

We have submitted 4 videos as a part of supplementary material along with the supplementary PDF file (02046\_supp). Please check the description of 4 videos as follows:

**blur.m4v:** Presents three examples under motion blur. EVA\* consistently overspreads or distorts fingers with unnatural spacing and interpenetration, while SGNify produces bio-mechanically correct but incorrectly positioned hands. In contrast, DexAvatar maintains compact rounded configurations with accurate fingertip alignment and clean contact across all examples, demonstrating robustness to motion blur.

**occlusion.m4v:** Presents three examples under self-occlusion. EVA\* consistently overspreads fingers with interpenetration and implausible postures, while SGNify produces bio-mechanically reasonable hands but misplaces contact or infers incorrect overlap order. In contrast, DexAvatar maintains compact configurations with correct fingertip alignment, realistic curl, and accurate overlap across all examples, demonstrating robustness to occlusion.

**gaussian\_noise.m4v:** We add Gaussian noise to the input frames and compare EVA\*, SGNify, and DexAvatar. EVA\* exhibits implausible finger spacing and distorted postures, while SGNify either produces mismatched configurations or fails completely due to missing keypoints under noise. In contrast, DexAvatar consistently reconstructs accurate and bio-mechanically plausible poses across all examples, demonstrating robustness to noisy conditions.

**sgnify\_baseline.m4v:** We present qualitative results of DexAvatar on the SGNify motion capture dataset. SGNify and EVA\* frequently produce misaligned wrists, unnatural limb orientations, and struggle with finger articulations across signs like *Sonne*, *BesuchenEinmischen*, and *Muell*. In contrast, DexAvatar consistently maintains close alignment to ground truth with bio-mechanically accurate reconstructions, preserving structural consistency and fine-grained hand articulations guided by our learned priors.