

## Introduction

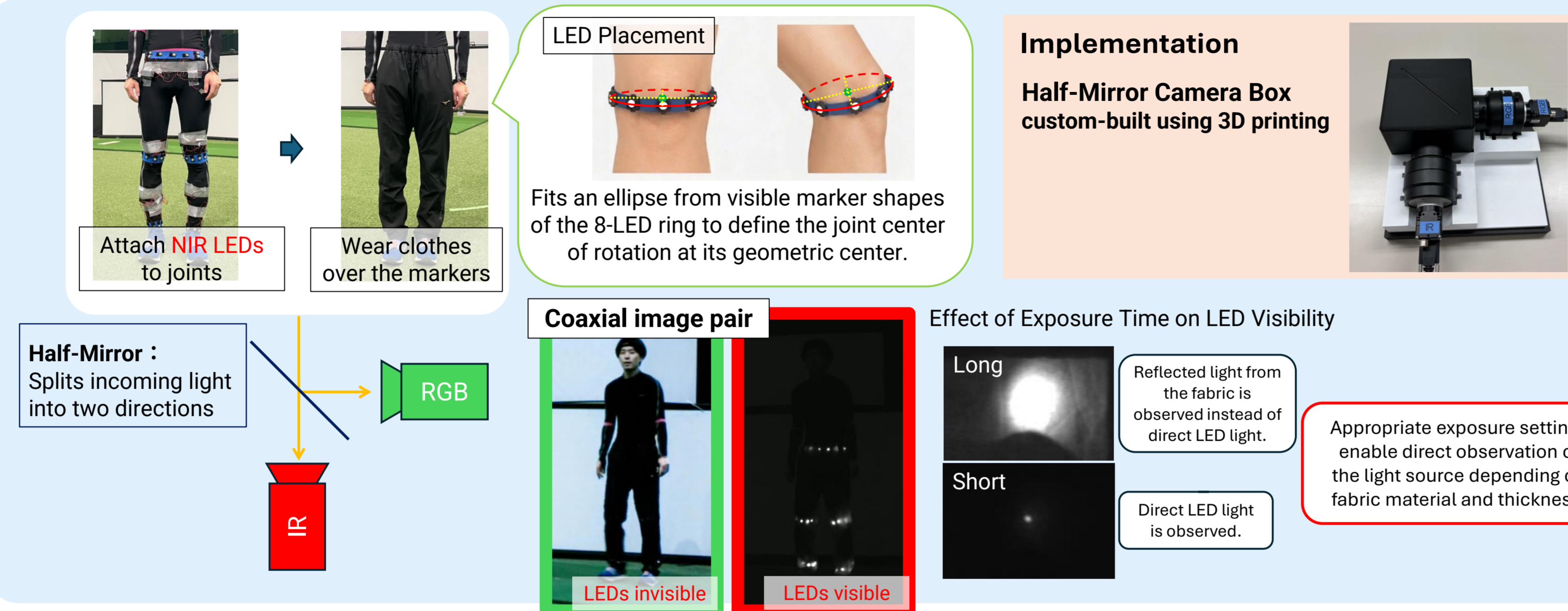
Where is the true right knee joint?



