

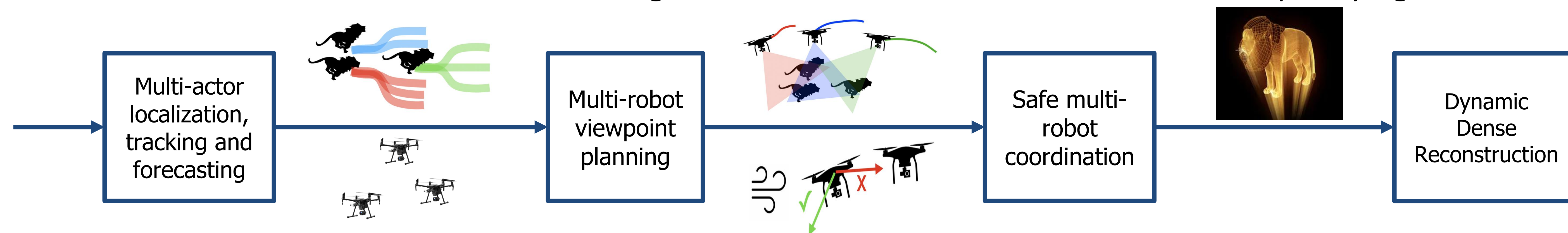
DroneOpticStudio

Dense Reconstruction of Moving Actors in the Wild

Sebastian Scherer¹, Kris Kitani¹, Volkan Isler², Hyun Soo Park²

[1: The Robotics Institute, Carnegie Mellon University; 2: Department of Computer Science, University of Minnesota]

Goal: Dense 3D reconstruction of moving actors in natural environments with multiple flying cameras



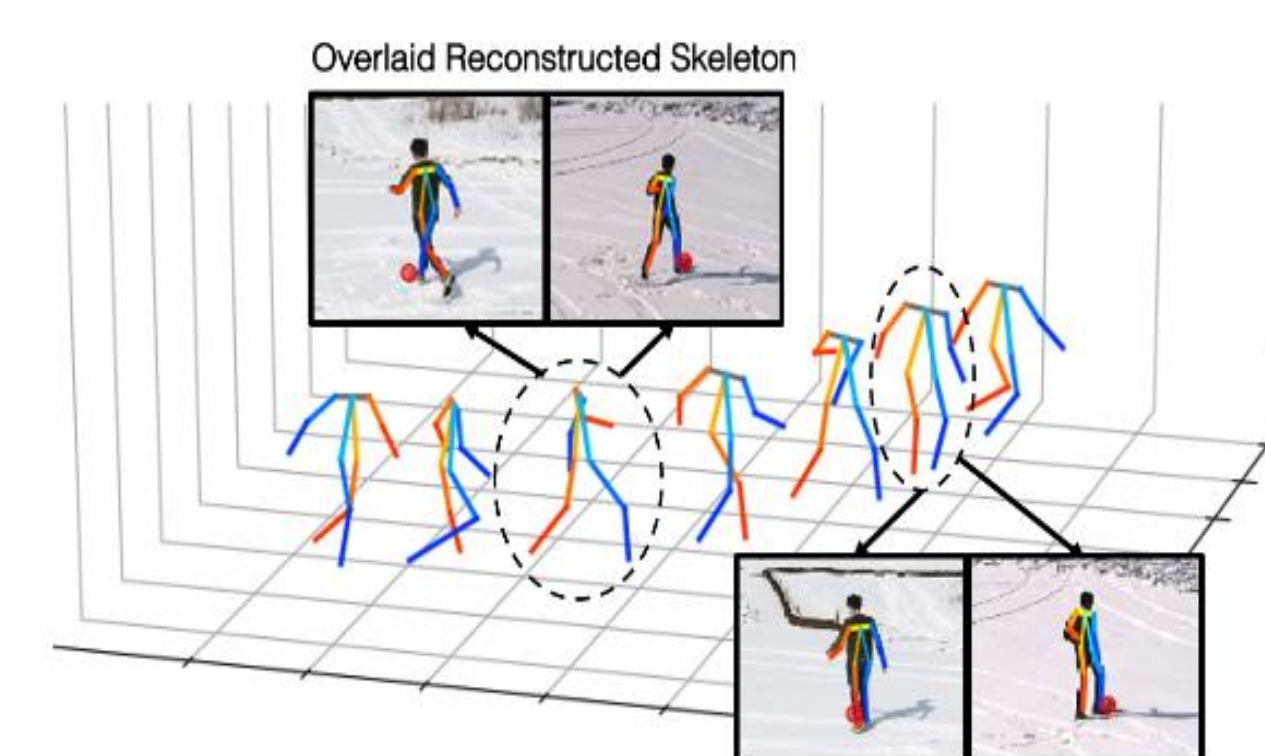
Tracking: Our system tracks multiple targets with occlusion, crossover and diverse motion patterns.

