


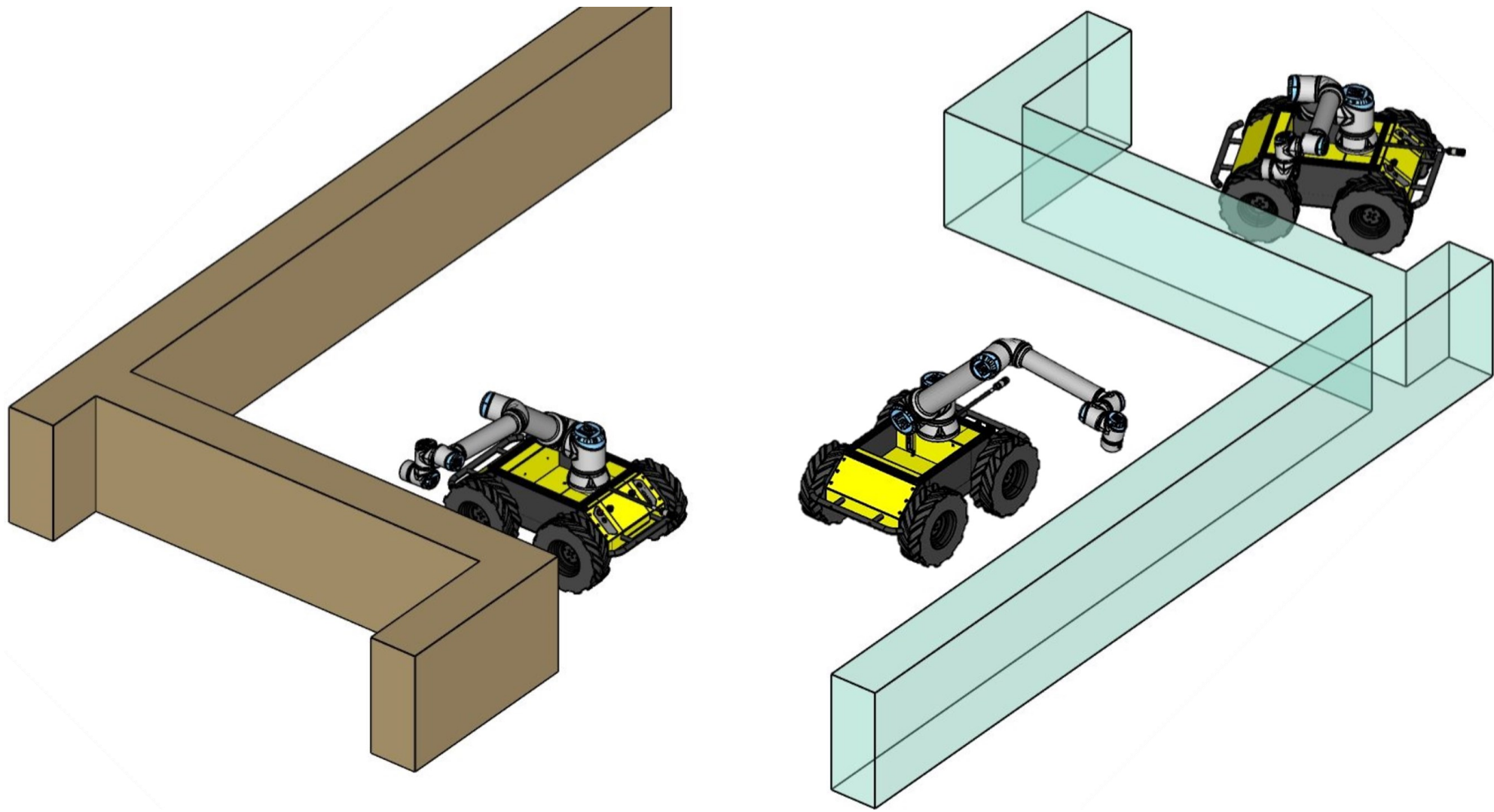
Problem

- Existing additive manufacturing methods rely on *gantry-based systems* that can only build structures within rigid frames, restricting **printing scale and speed**
- Collective Additive Manufacturing:** distributed 3D printing using a team of autonomous mobile robots



Challenges

Thrust 1: Planning and Localization
Thrust 2: Model Predictive Control
Thrust 3: Printing Coordination



Broader Impacts

Applications:

