HEURISTIC SEARCH FOR FAST ROBOTIC MANIPULATION PLANNING

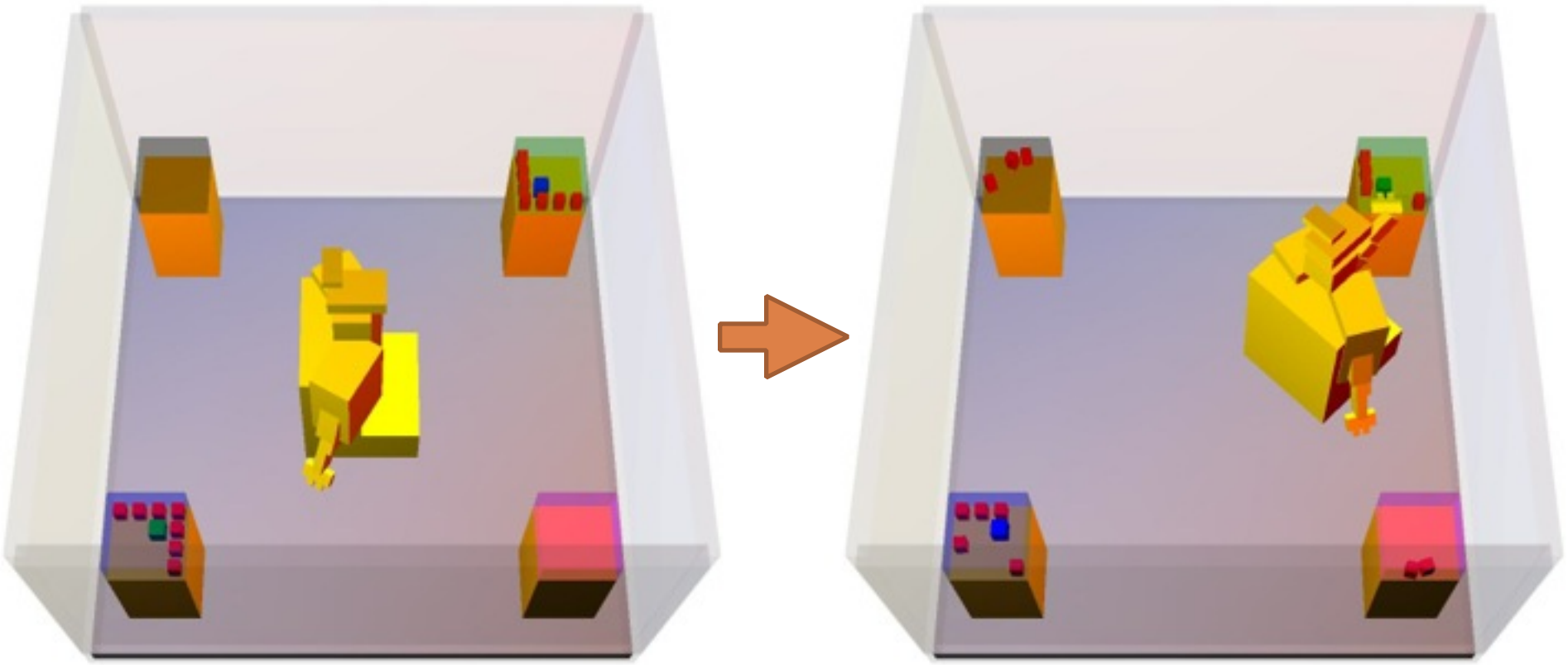
Caelan Garrett, Prof. Tomas Lozano-Perez, and Prof. Leslie Kaelbling
Draper Laboratory Undergraduate Research and Innovation Scholar

Manipulation Planning

- **Planning for autonomous robot applications** - cooking, organizing a warehouse, disaster recovery, etc.
- **Task planning** - planning for abstract sequences of robot actions (pick, place, look, open, etc.)
- **Motion planning** - planning for specific motor movements