Online and realtime tracking:

- Association frequency is 300 FPS with a single CPU
- Robust to crowded scenes and camera view change



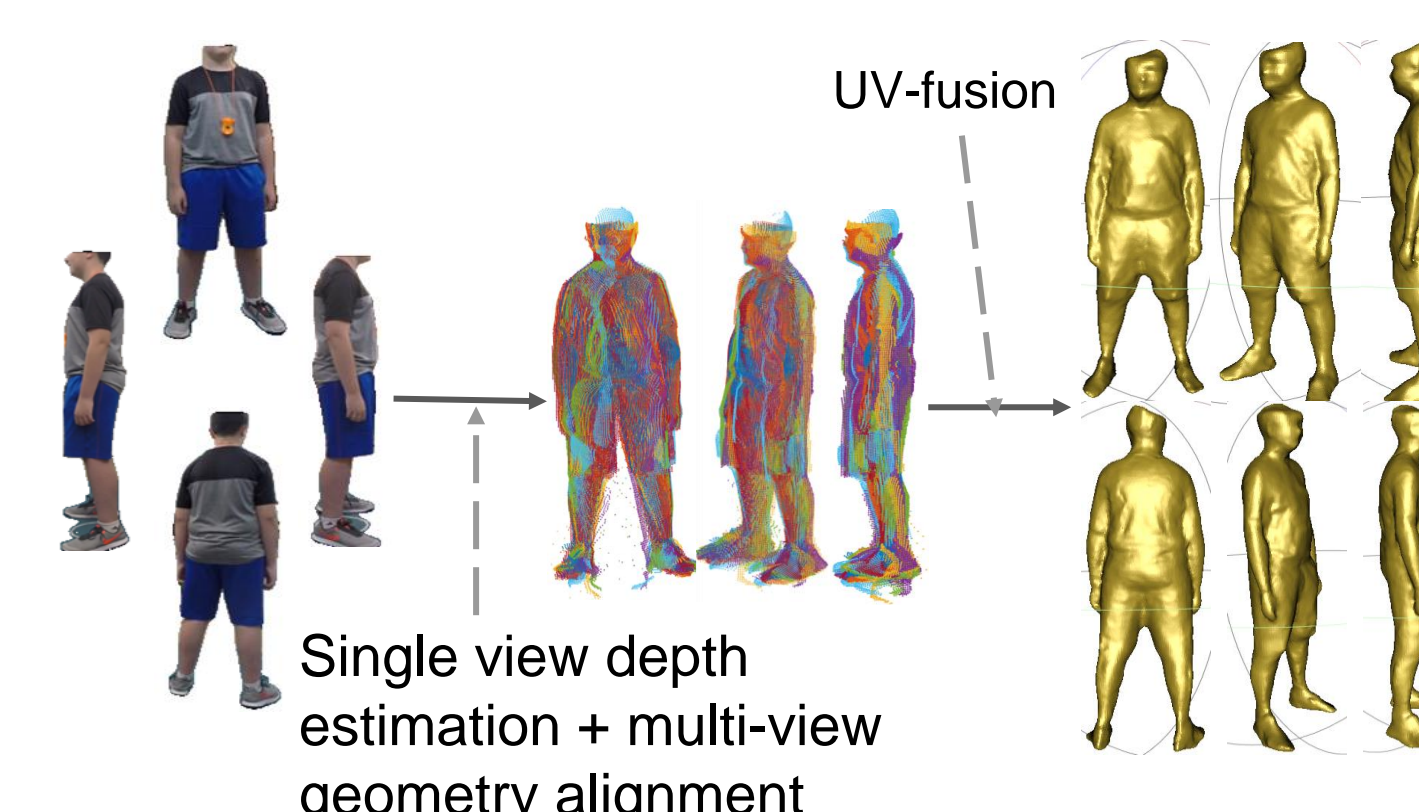
View Planning: We propose a **multi-drone system** that performs online view planning and recording with onboard cameras. Then we process them offline to obtain high-fidelity model of humans.



Multi-robot Coordination: We coordinate multiple cameras to reconstruct 3D body pose while avoiding obstacles and occlusions

Real-time formation planning that:

- Captures video for 3d human reconstruction in-the-wild
- Improves reconstruction quality compared to static formations

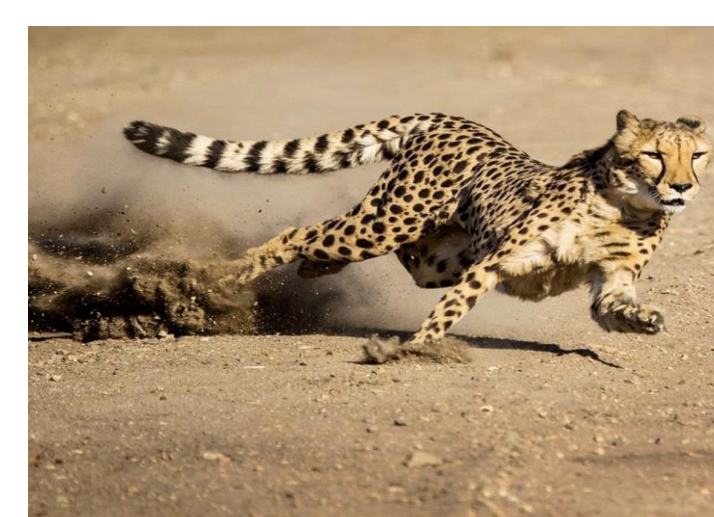


Dense Reconstruction: We propose a multi-view system that predicts the 3D geometry of a clothed human in each view and fuses them in UV space to obtain a full geometry.

Impact



Biomechanics
Accurate and actionable biomechanical data



Animal Studies
Large-scale tool for understanding group behaviors



Entertainment/Cultural Preservation/VR – infinite views of unscripted scenes



Robotics/AI – massive high-quality data for learning-based models