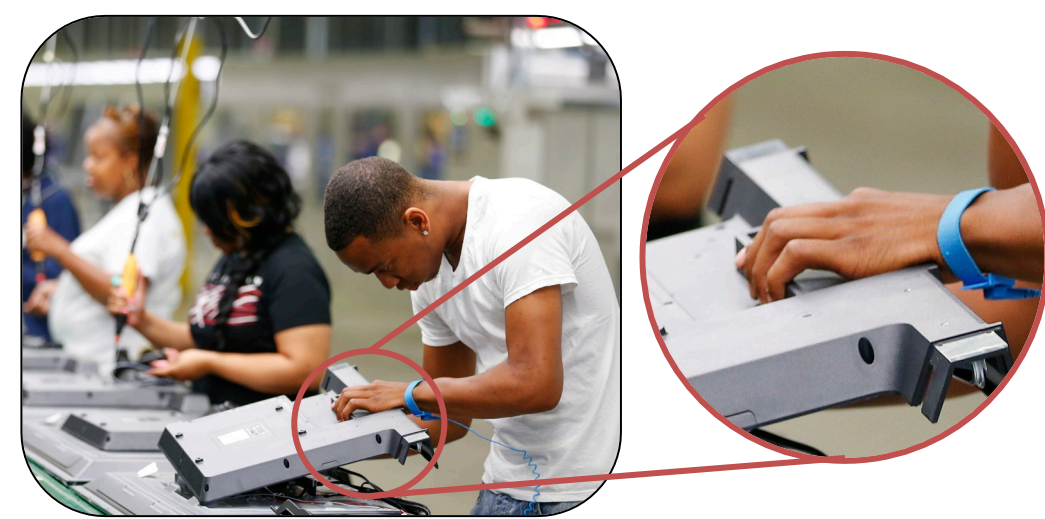


## Motivation

Tactile perception is crucial for human performance.