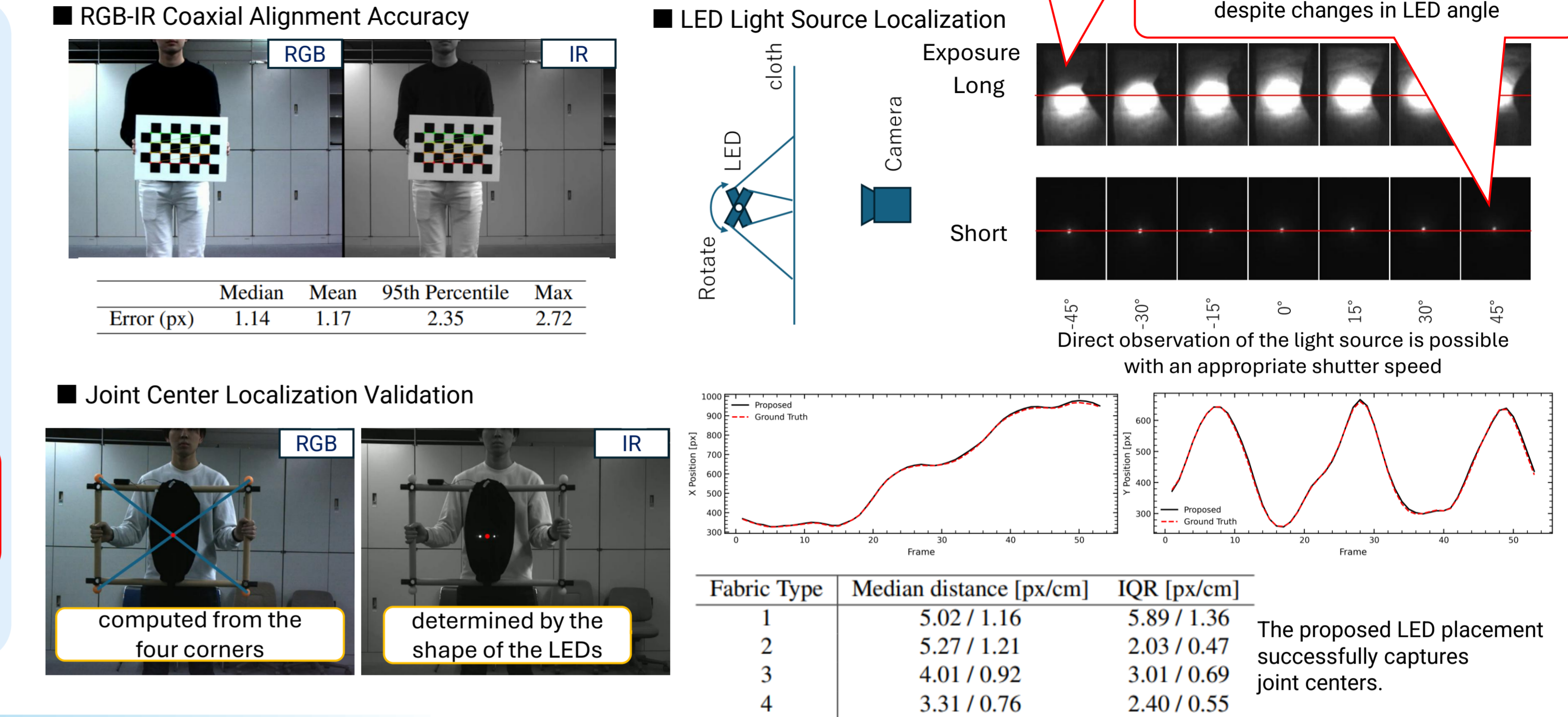
**Clothing makes accurate joint localization difficult!**

Especially with loose clothing, large variations in **garment motion** and **wrinkles** make joint localization even more difficult.

