Oops It Worked ;)

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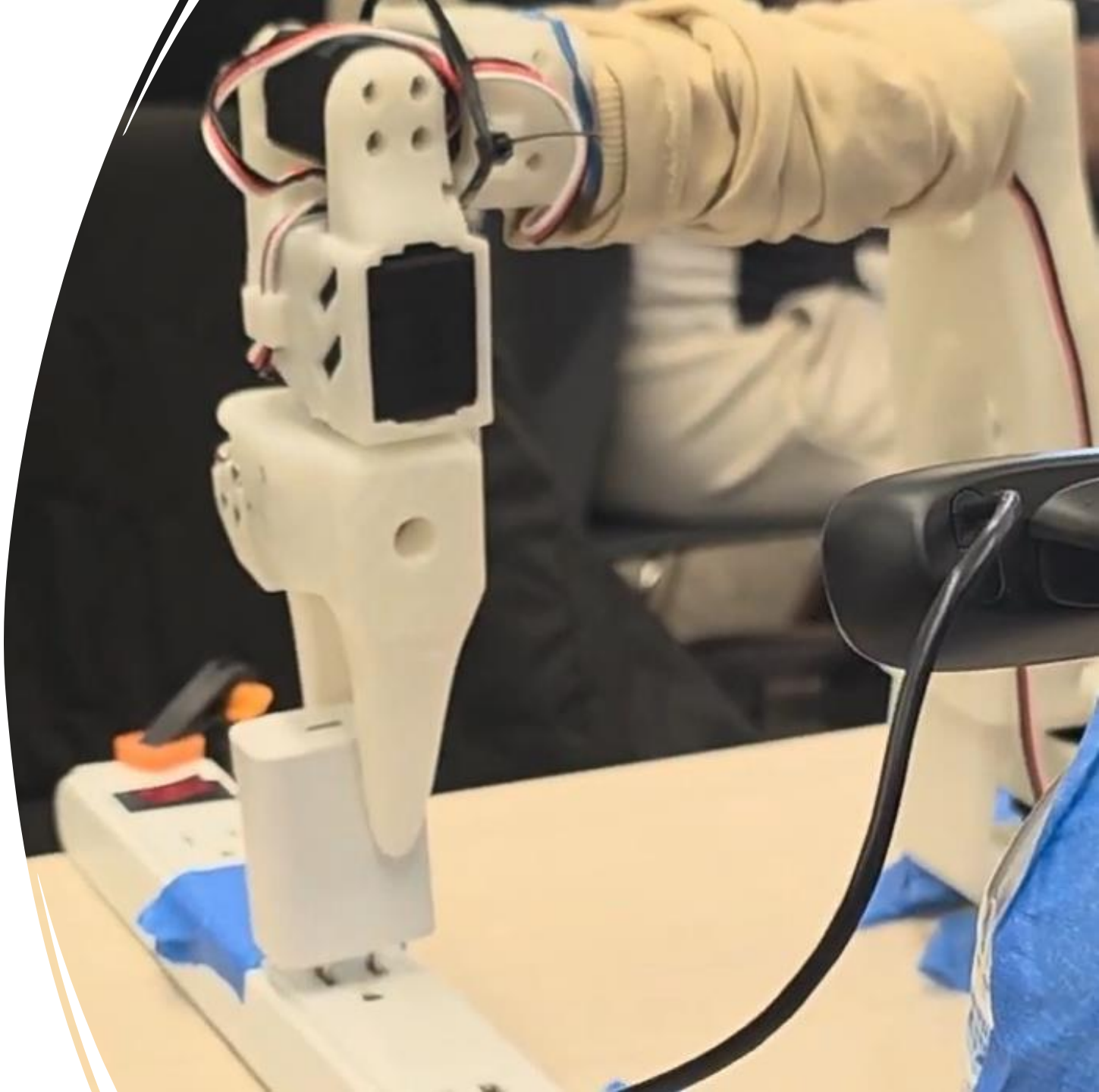
Project: Plugin Charger

Key Problems:

- **Precise aiming:** Aligning the charger accurately with a very small socket.
- **Small socket size:** Limited tolerance for positional error.
- **Resistance during insertion:** The plug encounters friction and sometimes needs force adjustment.
- **Gripper variability:** Charger can be picked up in different orientations and positions.

