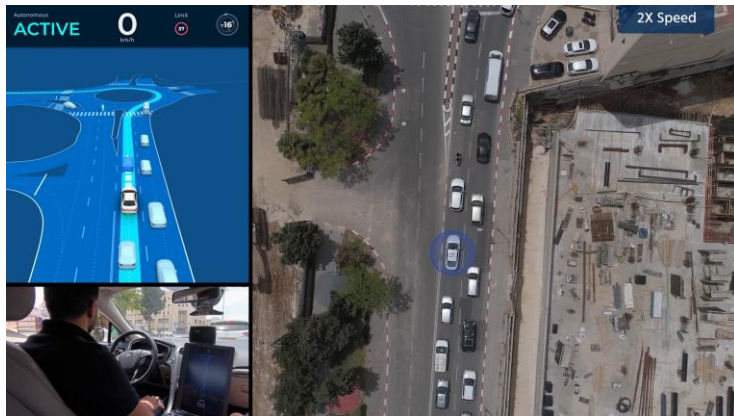# 4D Scene Understanding

Prof. Fisher Yu
D-ITET, Computer Vision Lab
Visual Intelligence and Systems Group

4D Scene Understanding

Full understanding of the dynamic 3d world is critical for real-world automation

Autonomous Driving
Courtesy of Mobileye

Home Service
Courtesy of Amazon Astro

Automated Stored
Courtesy of Amazon Go

Our Goal

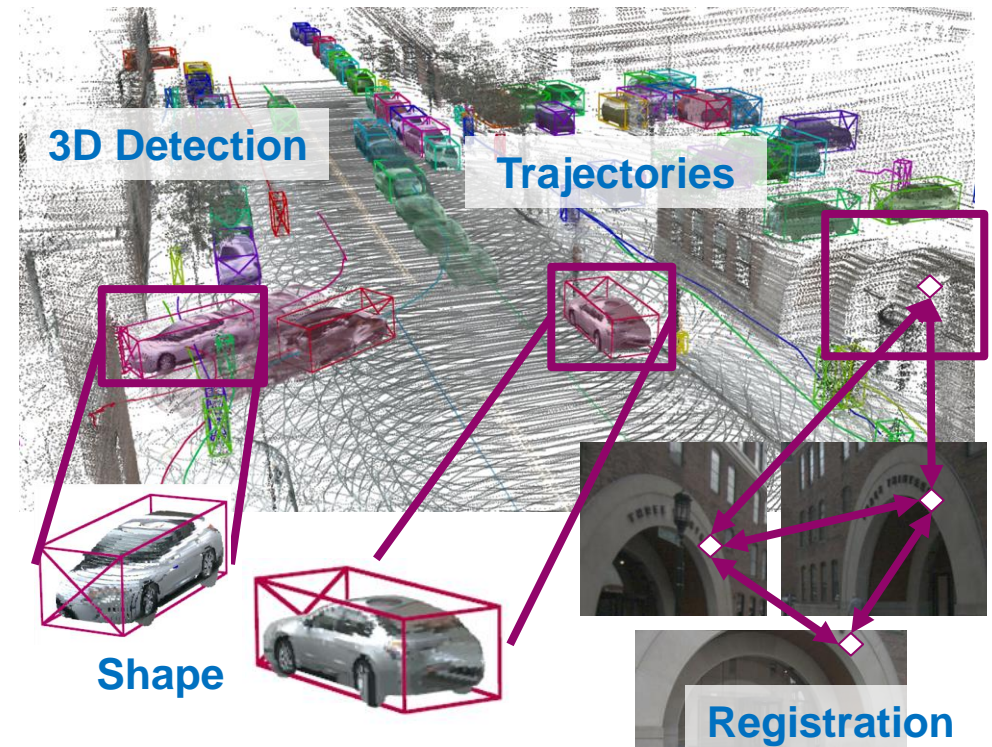Building foundational algorithms and software for 4D scene understanding