- Civil Infrastructure
- Disaster Response
- Manufacturing
- Space Exploration

Education:

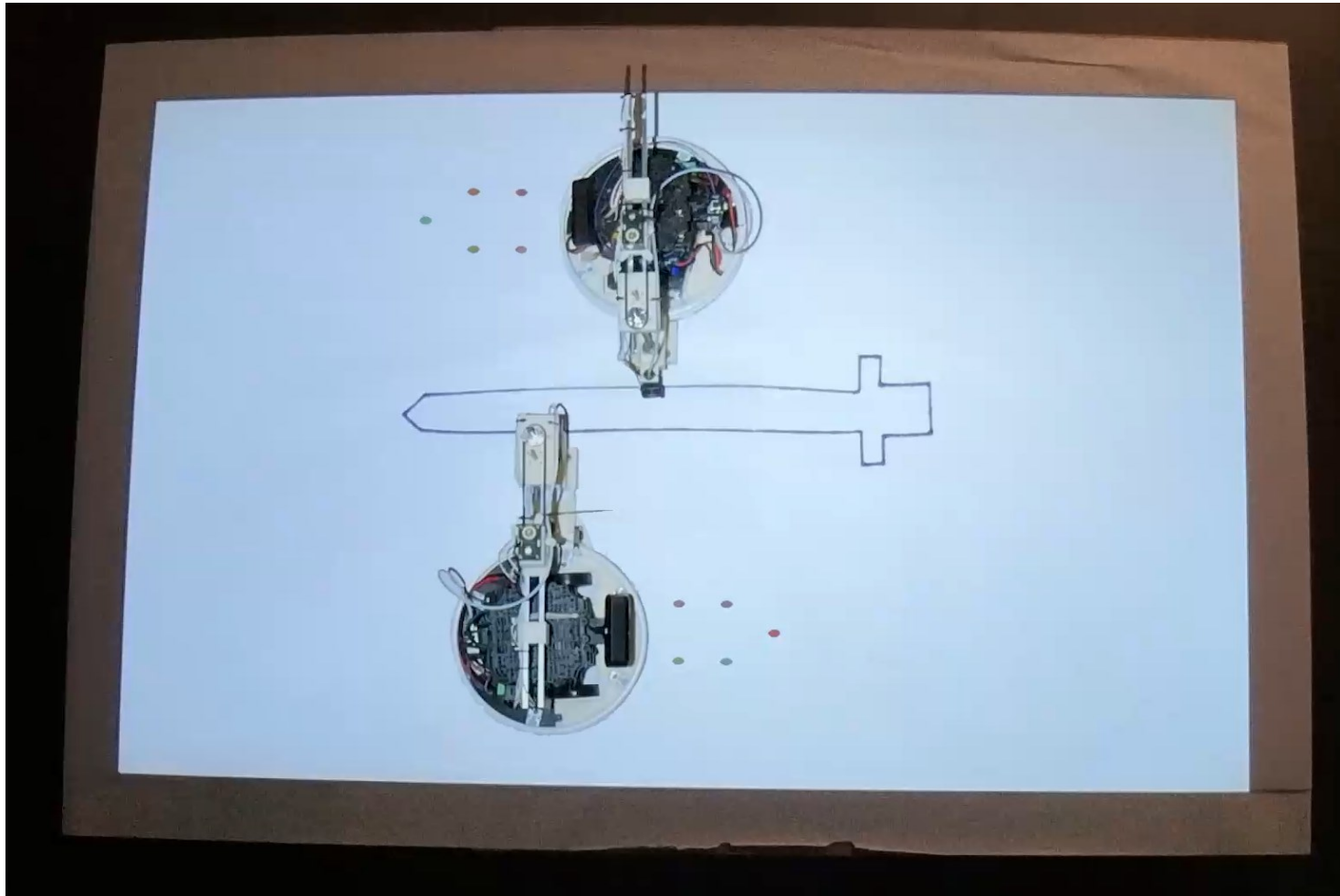
- Affordable/open educational CAM kit
- Summer undergrads & K-12 students

