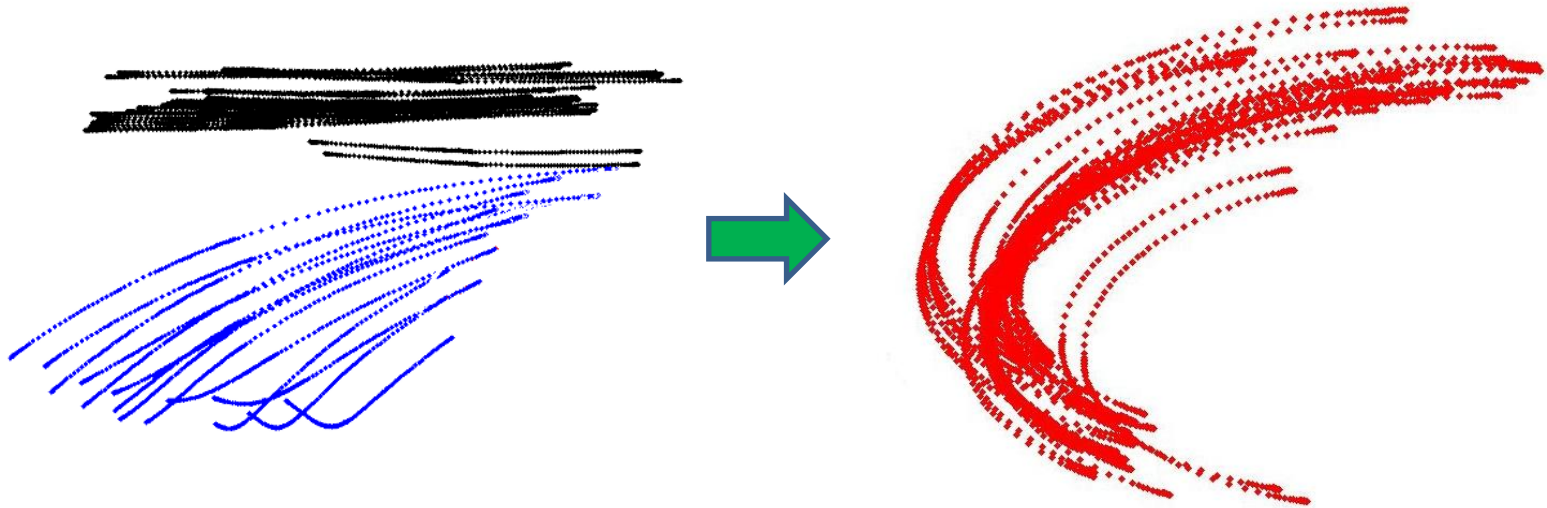
3-D Reconstruction

► Bundle Adjustment + EKF



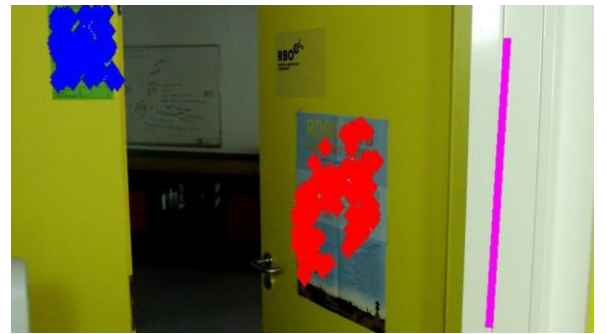
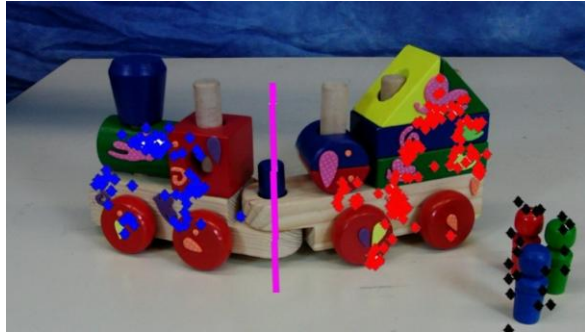
Bundler: Structure from Motion (SfM)
Snavely, IJCV 2007

Joint Detection



Learning Articulated Models
Sturm et al. (ICRA 2010)

Perceiving Articulated Objects



Limitations

⇒ Sufficient Texture

⇒ Interaction

⇒ Where to Interact ?

Conclusion

⇒ Interactive Perception

⇒ Task-Relevant Physical Properties

⇒ Single Rigid Body Reconstruction

⇒ Decomposition

More information:

- (1) Interactive Perception of Articulated Objects (**ISER 2010**)
- (2) Learning to Manipulate Articulated Objects using a Grounded Relational Representation (**RSS 2008**)



Interactive Perception of Articulated Objects

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ROBOTICS AND BIOLOGY LABORATORY



The most active IEEE/RAS Technical committee:
<http://mobilemanipulation.org>