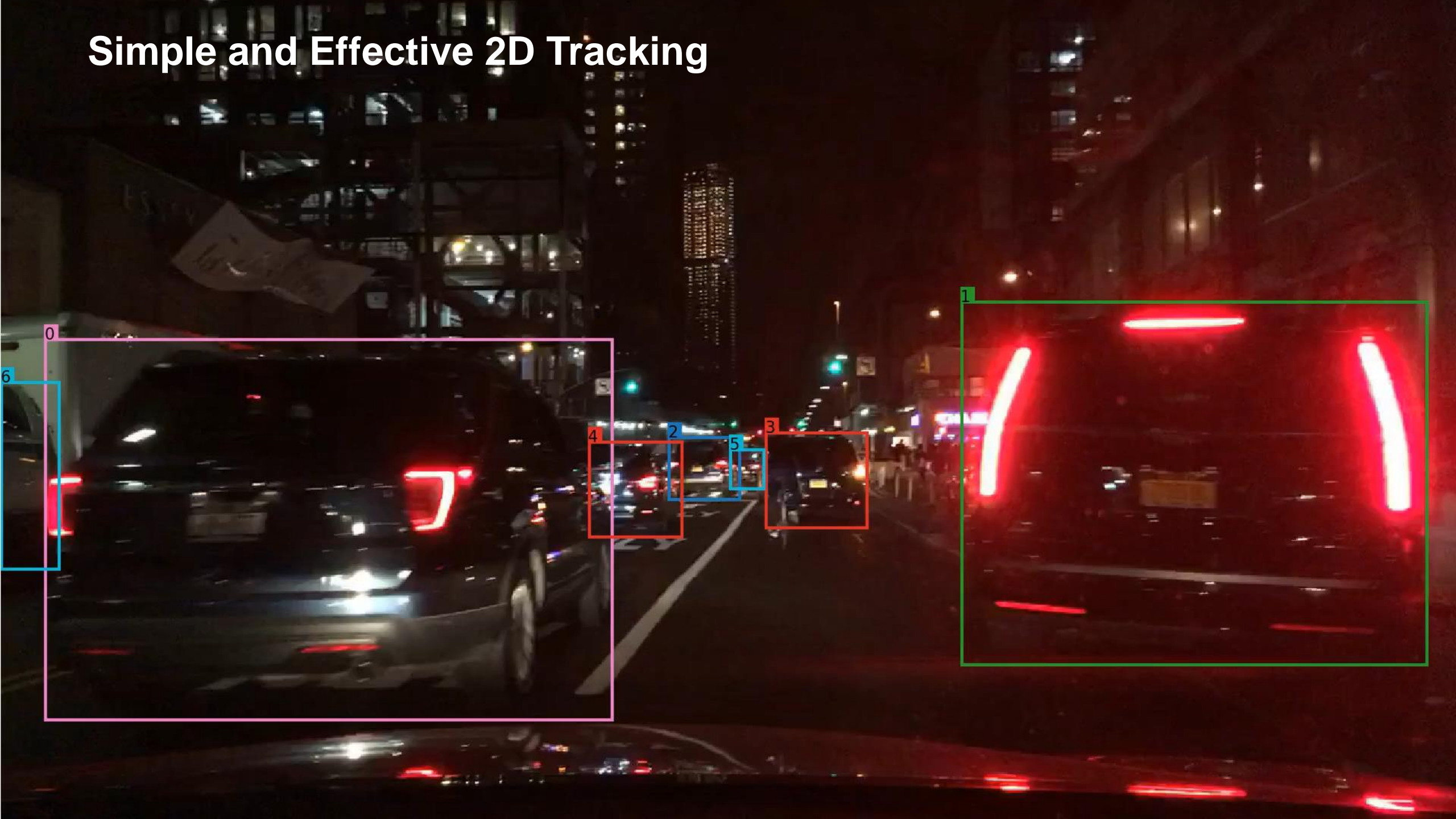**Videos** **Our algorithms** **4D Scene Understanding**

- 2D object tracking
- 3D object tracking
- Depth estimation
- Optical flow
- Shape recovery
- Camera poses
- Instance segmentation
- Semantic matching