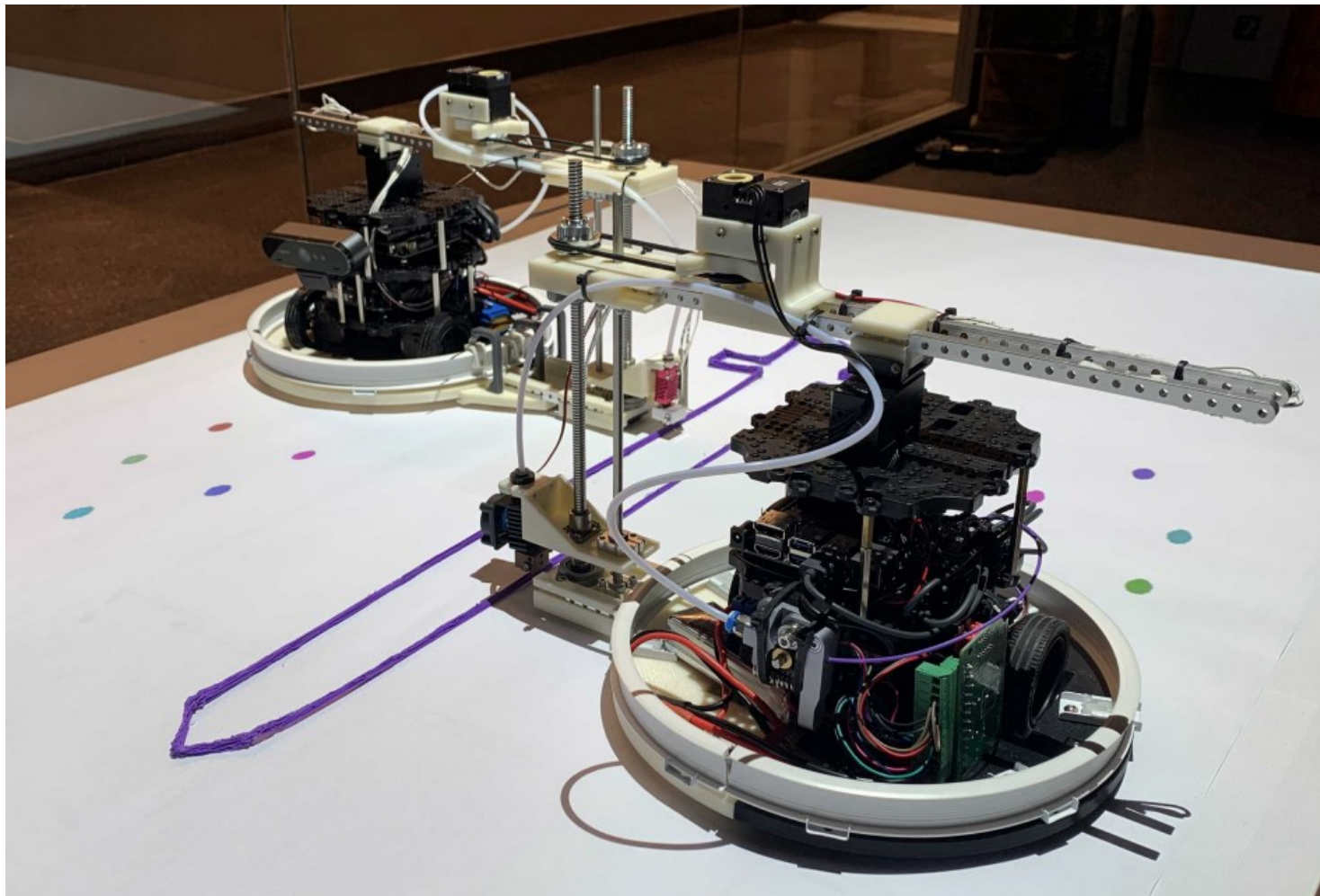
Patents:

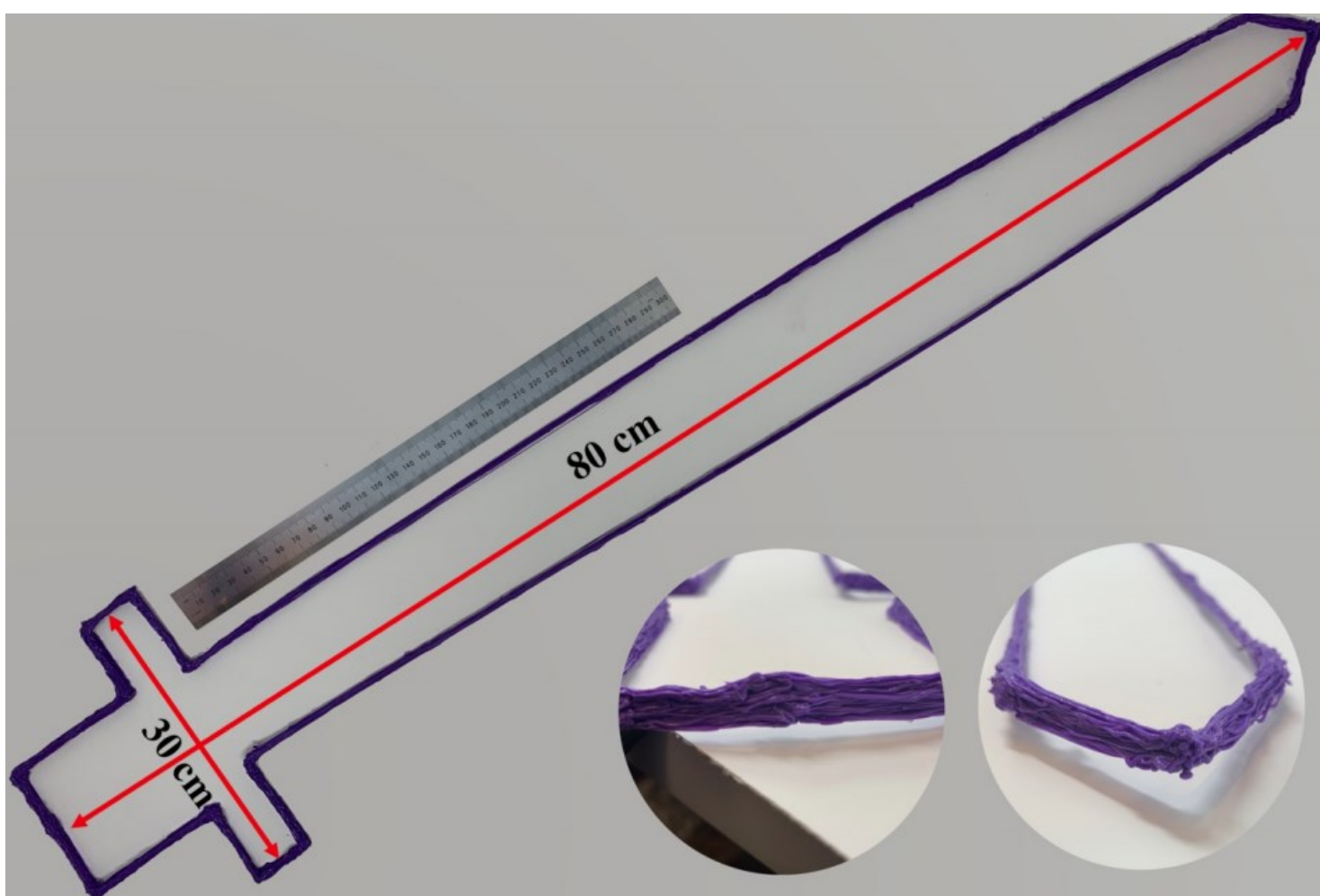
- 1 provisional patent on CAM is filed

Progress Updates