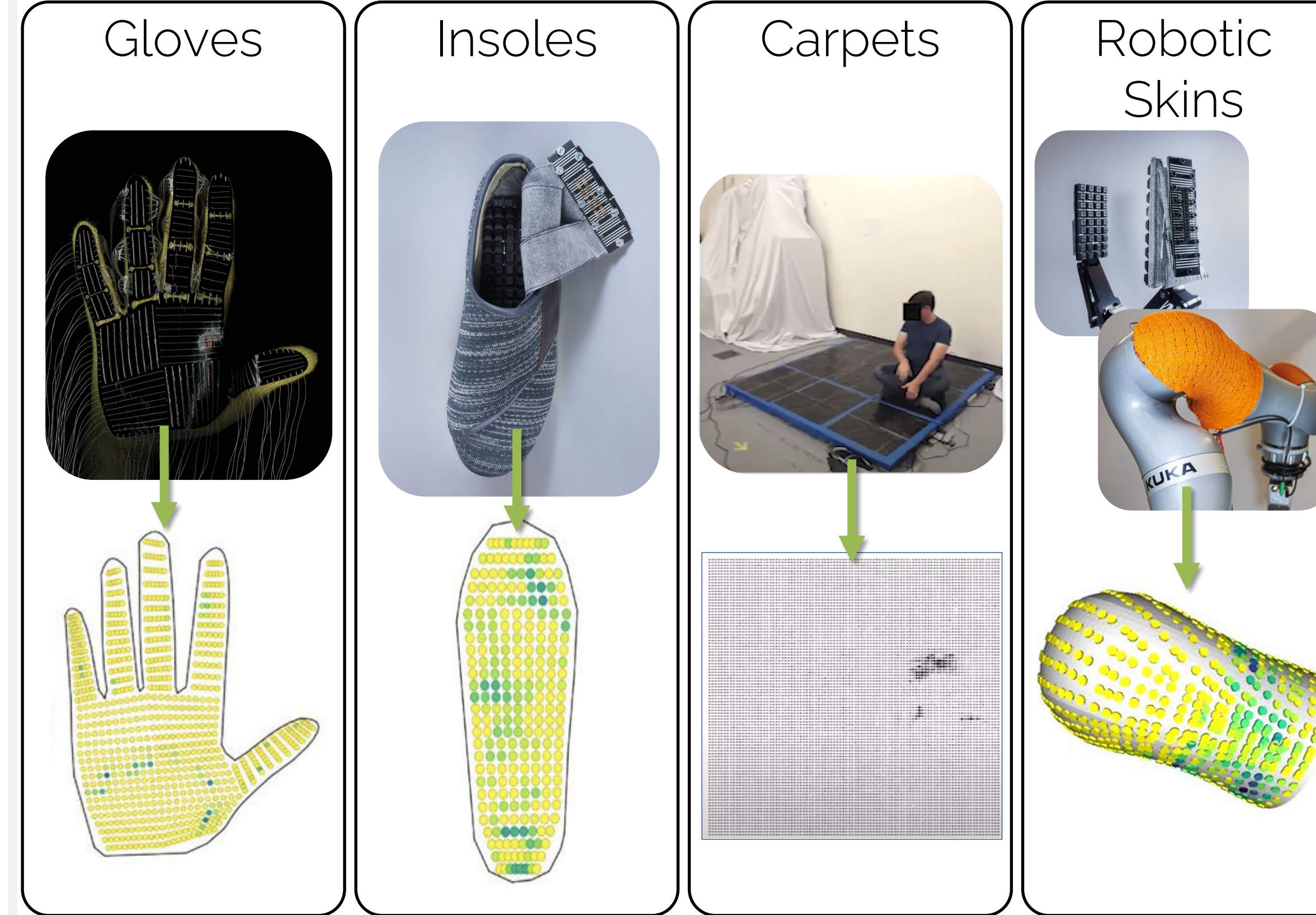


Task Performance