3D Detection **Trajectories**

Shape

Registration

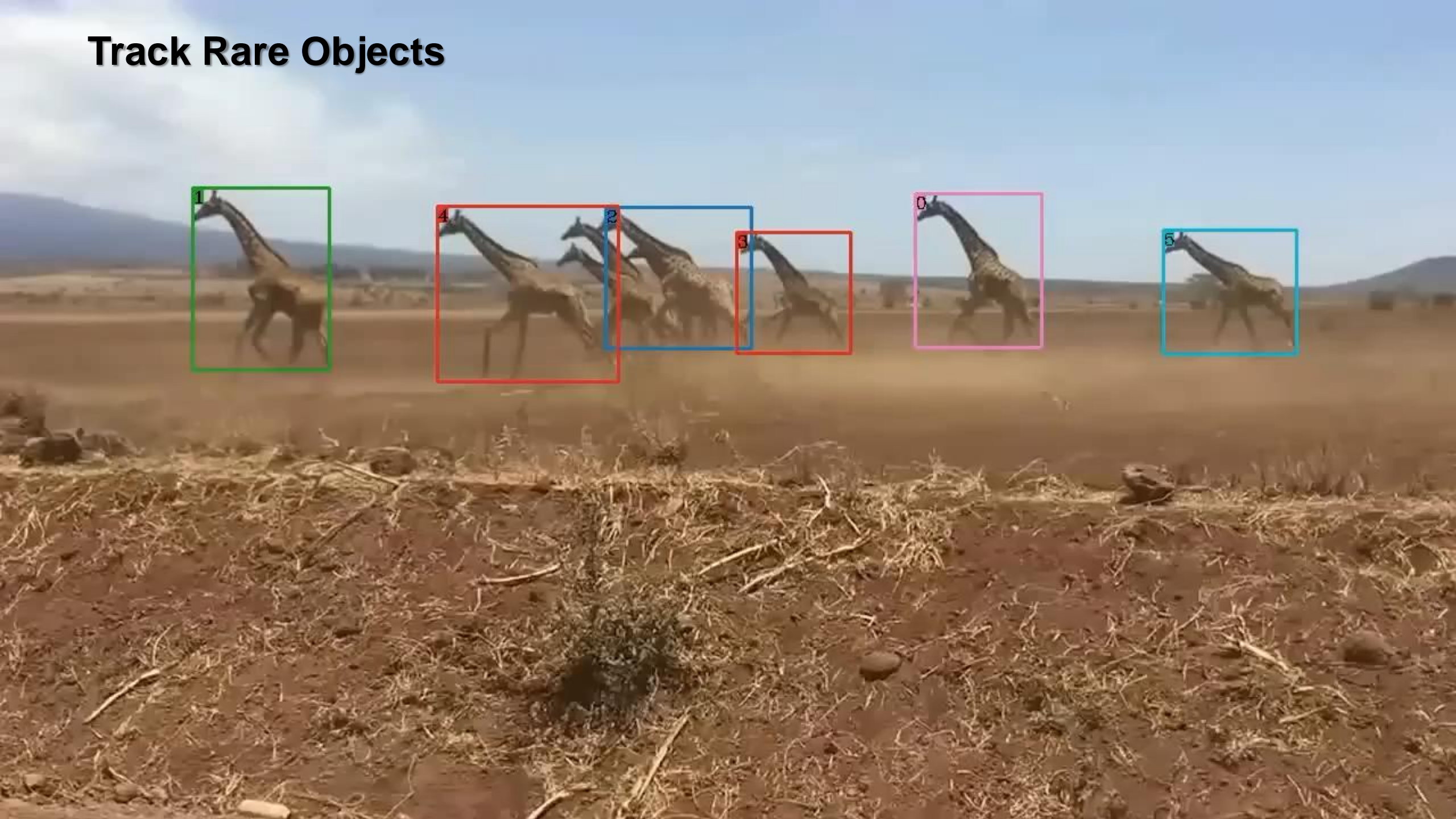**An example on outdoor scene understanding**