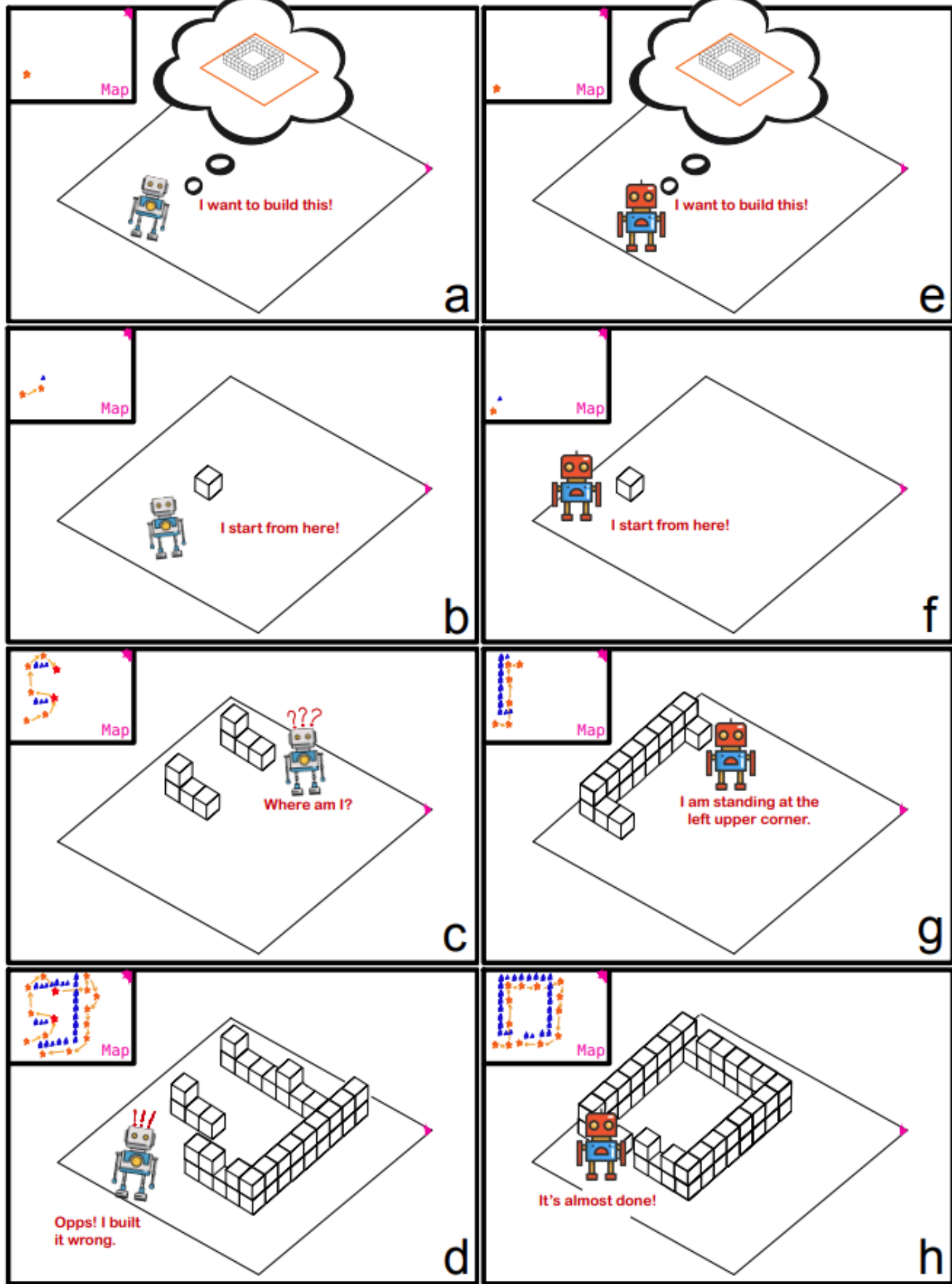
Projector-Guided Mobile 3D Printing (ICRA'2021)

