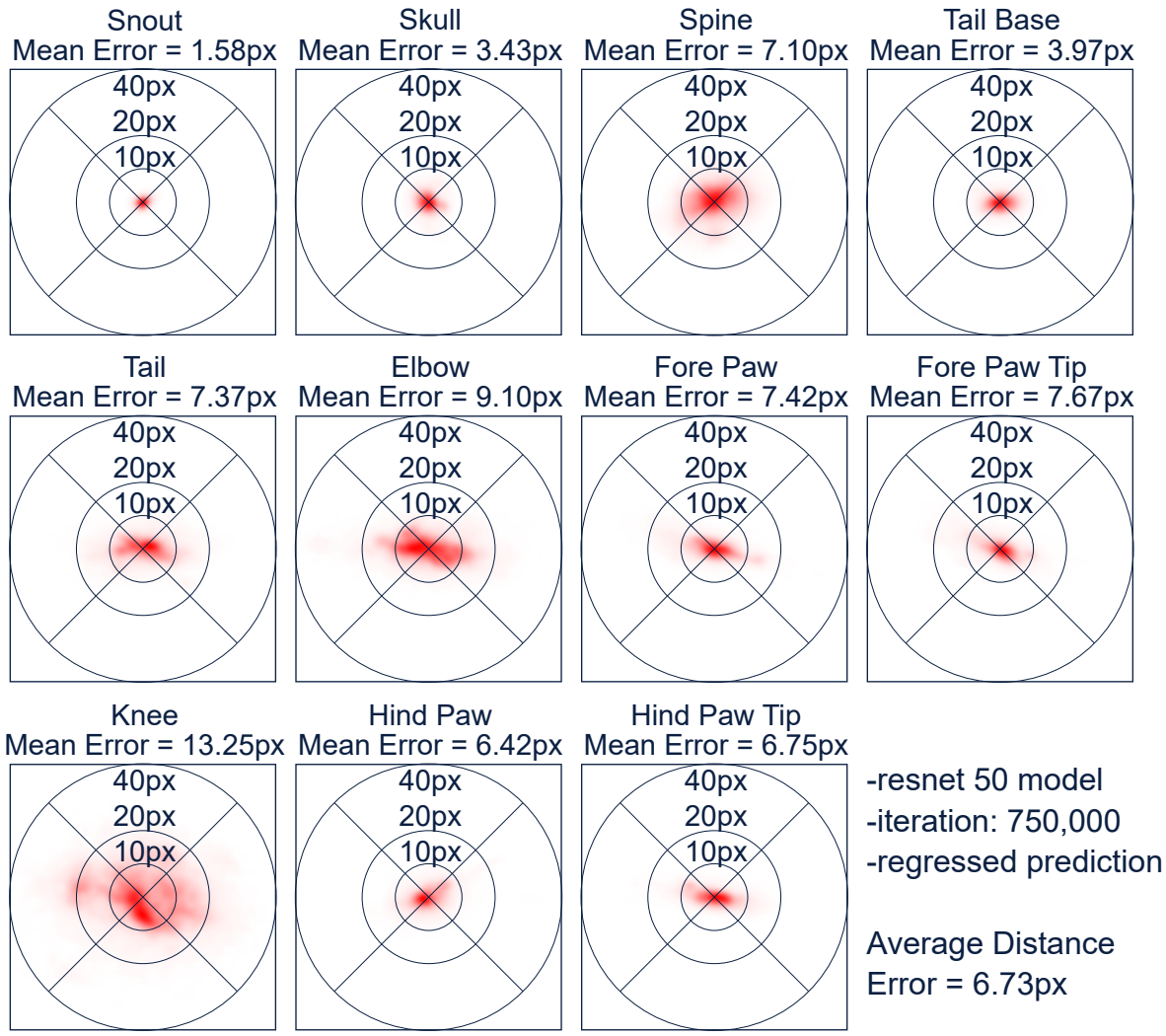
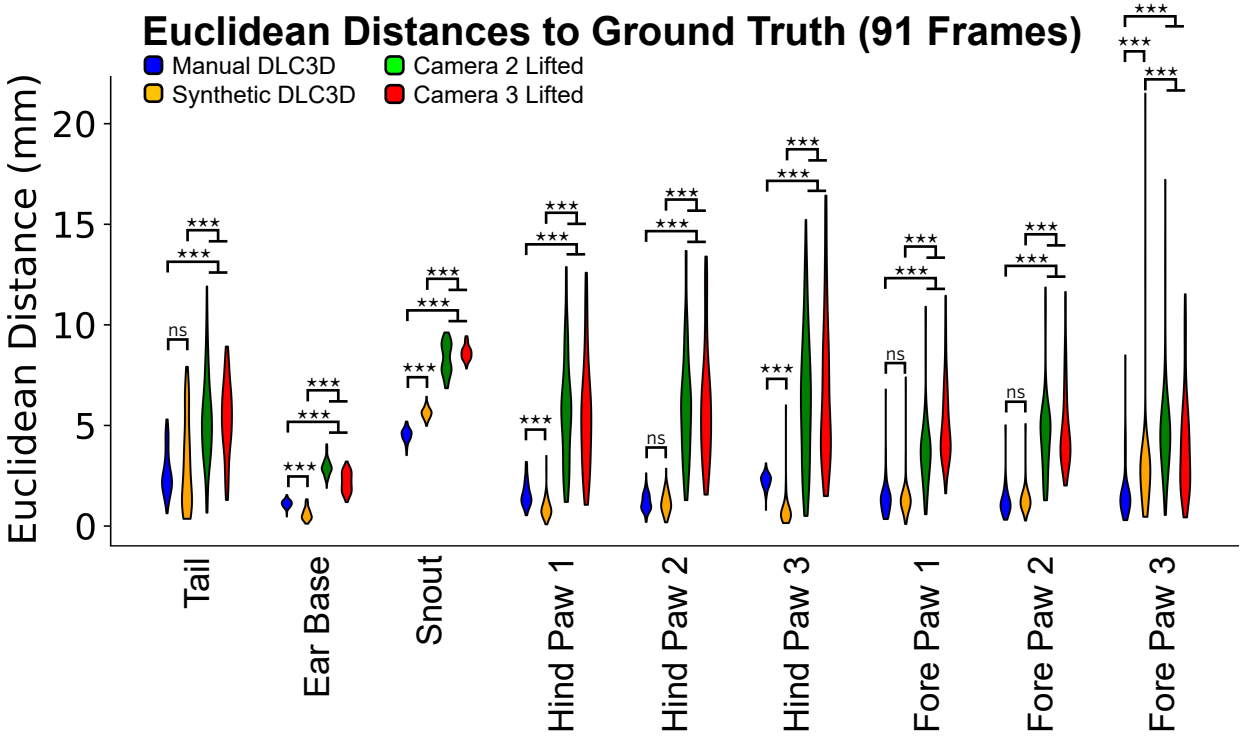