Simple and Effective 2D Tracking

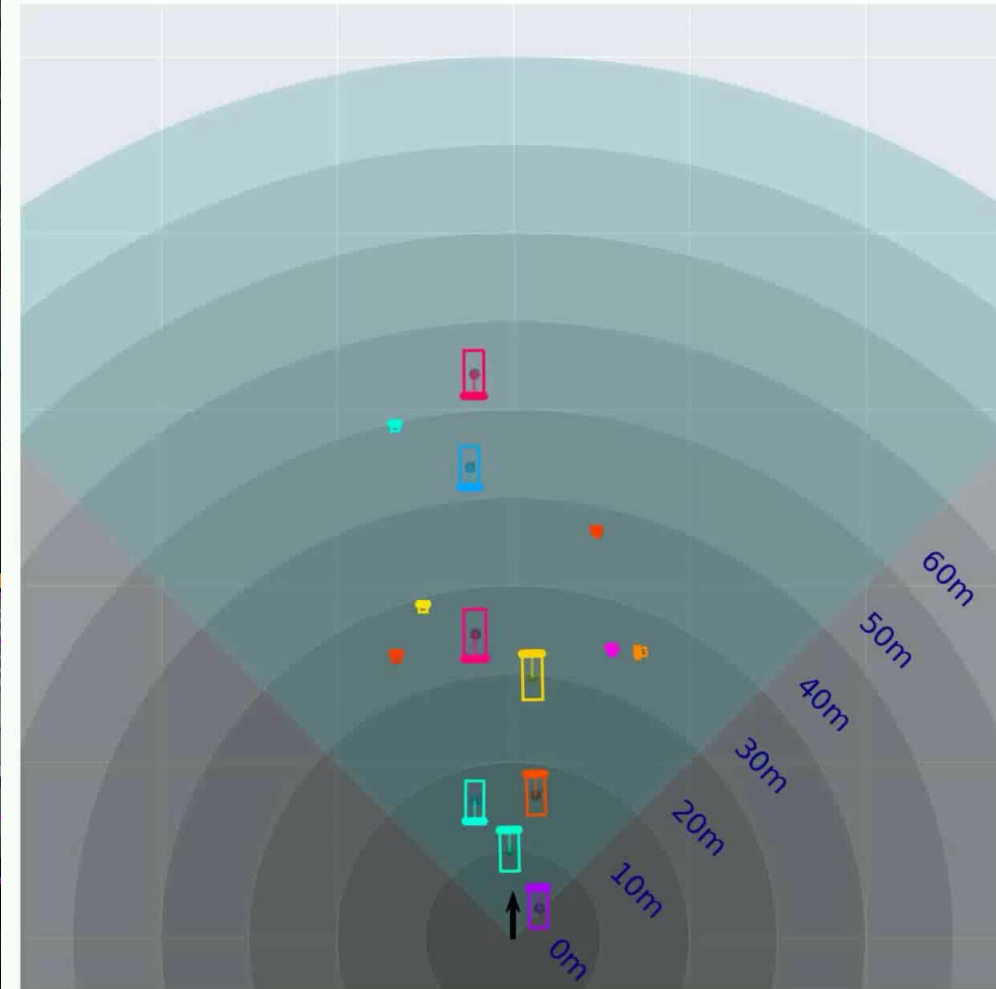