SuperUROP

Swap Green and Blue Blocks



SuperUROP

FFRob

- **Modern planners take minutes to hours to solve**
- **Result from discrete planning** - powerful heuristic guesses are key to good empirical performance
- **State of the art** - independent task and motion planning. Only uses a discrete task heuristic
- **FFRob** - integrated task and motion planning. Uses a combined task and motion heuristic

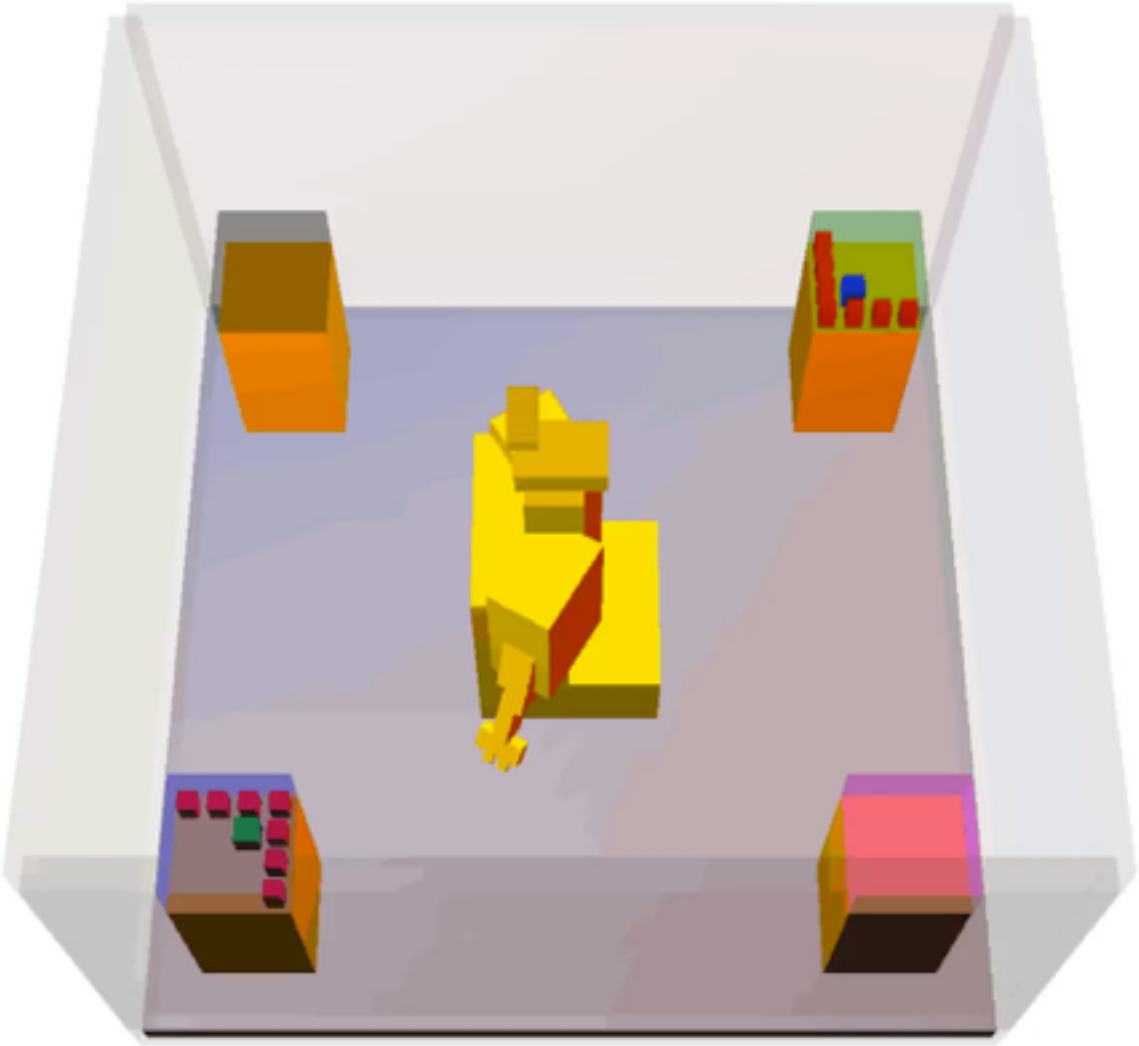
SuperUROP

Swap Green and Blue Blocks

Task 4

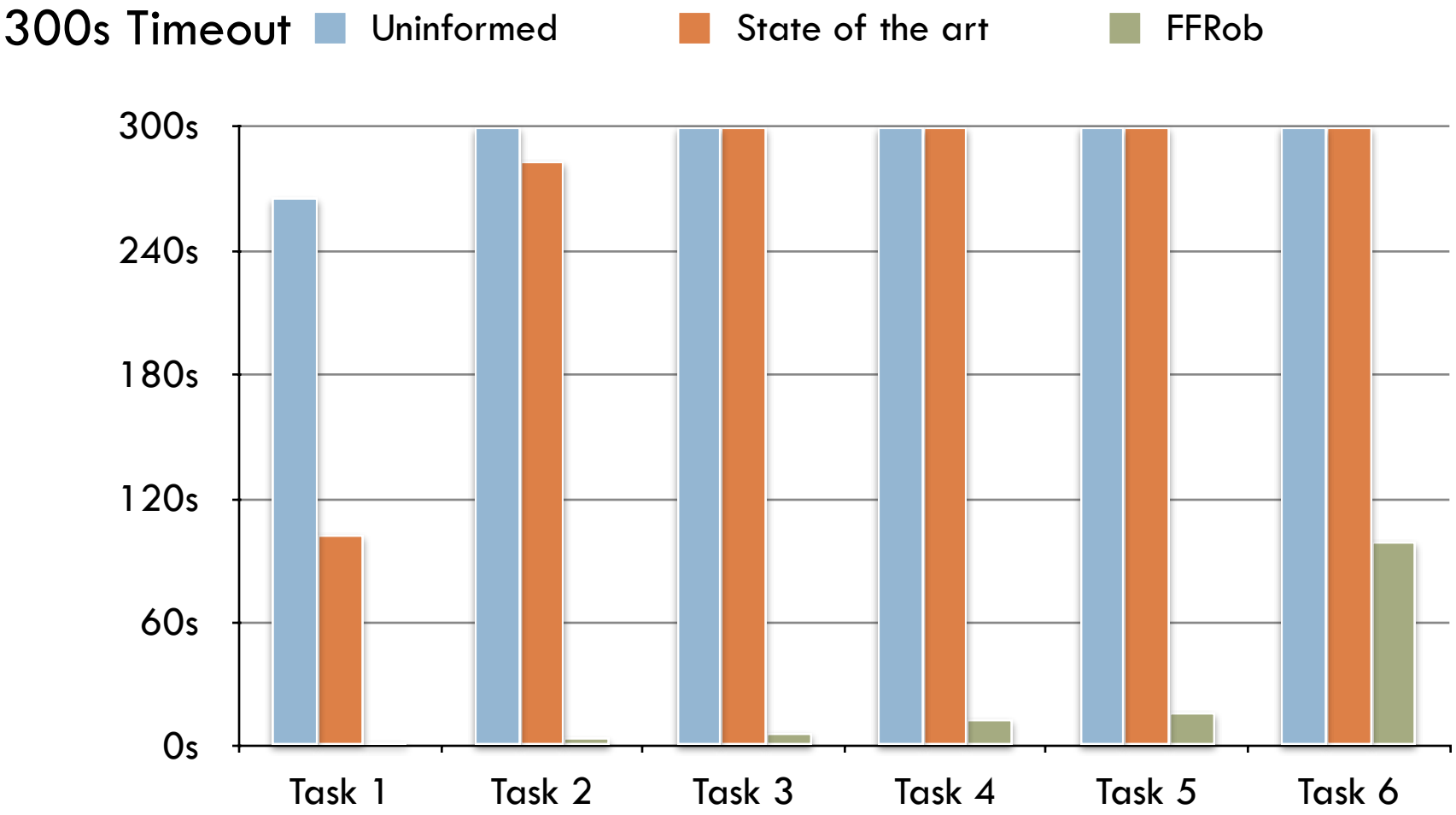
Plan length
9 picks
9 places
493 movements