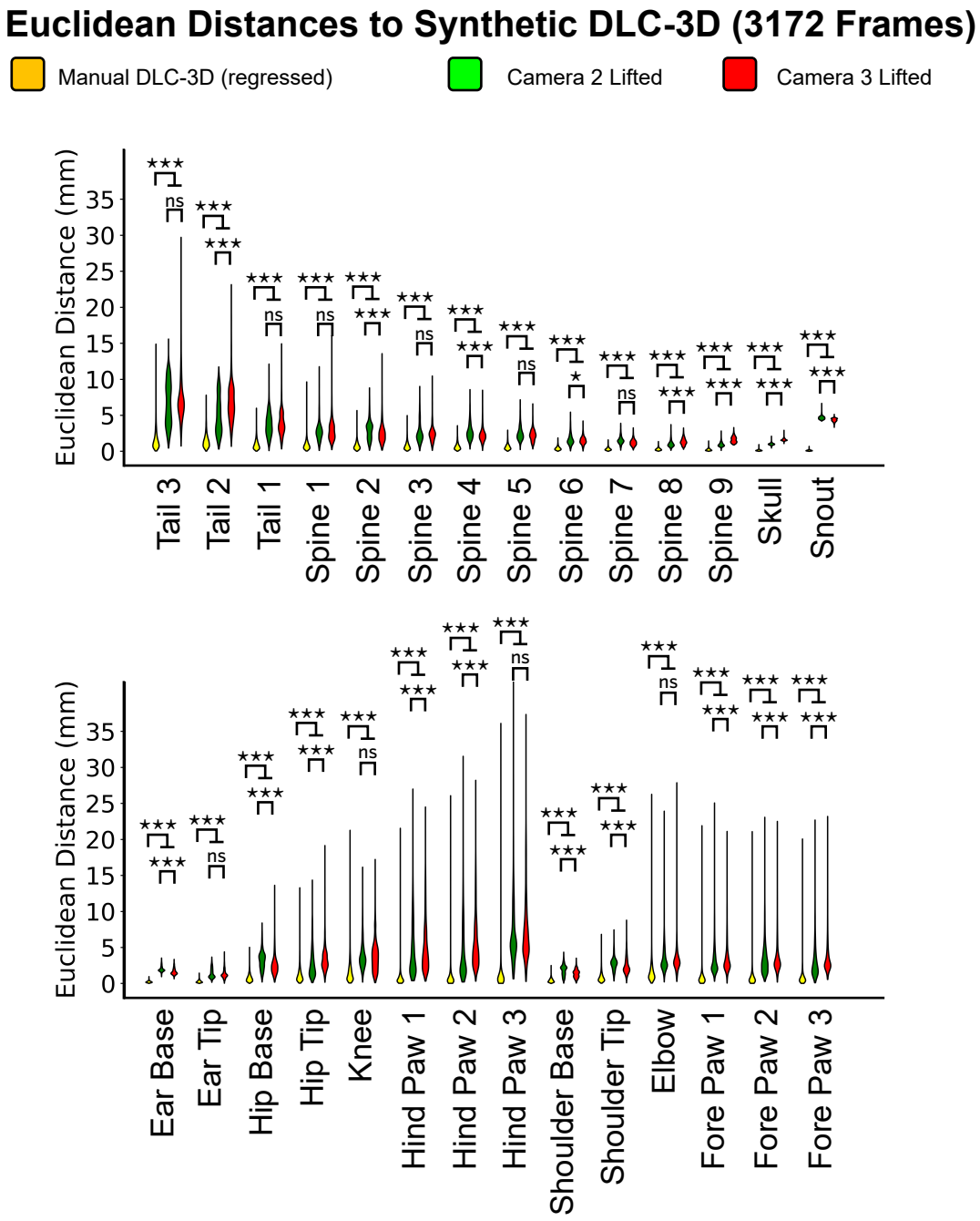