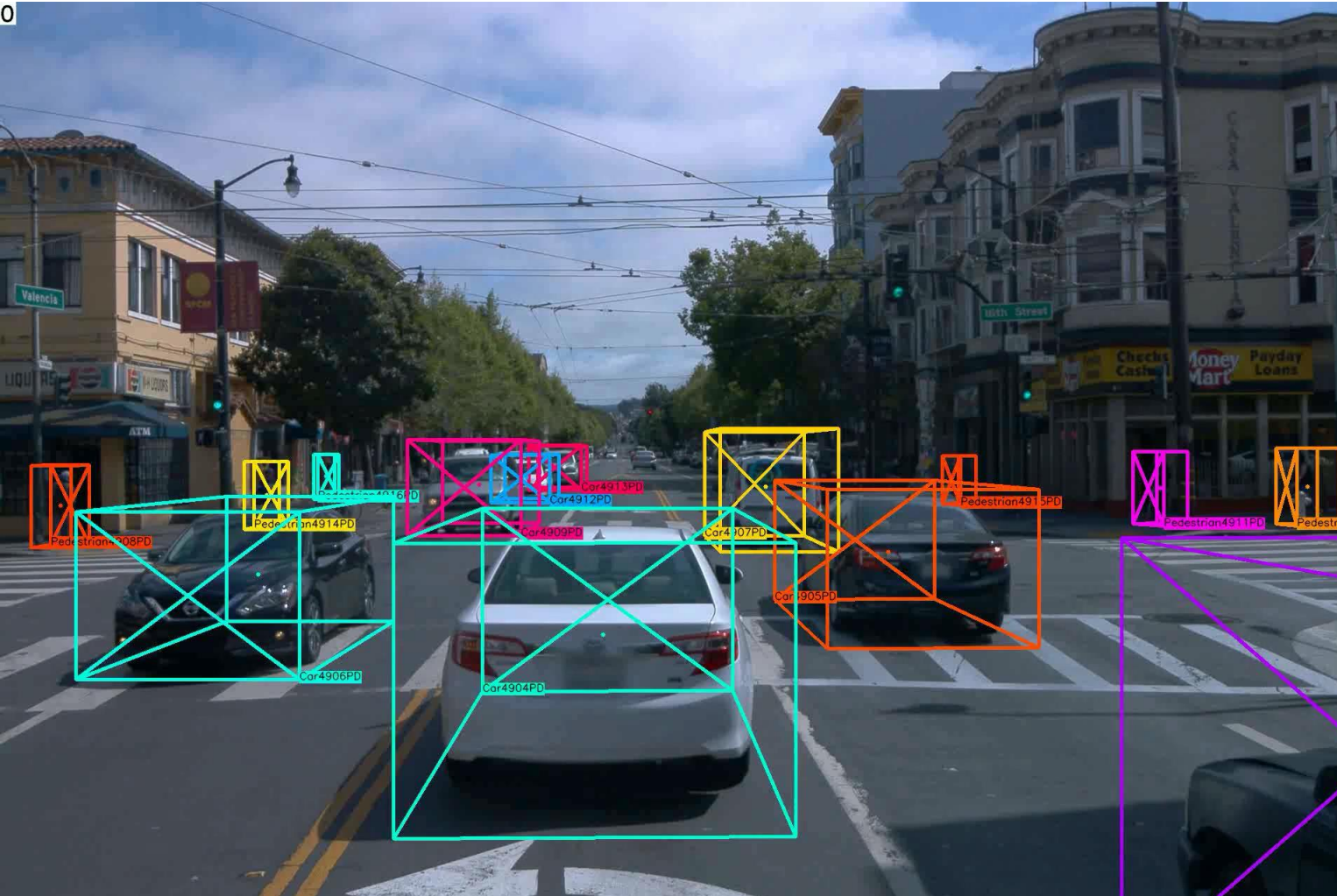Tracking Without Tracking Annotations