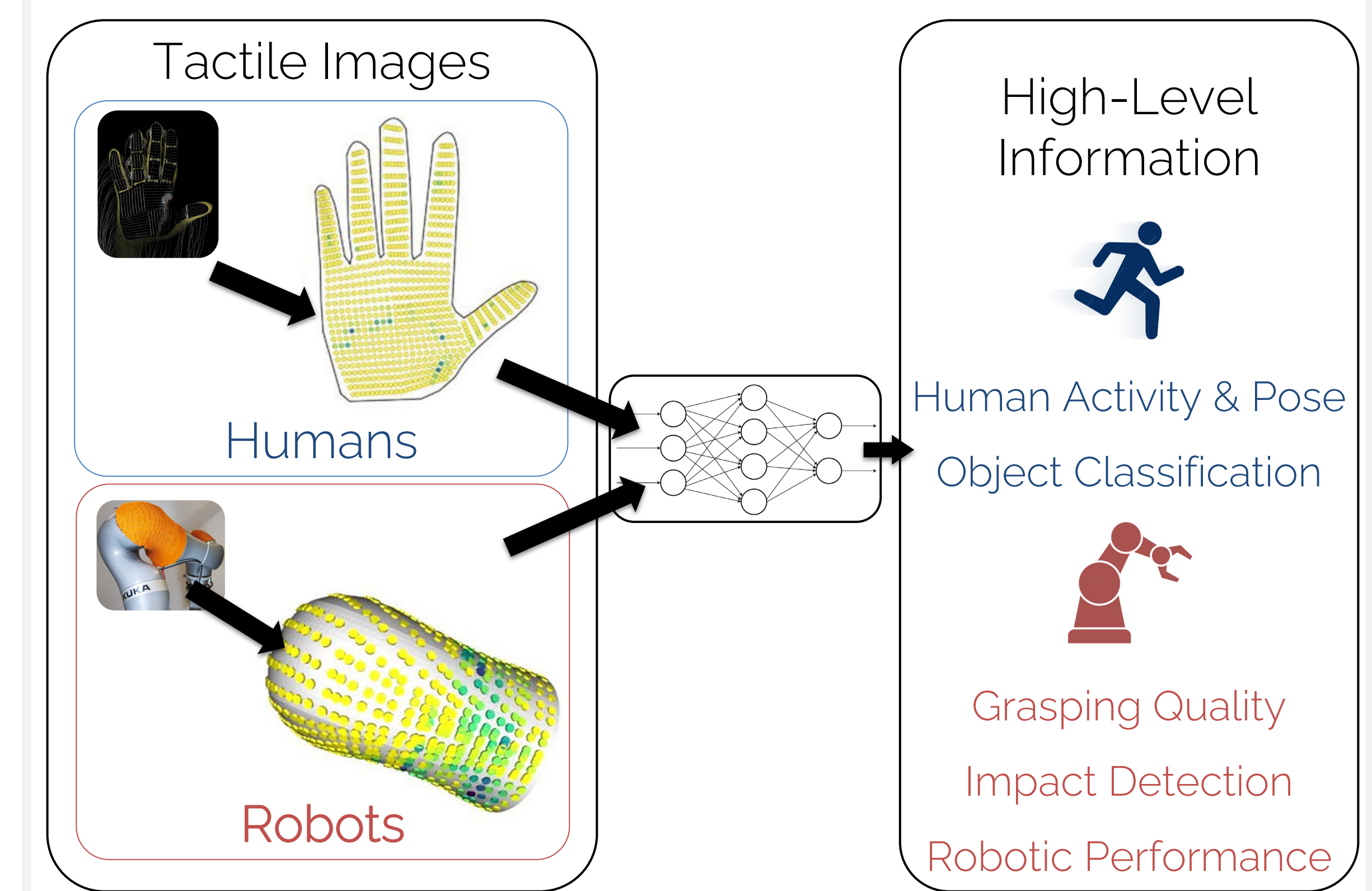


Locomotion Feedback

