Beyond Static Perception: Integrating **Temporal Context into VLMs** for Cloth Folding

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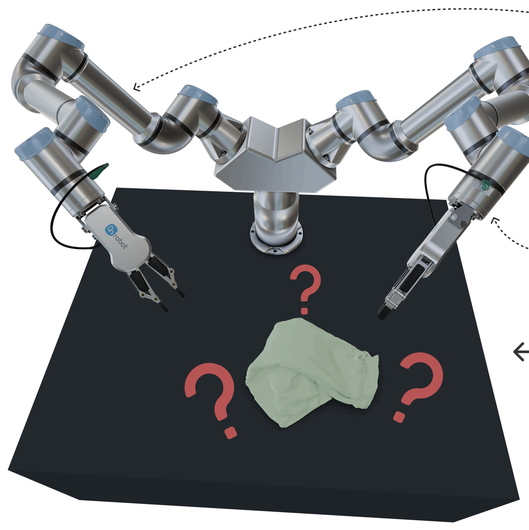
Motivation



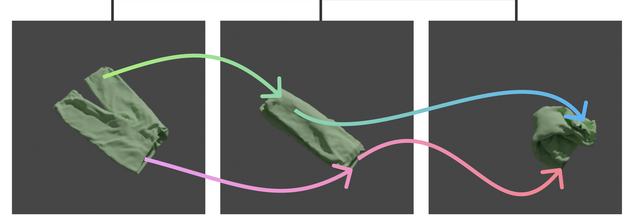
Static Policy

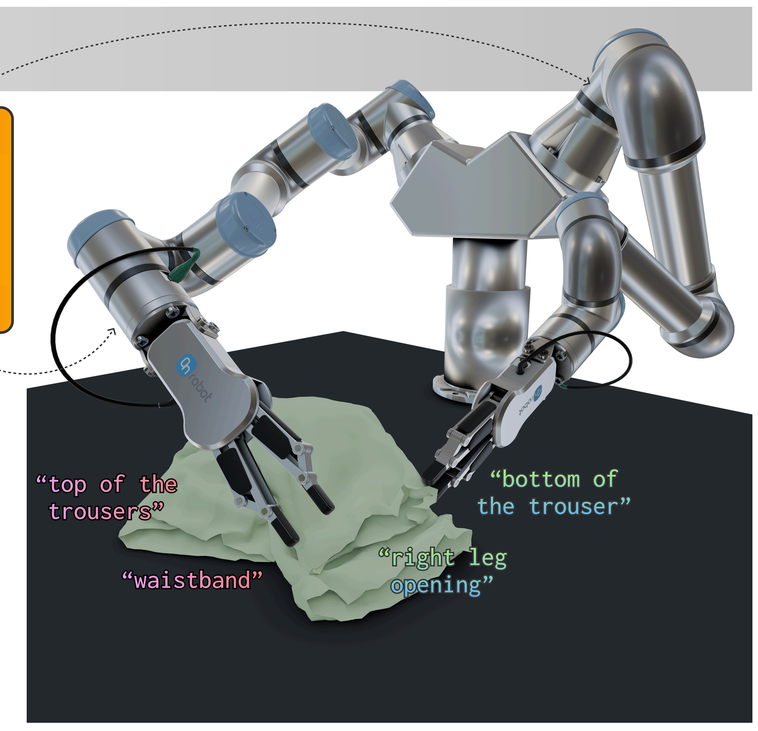
"Grasp the right leg opening"