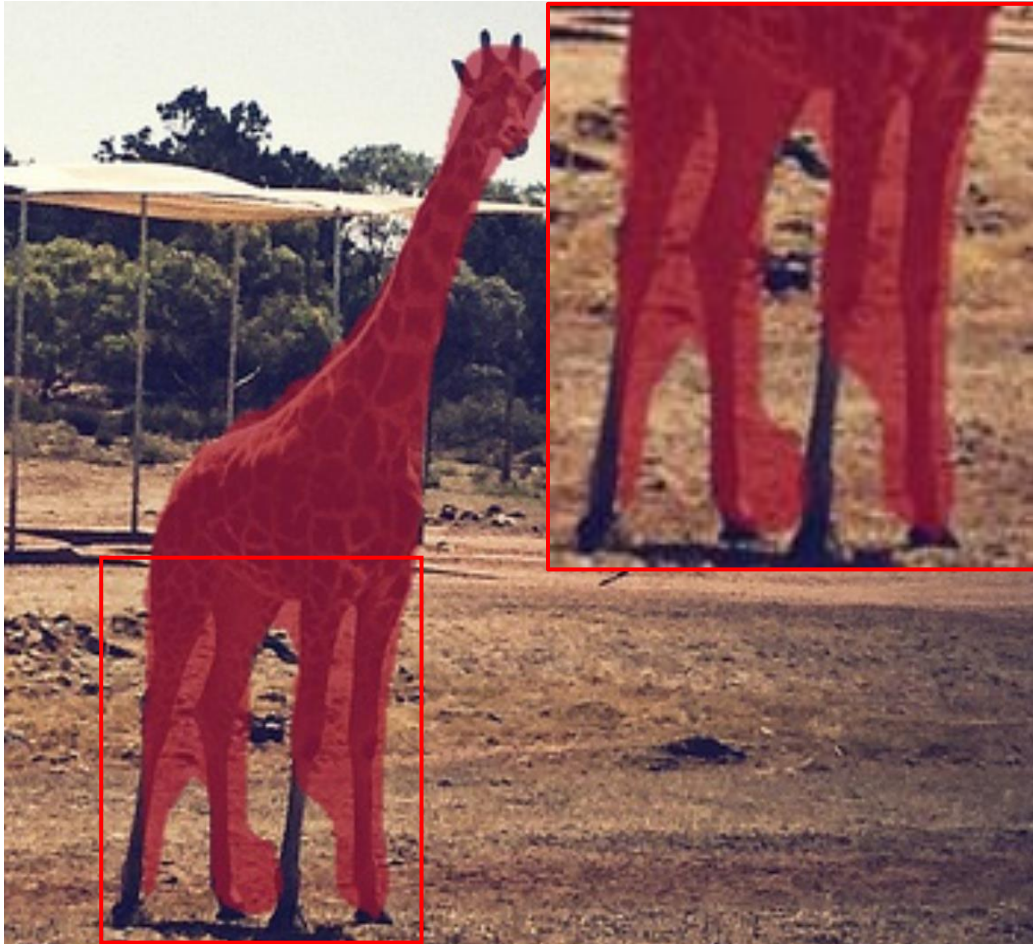
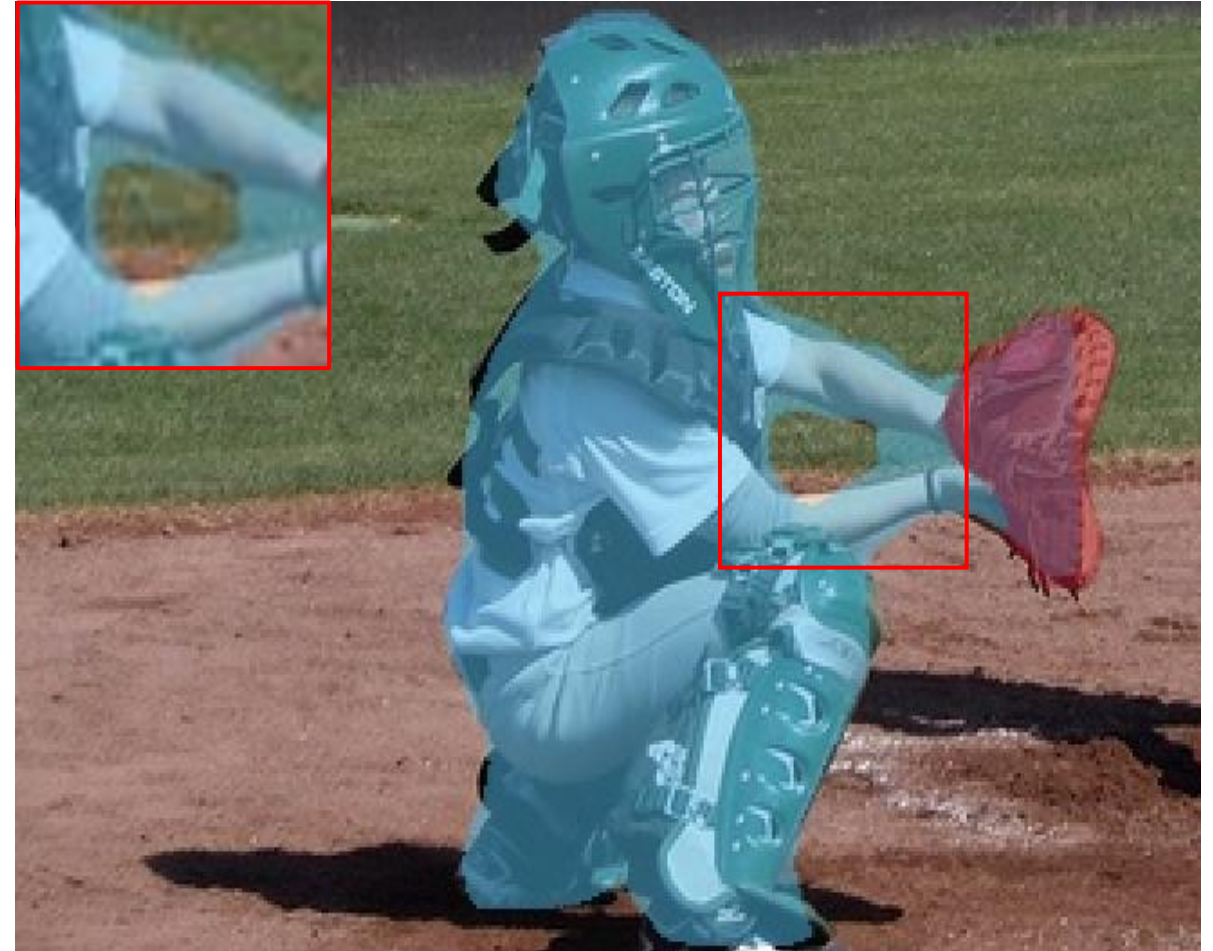**Track Rare Objects**

