

WildPose: A Long-Range 3D Wildlife Motion Capture System

Naoya Muramatsu, Sangyun Shin, Qianyi Deng, Andrew Markham, Amir Patel



Motivation

- **3D Data Acquisition** for modern biomechanics research
- **Long-range Capability** to minimize behavioral influence
- **Portability** for easy to transport and set up in field works

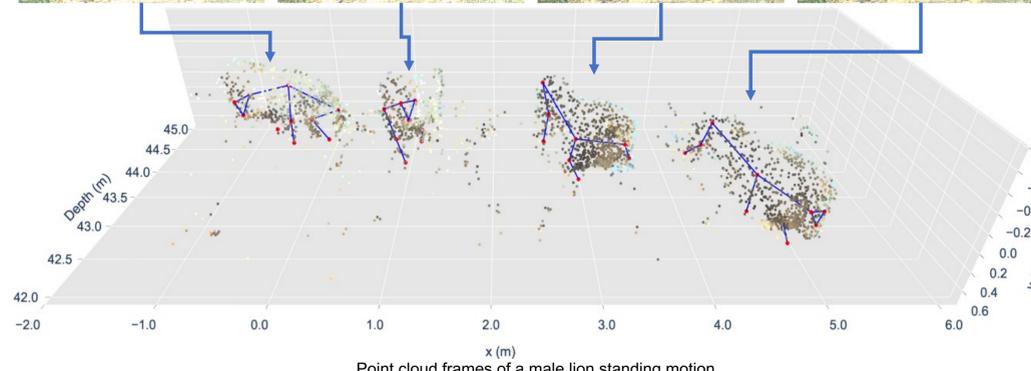
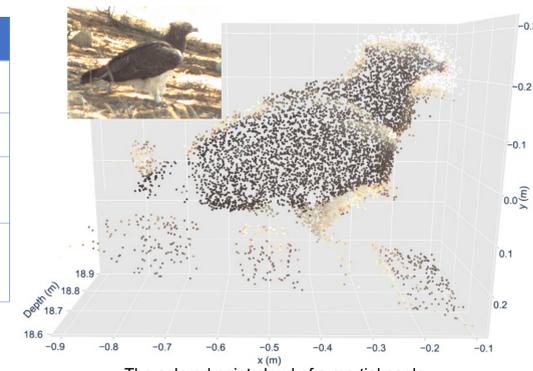
	Outdoor	Portable	3D data
Motion capture			
- Multiple cameras	✗	✗	✓
- Mocap w/ markers			
Camera trap	✓	✗	✓
GPS-IMU collar	✓	✓	✗
Photography	✓	✓	✗
- Drone			
Zoom-lens Stereo Vision	✓	✗	✓
WildPose	✓	✓	✓



Application1: Morphometrics

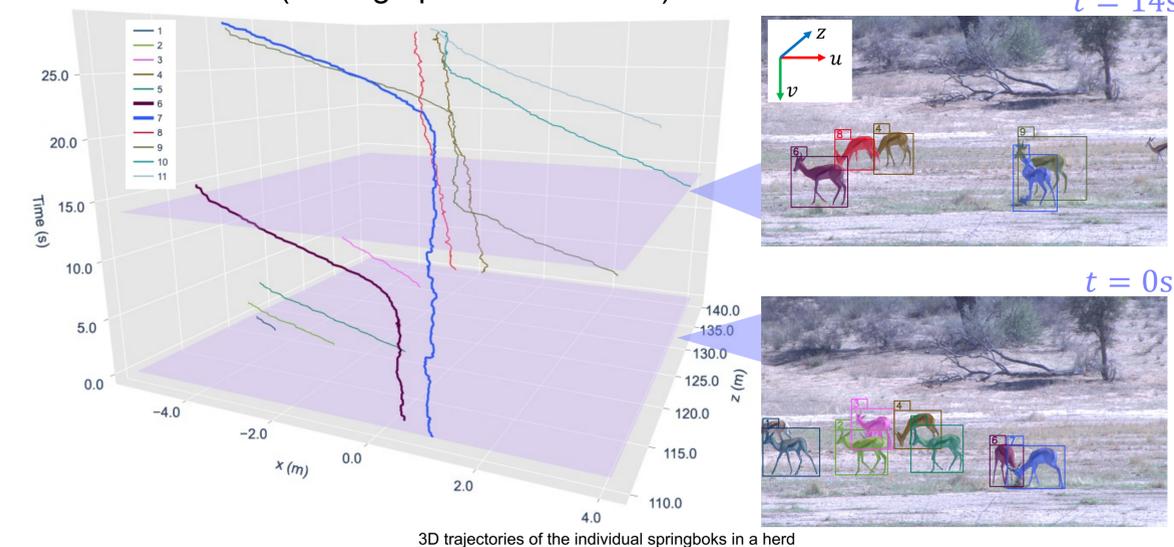
- WildPose can measure the morphometrics of wildlife at a distance.