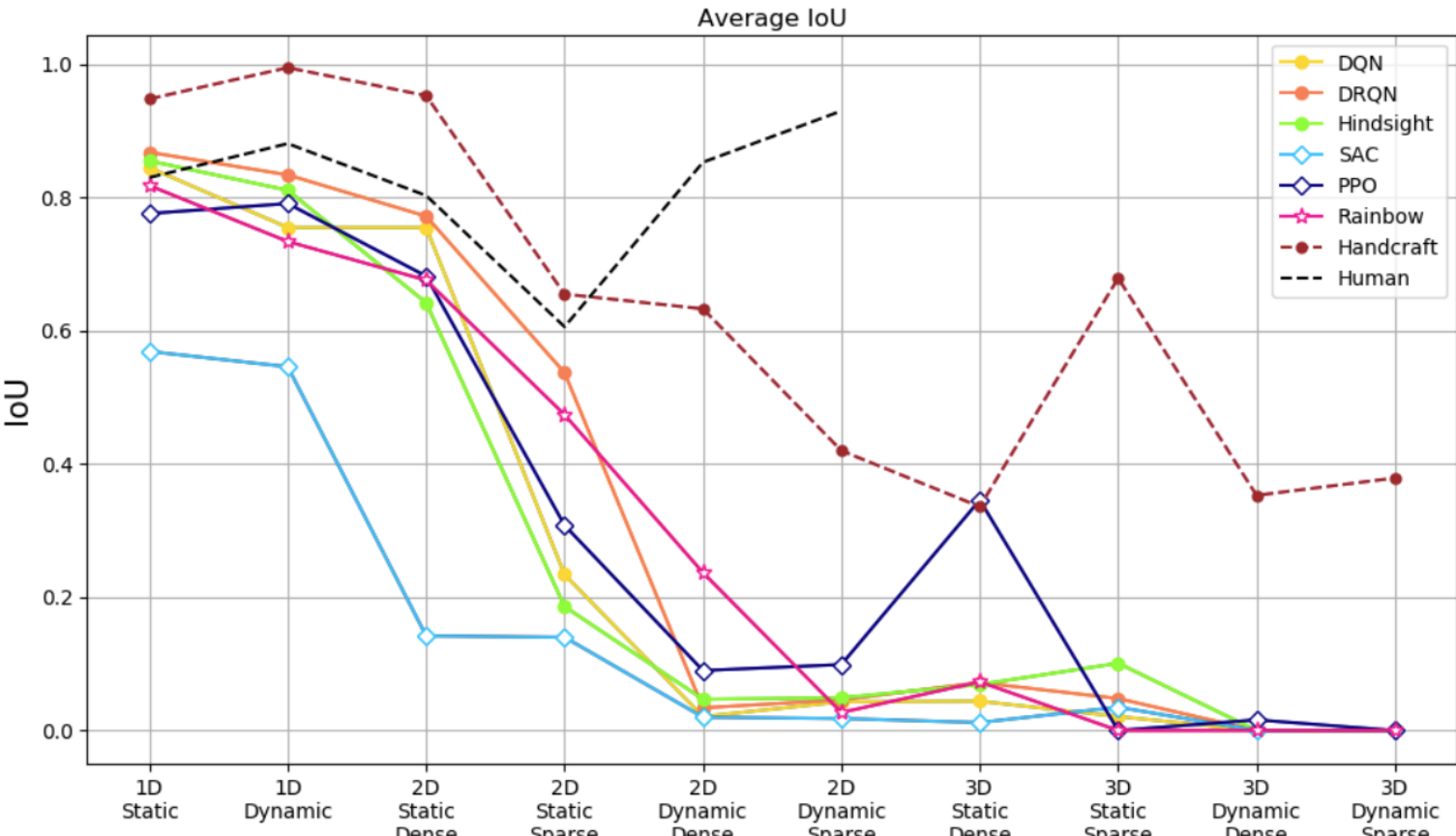




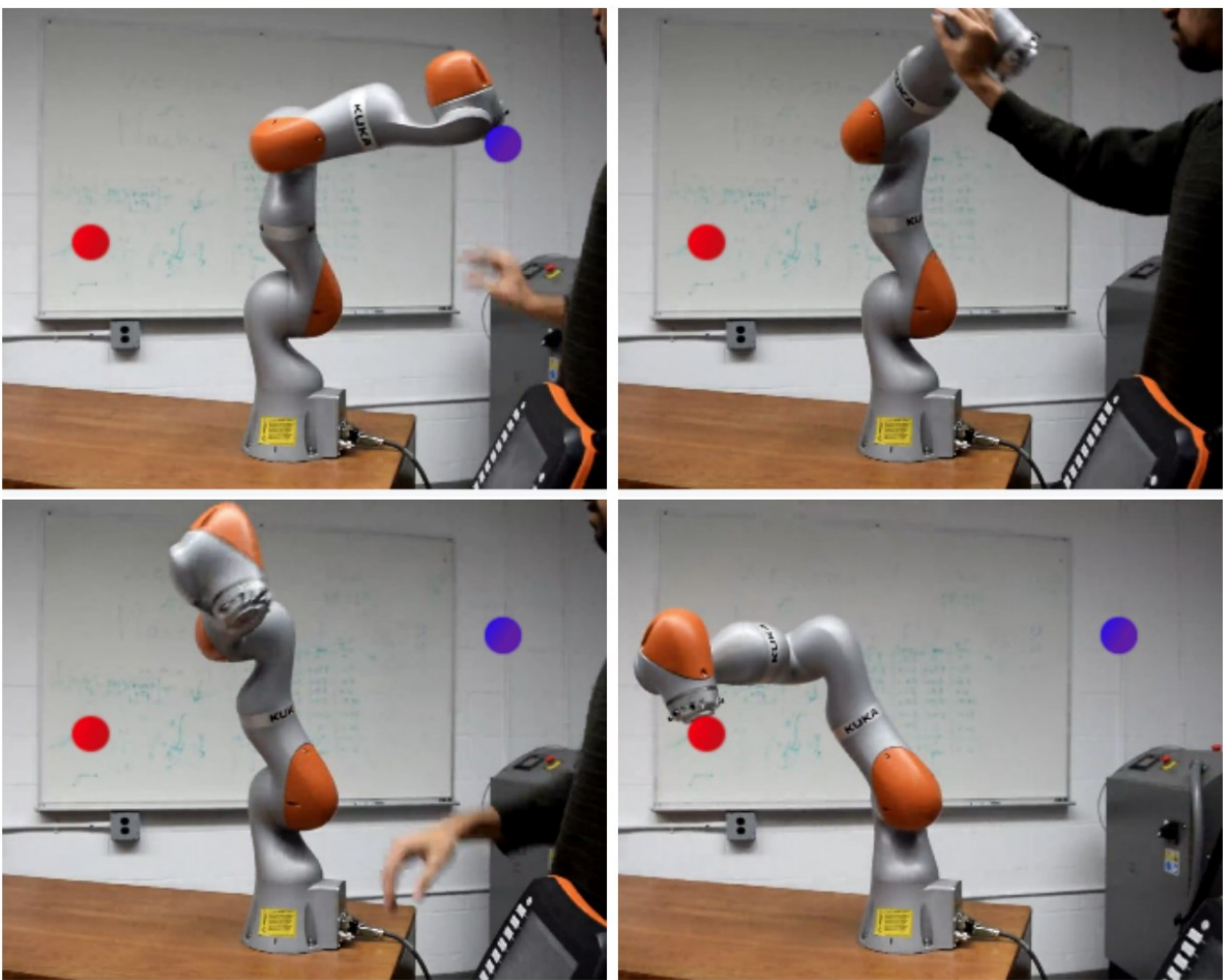


Simultaneous Navigation and Construction (arXiv'2021)