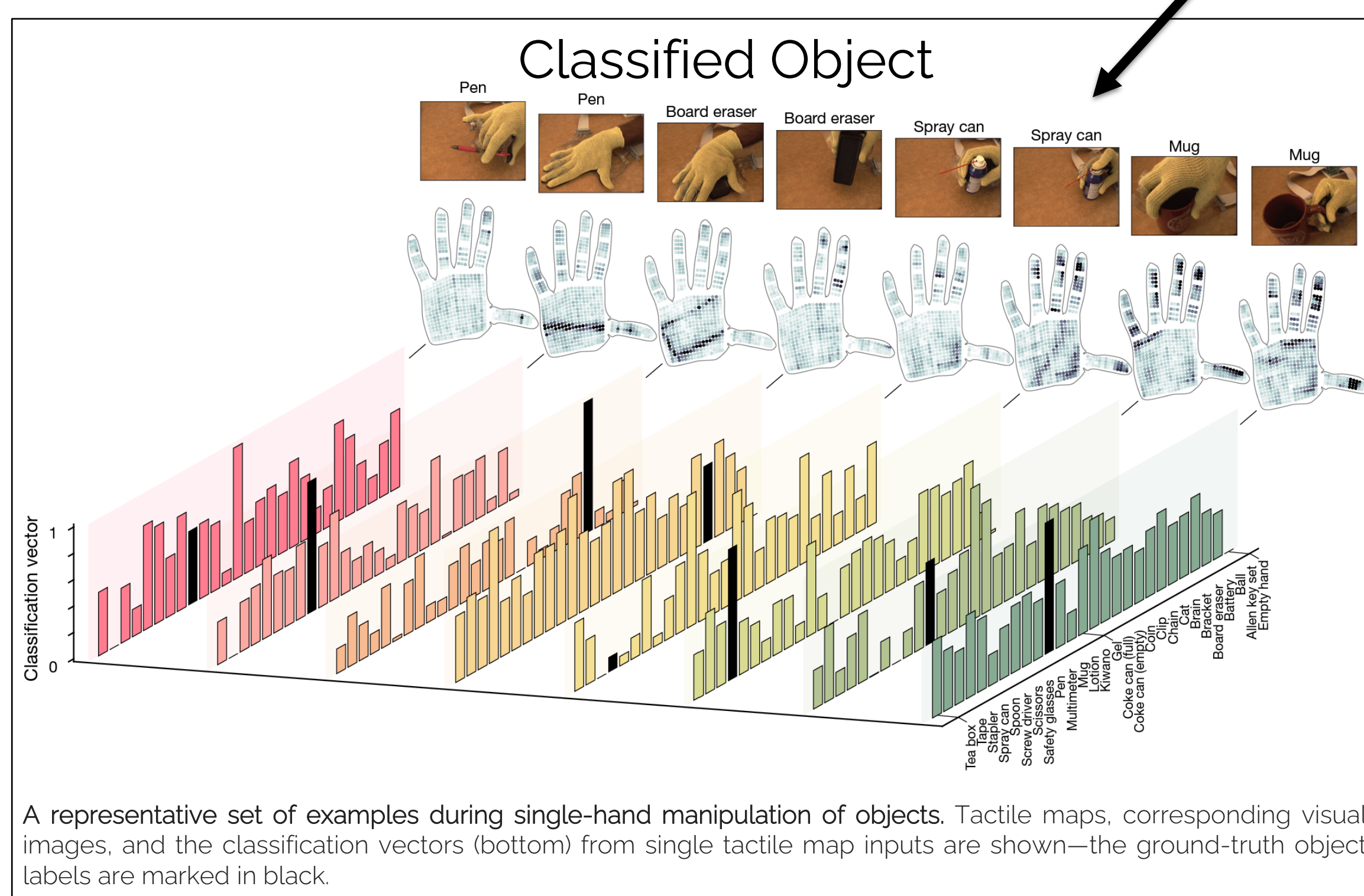