	Martial eagle (mm)	Giraffe (m)
Height	493.9 ± 3.3	5.50 ± 0.02
Head length	56.7 ± 3.5	0.42 ± 0.02
Neck length	123.4 ± 2.9	2.23 ± 0.02
Body length	530.0 ± 11.2	1.30 ± 0.04



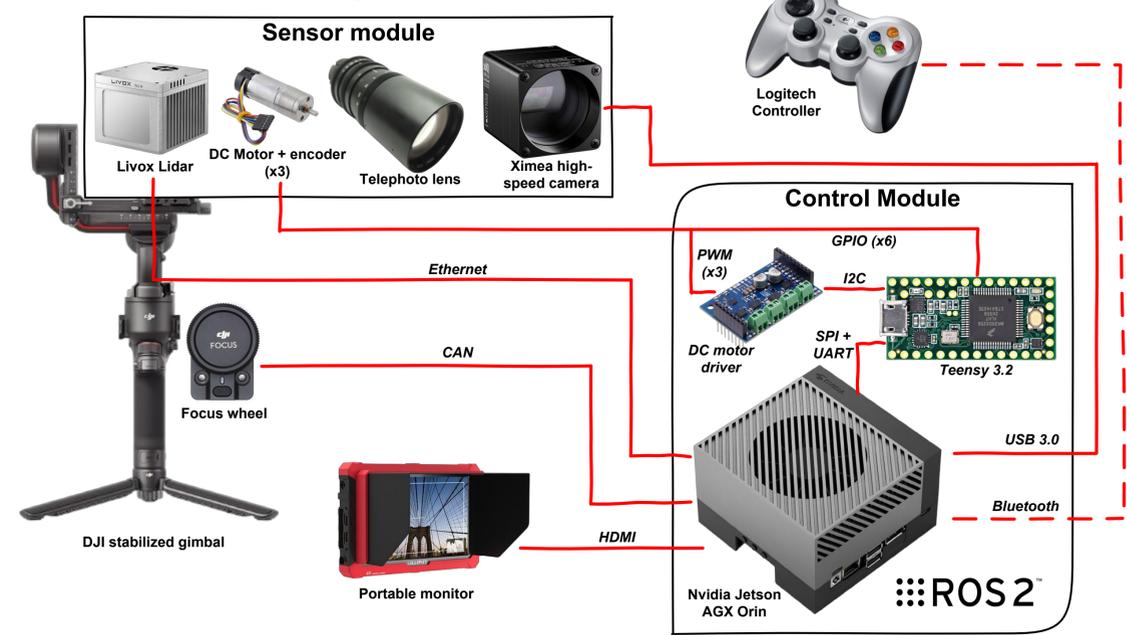
Application2: 3D Tracking

- With the Segment-Anything model, the individual springboks can be tracked in 3D (average precision: 42mm).



System

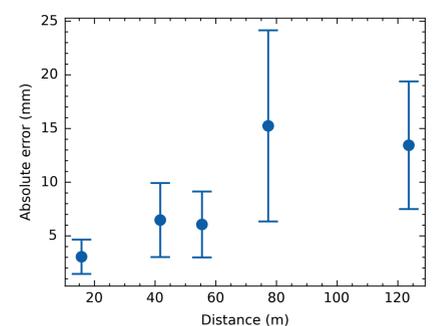
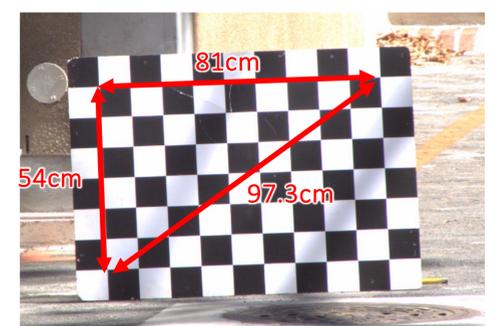
- The system combines Livox TELE-15 and a zoom-lens camera.
- The software is integrated on ROS2.



An overview of the hardware sub-systems which comprise WildPose

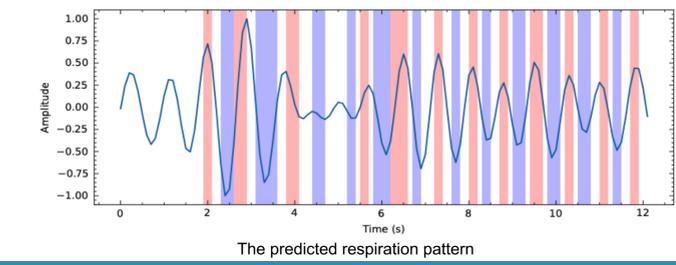
Evaluation

- We validated the measurement procedure with the known objects.



Application3: Respiration

- The lion's respiration pattern can be obtained from the body deformation in 3D.
- A band-pass filter isolates the breathing frequency amid data noise.



Conclusion

1. WildPose is a novel long-range 3D motion capture system that enables researchers to study animals in their natural habitats at an unprecedented level.
2. Its portable design and ability to record fine-grained behavioral data open new possibilities for diverse experiments.