Playing Games with Robots: Autonomous Small-Scale Manipulation

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“Gambit”, right, is a manipulator robot that can play chess with an opponent in real-time, announcing actions and intentions as it plays.

Robotic gameplay helps us explore robotic abilities and human/robot interactions. Our long-term goal is a robot that can engage with humans as an assistant.

Why Chess?

For many years, people thought that reasoning would be the hardest part of chess; we now know that real-world sensing, manipulation, and human communication are at least as difficult.

Playing games in the physical world is a step towards an intelligent assistant that can open pill bottles, help with kitchen tasks, or assist a scientist with tasks at a messy lab bench.

System Components

- **Hardware**: Novel manipulator allows positional precision at reasonable cost
- **Sensing**: RGB-D camera gives board position and pieces; small hand camera allows up-close detail work
- **Manipulation**: “Opposing trampoline” gripper gives self-centering grasps
- **Learning**: Autonomously collects pictures of pieces for piece recognition and servoing