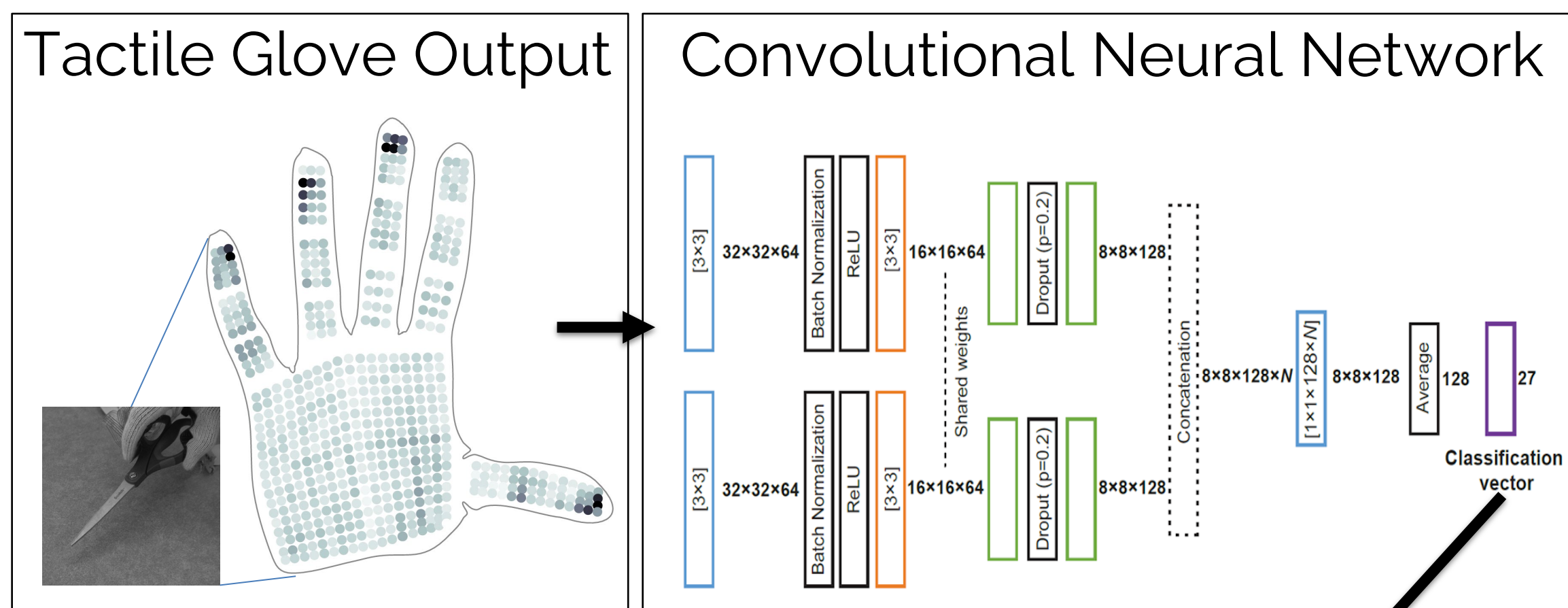
## Tactile Sensing Skins