Supplementary Fig. 1 Polar plots showing mean errors for different body parts between a synthetically trained DeepLabCut (DLC) project and a model trained on 1280 manually labelled frames over the course of 27,000 frames.



Supplementary Fig. 2 Violin plots of Euclidean distances between 3D pose estimators to ground-truth of a 91 frame long sequence. Results show similar performance between a synthetically trained and real-video trained (208 manually labelled frames) DLC 3D project, while single camera pose estimation models show a significantly larger error but in the realm of 5 to 7mm (one-way ANOVA, Dunn's Multiple Comparison Test, *** denote $p<0.001$).



Supplementary Fig. 3 Euclidean distances to the synthetically trained DLC 3D project to test single camera 2D to 3D pose recovery show an RMSE of 3.97 and 4.17 mm for camera 2 and camera 3 respectively (one-way ANOVA, Dunn's Multiple Comparison Test, *** denote $p<0.001$).

Experiment	Key Animations	Key Animation Length (frames)	Looped Length (frames)	Total Animation Length (frames)	Noise Objects	U-GAT-IT Pytorch trainA set size (# of images)	U-GAT-IT Pytorch trainB set size (# of images)	U-GAT-IT (PyTorch) Parameters - Trained on GTX 1070
Mouse Running Wheel	various poses (grooming, resting, running)	20	500	1000	Bone position & rotatations (paws, digits, knee, skull, hips, shoulders, tail)	1000	mGT1: 3511 mGT2: 2945 mLD1: 576 mLD2: 3158 mLD3: 3905	--light False --img_size 320 --batch_size 1 --ch 24 --n_res 3 --n_dis 5 --adv_weight 1 --cycle_weight 256 --identity_weight 128 --cam_weight 512
	running animation loop	28	500		Camera1 position and rotations			
Pellet Reaching	successful reach	50	1000	1000	Bone position & rotatations (paws, digits, elbow)	3000 (1000 for each camera - forward, lateral, and interpolated)	9729	--light False --img_size 320 --batch_size 1 --ch 24 --n_res 3 --n_dis 5 --adv_weight 1 --cycle_weight 1024--identity_weight 512 --cam_weight 512
					Camera rotation			
					Lighting intensity			
Openfield	various poses (walking, grooming, turning, reaching up, etc.)	10	2000	2000	Bone position & rotatations (paws, digits, knee, skull, hips, shoulders, tail)	2000	2677	--light False --img_size 320 --batch_size 1 --ch 24 --n_res 3 --n_dis 5 --adv_weight 1 --cycle_weight 1024--identity_weight 512 --cam_weight 512

Supplementary Table 1 Primary animations done for each dataset and their final animation length with noise objects, and parameters used during U-GAT-IT training.