Policy with temporal context

Challenging to recognize crumpled states

Provide previous observations

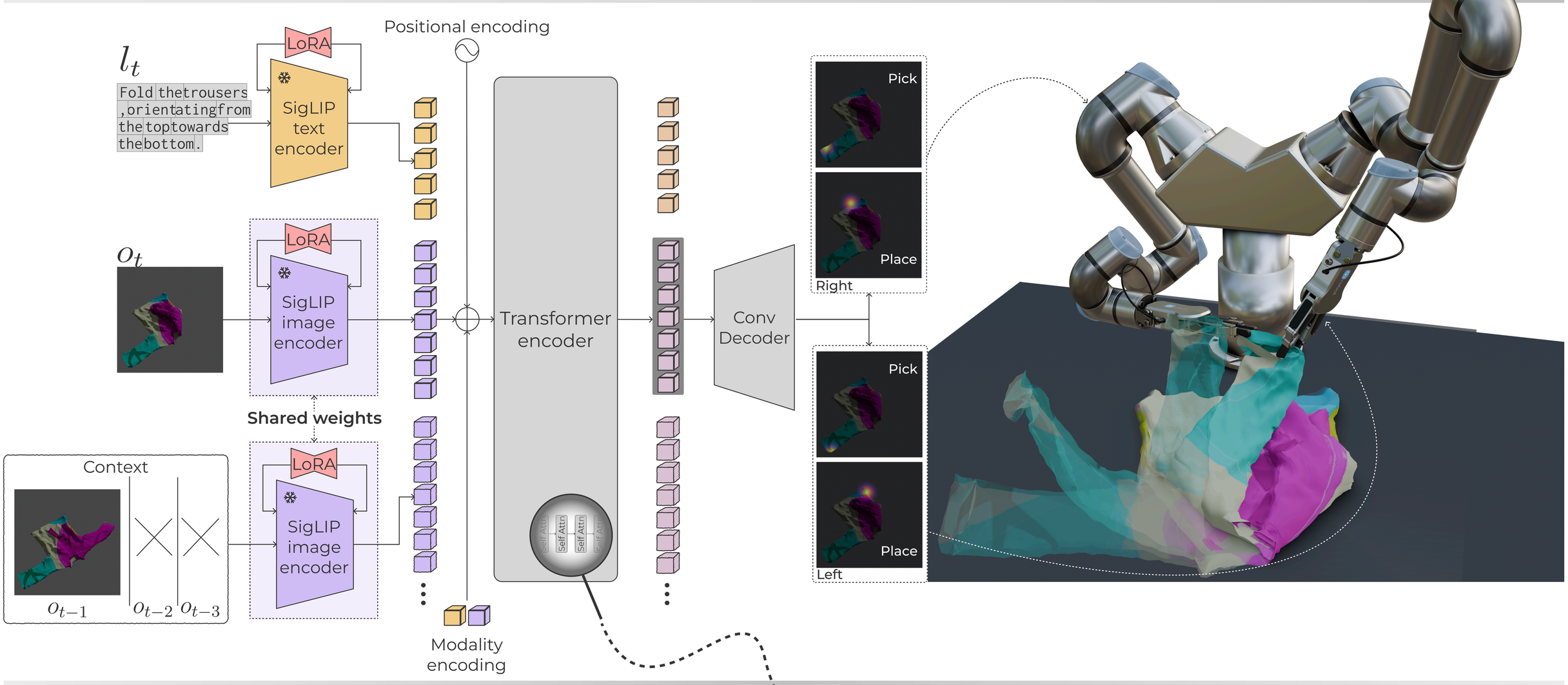




Model	AP_5 (↑)	AP_{10} (↑)	AP_{50} (↑)	Quantile (%) (↑)
BiFold w/o context (static)	40.3	55.7	88.9	97.1
BiFold consecutive frames	34.6	49.8	83.9	97.3
BiFold (***keyframes***)	**75.1**	**92.8**	**98.9**	**98.8**