## Ai-Enabled Tactile Perception



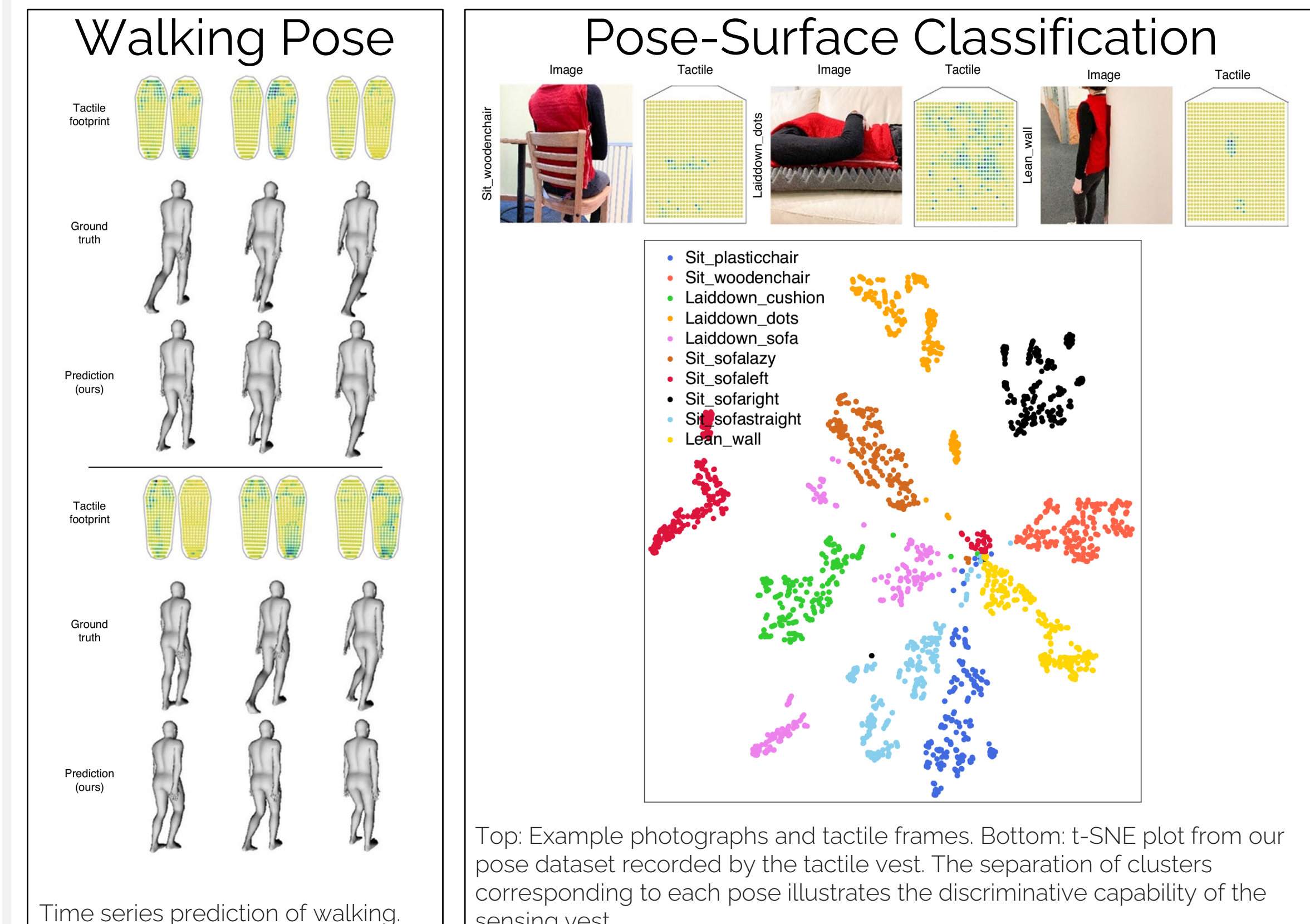
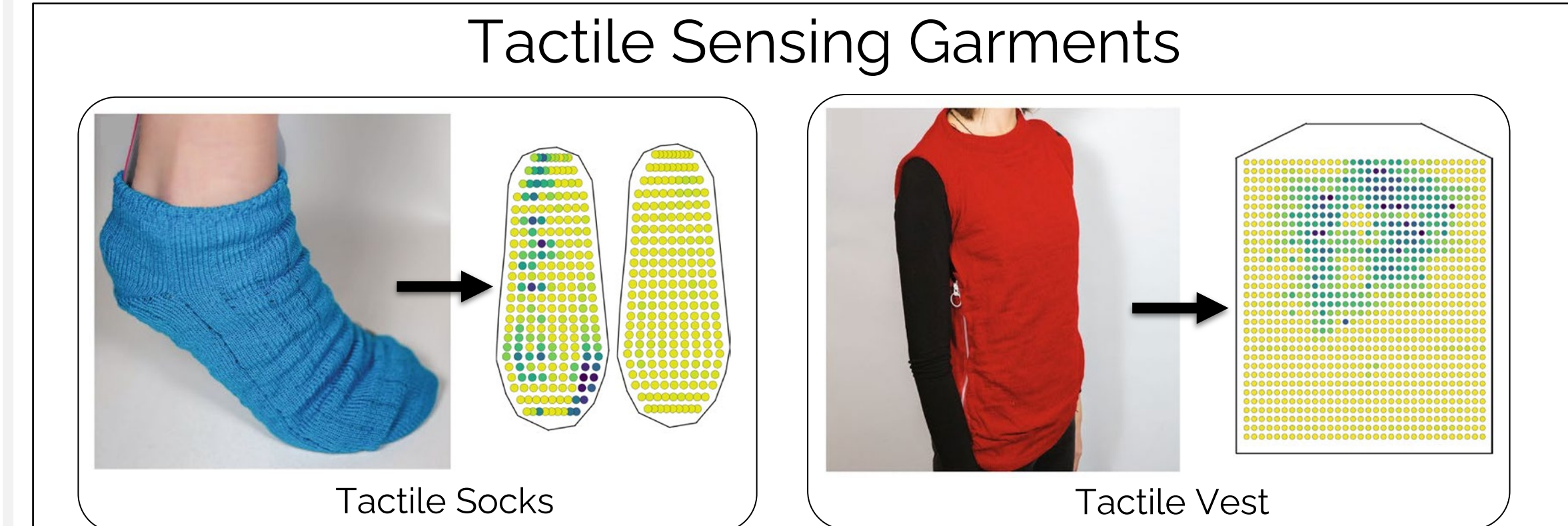
## Understanding Human Grasp