Planing resources
24s preprocessing
15s search
74 states explored



SuperUROP

Median Plan Time

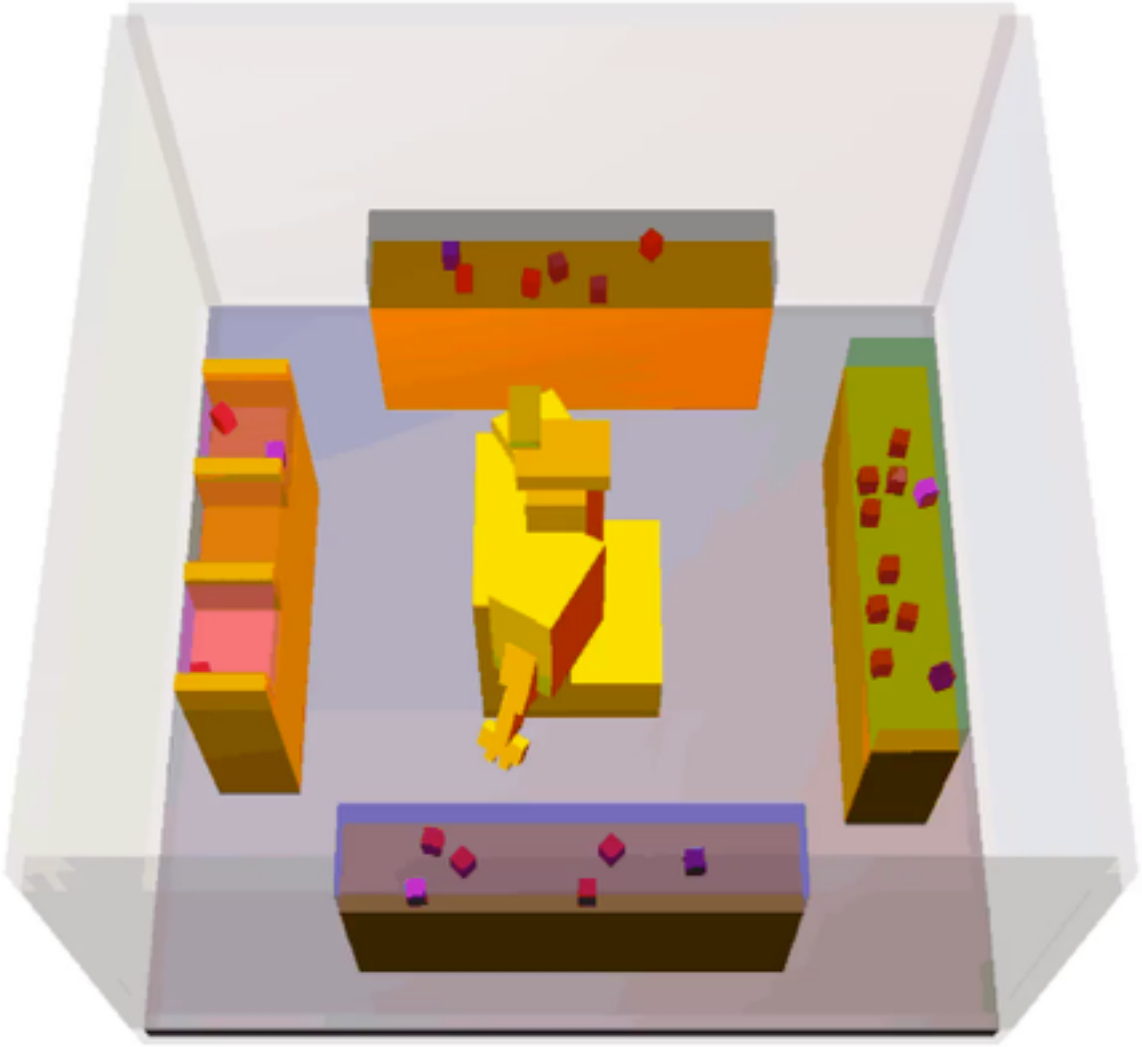


SuperUROP

Thank you!

Task 6

Questions?



SuperUROP