Monocular 3D Object Tracking

Panoramic 3D Object Tracking

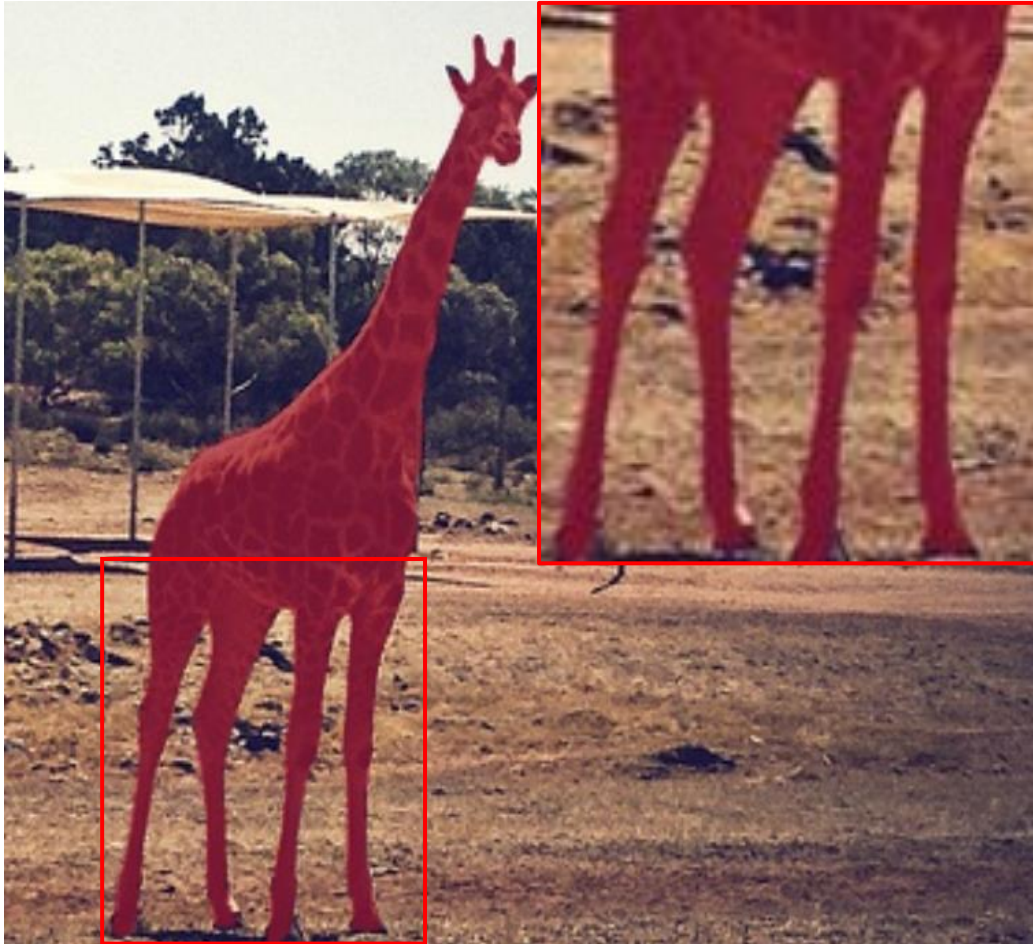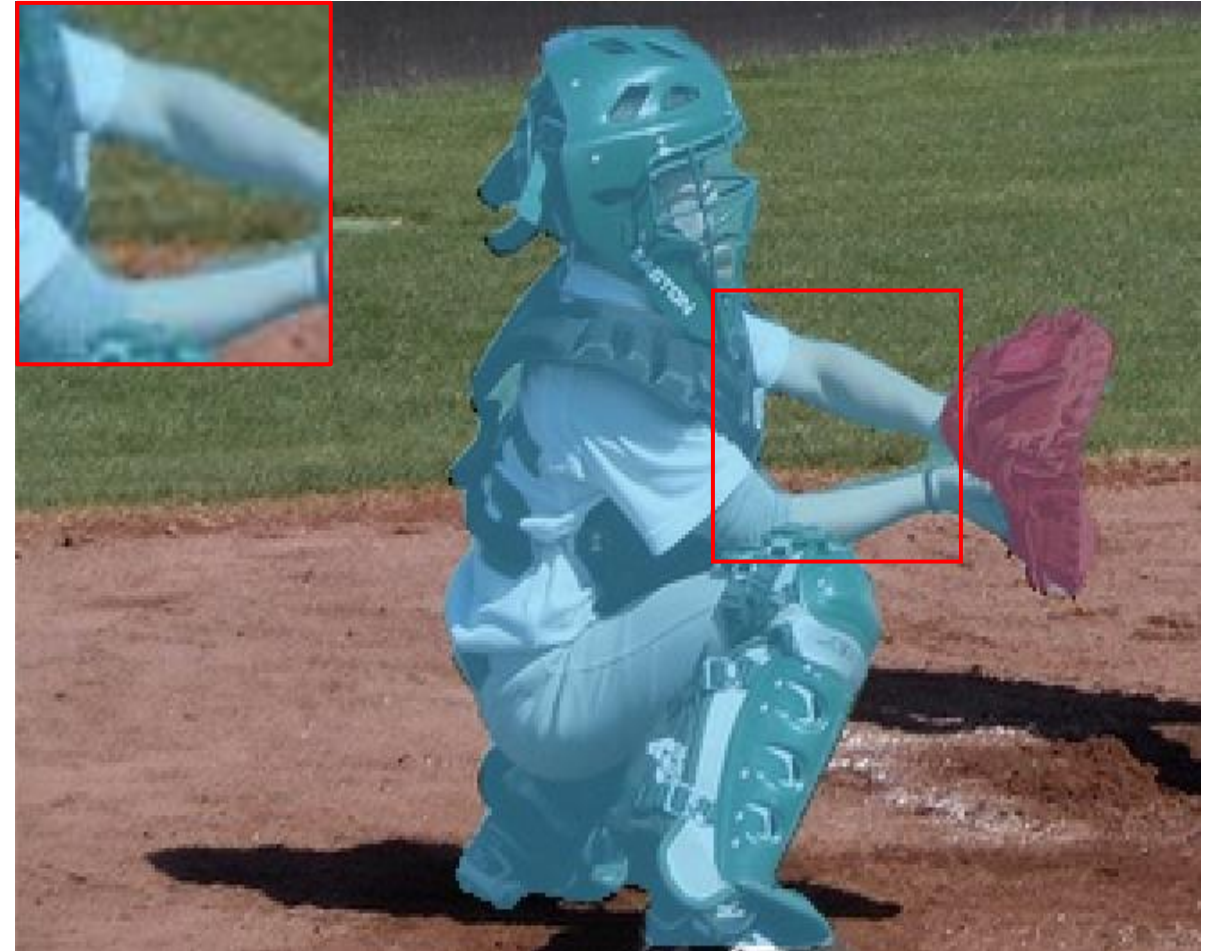# High-Quality Image and Video Segmentation