A representative set of examples during single-hand manipulation of objects. Tactile maps, corresponding visual images, and the classification vectors (bottom) from single tactile map inputs are shown—the ground-truth object labels are marked in black.

Reference: Sundaram, S., Kellnhofer, P., Li, Y., Zhu, J.Y., Torralba, A. and Matusik, W., 2019. Learning the signatures of the human grasp using a scalable tactile glove. *Nature*, 569(7758), pp.698-702.

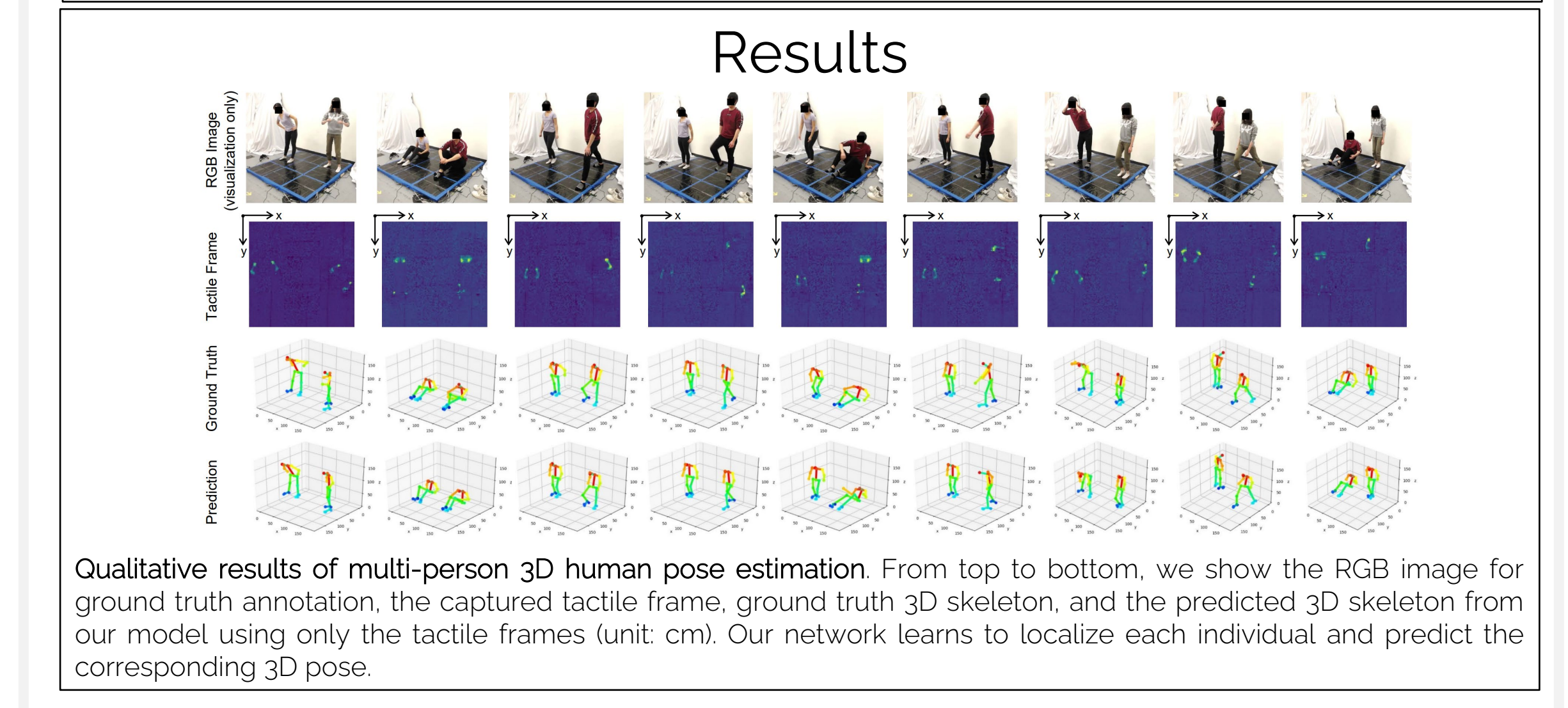
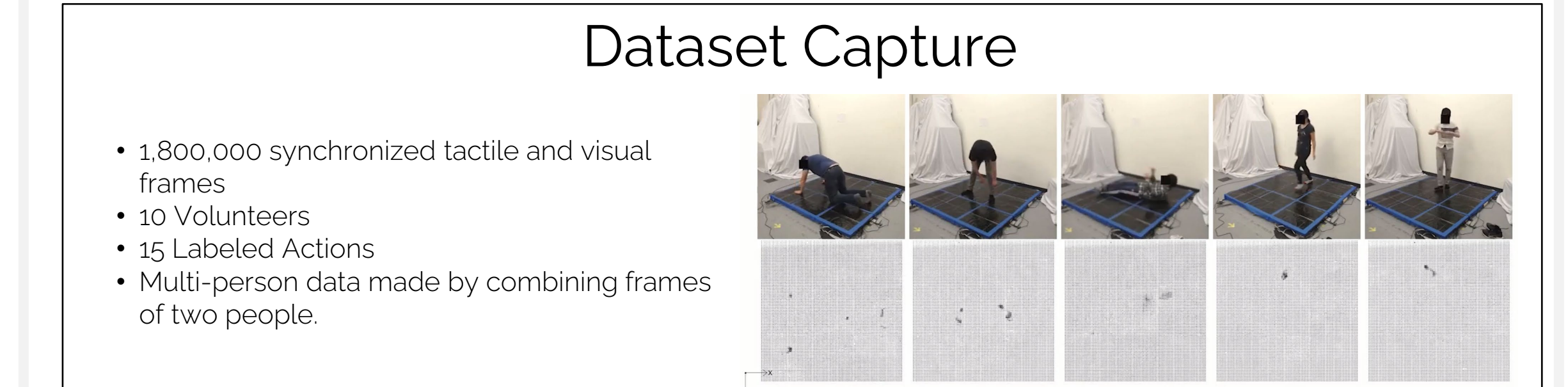
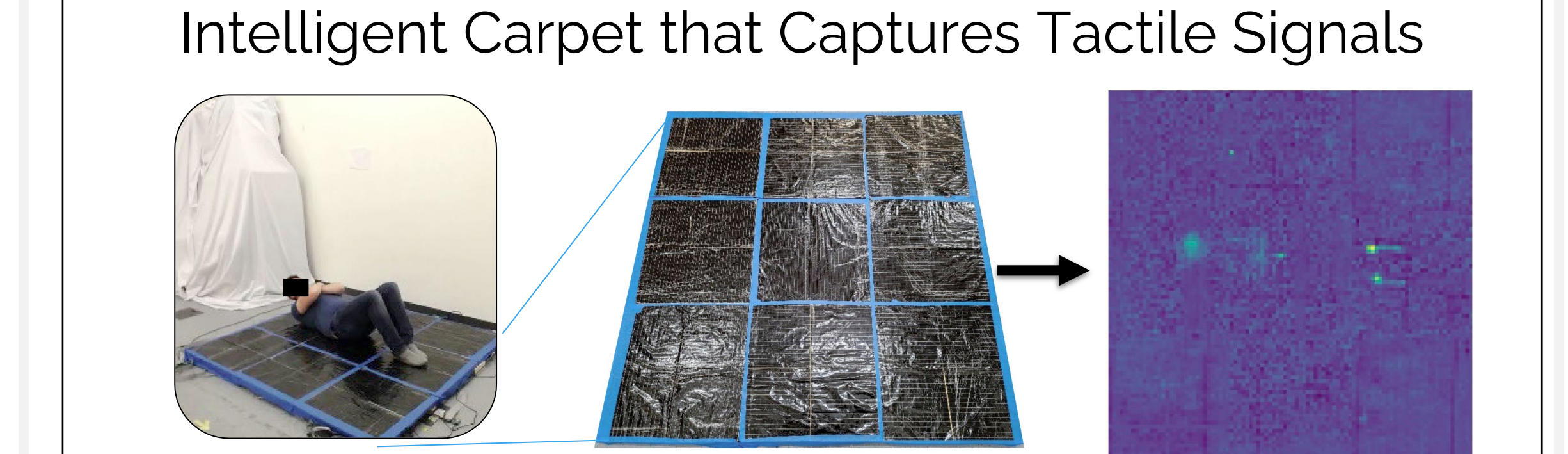
## Human-Environmental Interactions



Top: Example photographs and tactile frames. Bottom: t-SNE plot from our pose dataset recorded by the tactile vest. The separation of clusters corresponding to each pose illustrates the discriminative capability of the sensing vest.

Reference: Luo, Y., Li, Y., Sharma, P., Shou, W., Wu, K., Foshey, M., Li, B., Palacios, T., Torralba, A. and Matusik, W., 2021. Learning human-environment interactions using conformal tactile textiles. *Nature Electronics*, 4(3), pp.193-201.

## 3D Human Pose via Tactile Signals



Qualitative results of multi-person 3D human pose estimation. From top to bottom, we show the RGB image for ground truth annotation, the captured tactile frame, ground truth 3D skeleton, and the predicted 3D skeleton from our model using only the tactile frames (unit: cm). Our network learns to localize each individual and predict the corresponding 3D pose.

Reference: Luo, Y., Li, Y., Foshey, M., Shou, W., Sharma, P., Palacios, T., Torralba, A. and Matusik, W., 2021. Intelligent carpet: inferring 3d human pose from tactile signals. In *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition* (pp. 11255-11265).