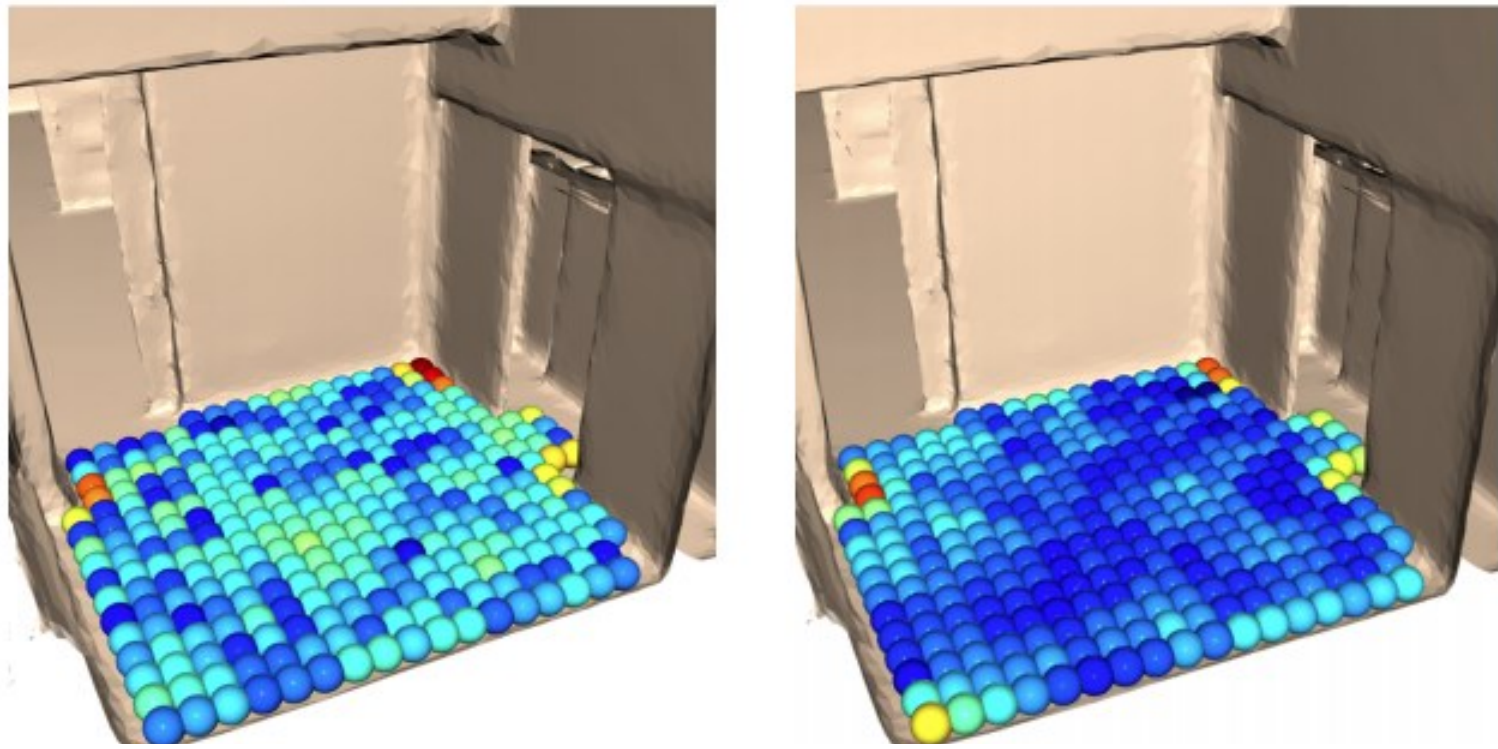




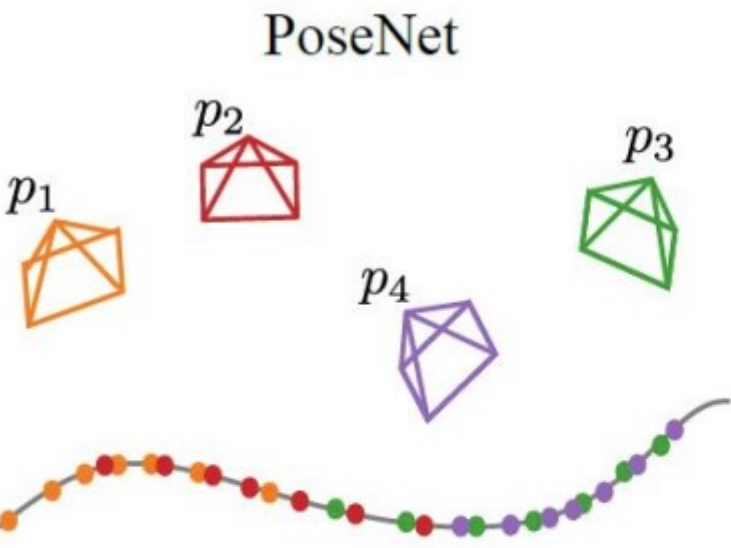
High-Frequency Nonlinear Model Predictive Control of a Manipulator (ICRA'2021)



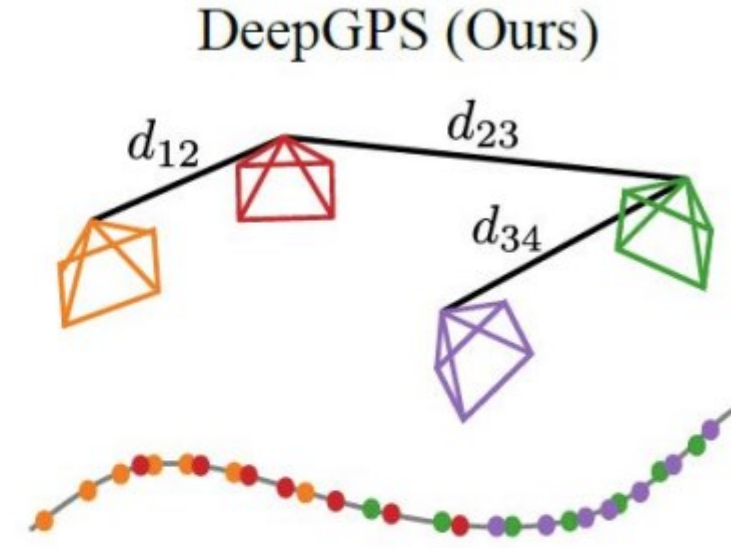
Deep Weakly Supervised Positioning (arXiv'2021)




PoseNet




DeepGPS (Ours)



GT Position Supervised



Unknown Position Weakly Supervised



2021 NSF Cyber-Physical Systems Principal Investigators' Meeting
June 2-4, 2021

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