Popular Method

Popular Method

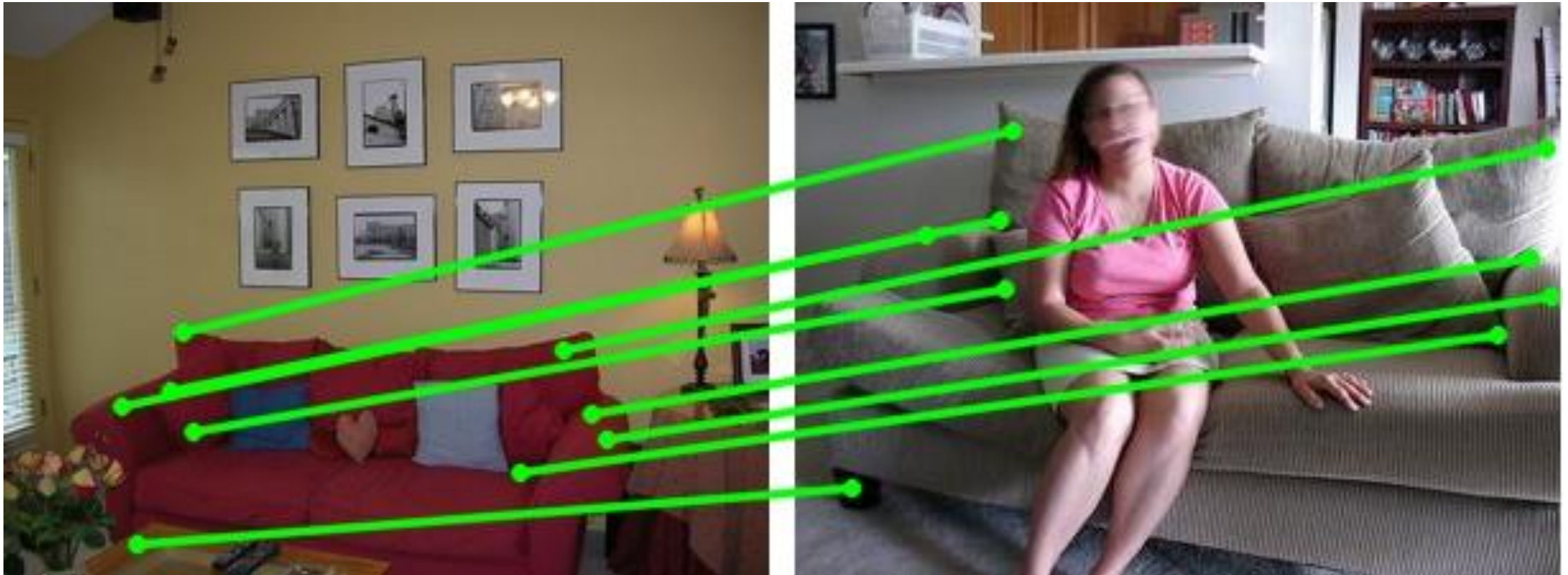# High-Quality Image and Video Segmentation

Mask Transfiner
(Ours)

Mask Transfiner
(Ours)

Self-Supervised Semantic Matching

4D scene understanding for your automation!

Prof. Fisher Yu
@DrFisherYu | fisheryu@ethz.ch
Projects: https://www.vis.xyz

ETH Zurich
D-ITET, Computer Vision Lab
Visual Intelligence and Systems Group