Frames are redundant
Use *keyframes!*

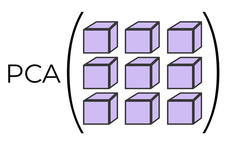
BiFold model architecture

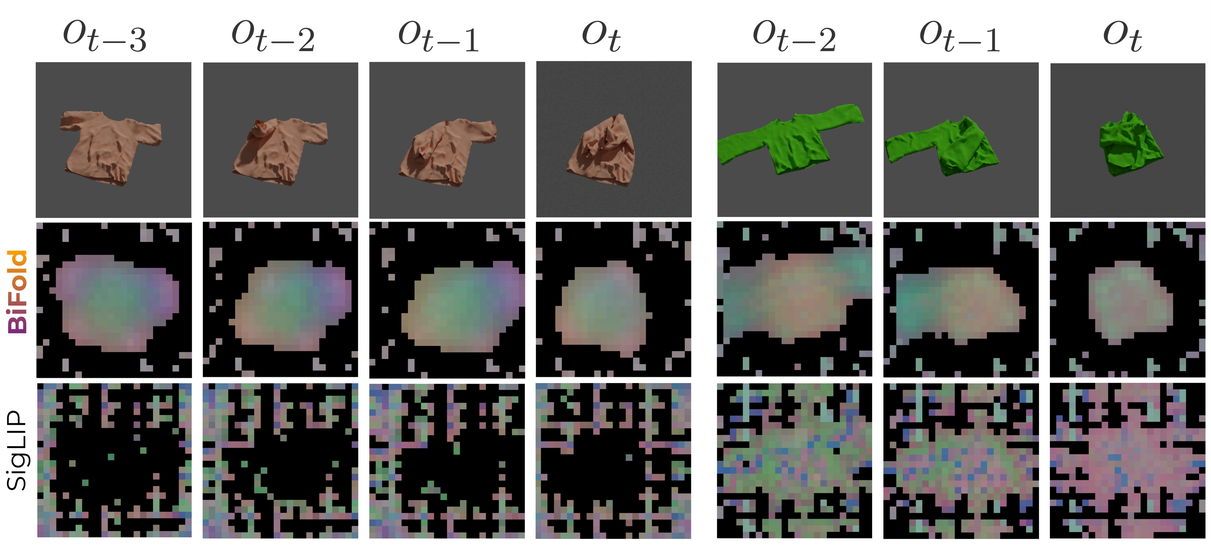


Emergent visual correspondences

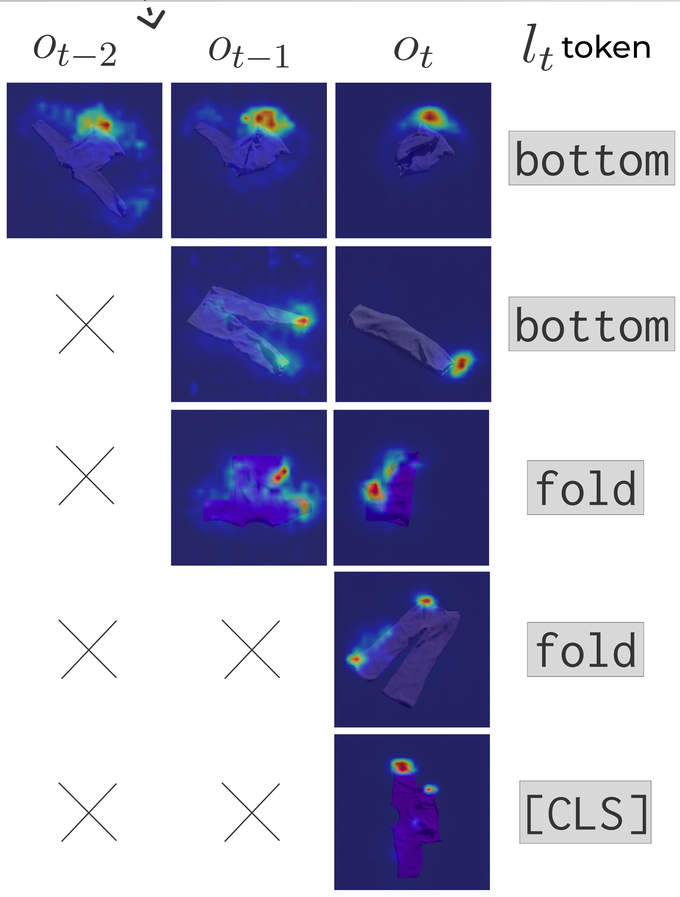
Parameter-Efficient Fine-tuning of VLMs:

- Extract task-specific representations
- Robustness and open-vocabulary understanding from pretraining





Effective modality fusion



Consistent spatial focus across temporal frames

Incorporating ***keyframe*** history improves complex object state recognition

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CSIC Consejo Superior de Investigaciones Científicas
ellis European Laboratory for Learning and Intelligent Systems
ICRA IEEE International Conference on Robotics and Automation
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