## Proposed Method : Coaxial RGB-Infrared Imaging

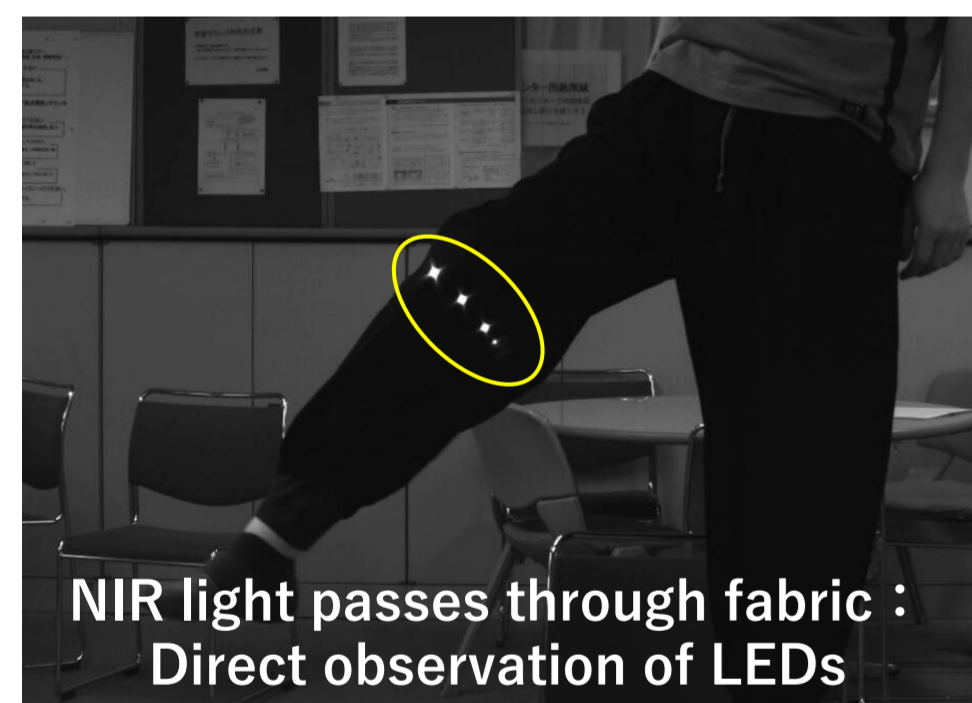


## Ground-Truth Validation



## Experimental Results

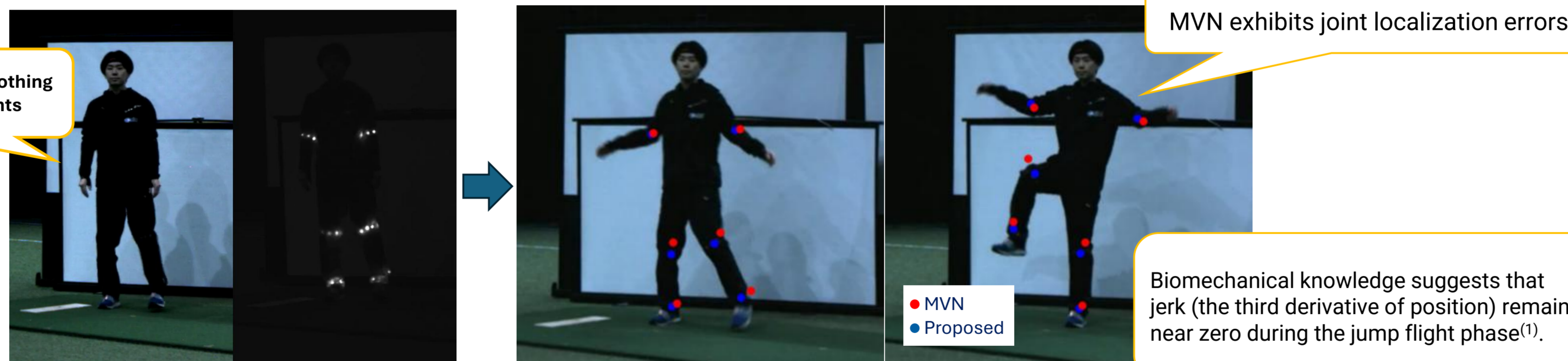
### Key Idea



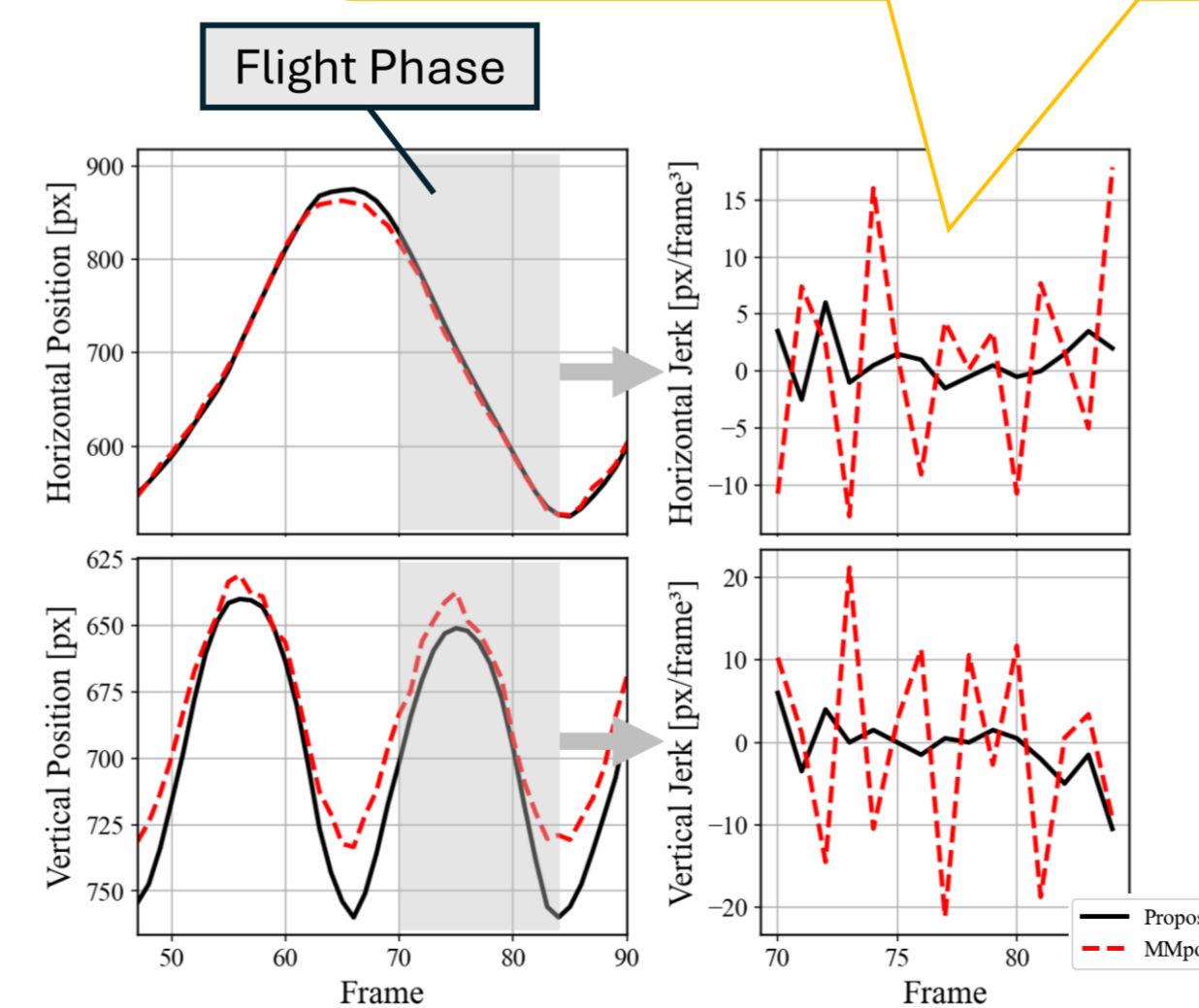
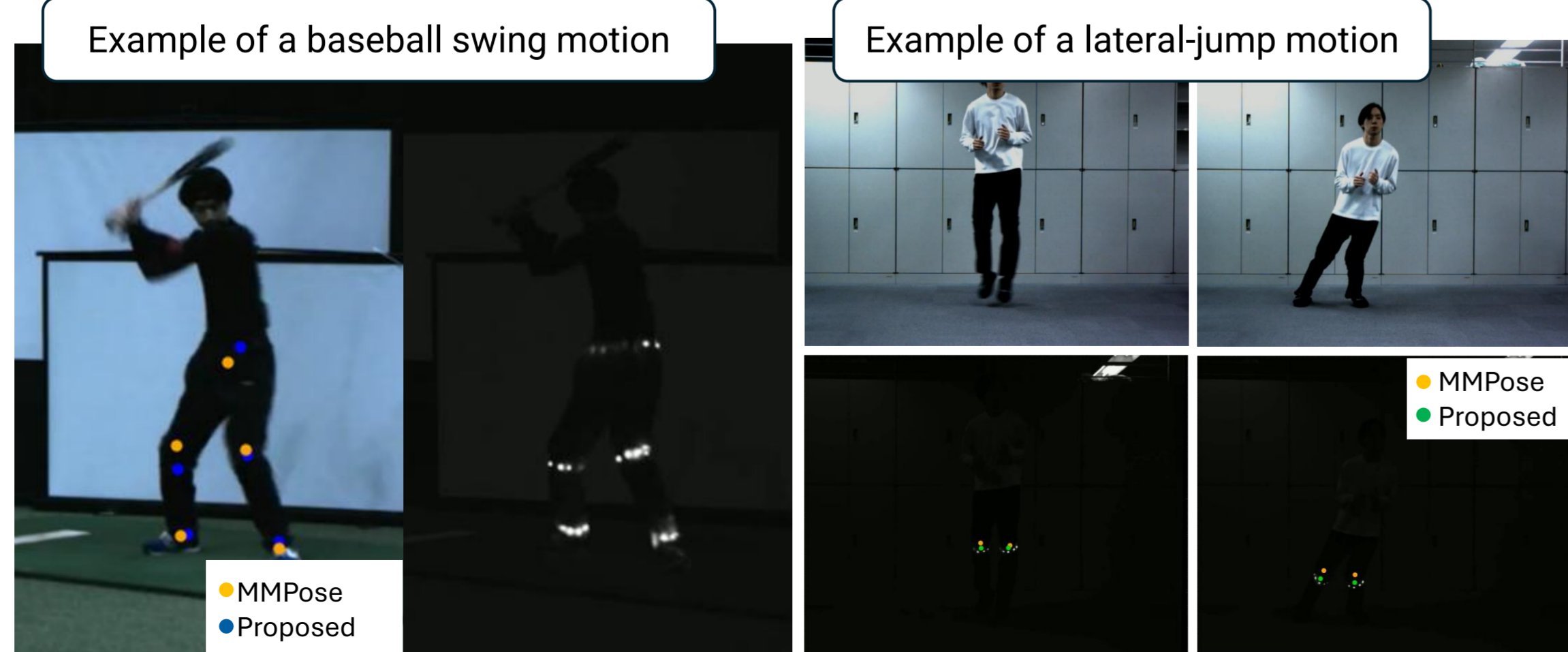
- Wear MVN suit beneath clothing
- Attach NIR LEDs to the joints

Accurate joint localization beneath clothing (true centers of joint motion).

### Comparison with IMU-Based Mocap (MVN)



### Comparison with a COCO-Trained MMPose Model



### Other examples



(1) T. Flash and N. Hogan., "The coordination of arm movements: an experimentally confirmed mathematical model", Journal of Neuroscience, 1985

## Conclusion

### Summary

- We propose a system that uses the near-infrared (NIR) spectrum to directly measure joint positions beneath clothing.
- We identify the limitations of existing pose estimation methods and IMU-based approaches.

### Future Work

- Extension to full-body joint
- Extension to 3D keypoints acquisition
- Creation of training data and model training using the proposed method etc.