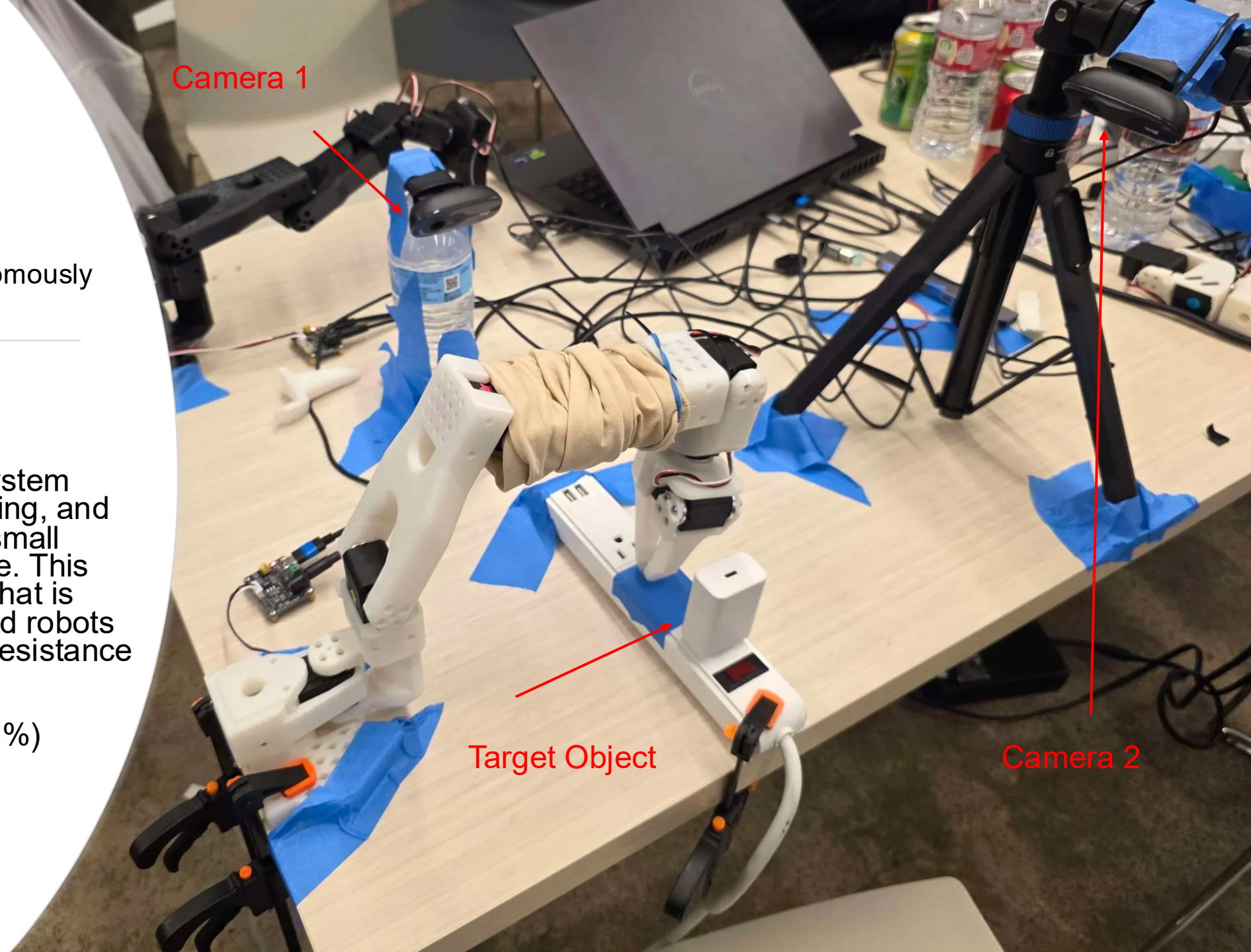


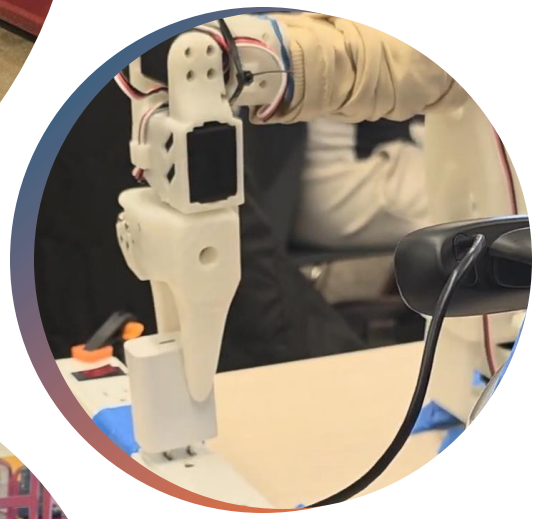
Outcome

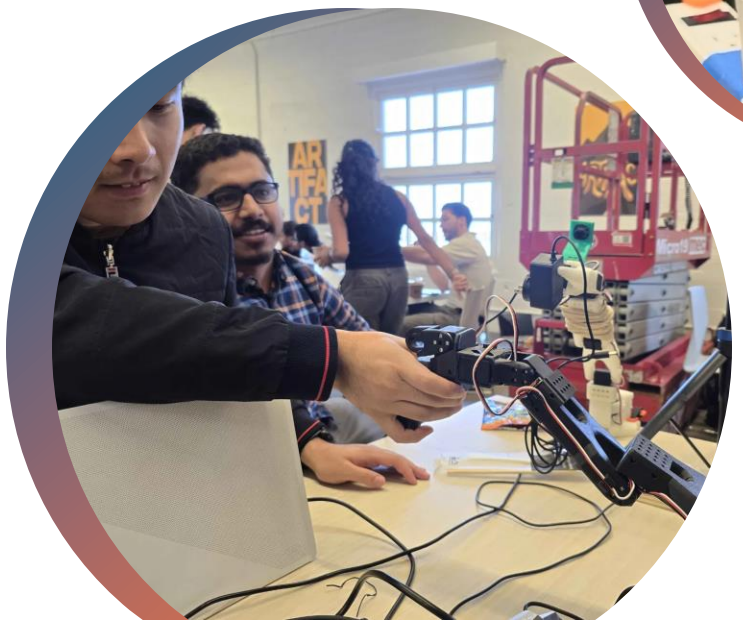
- Use an **Action Conditioned Transformer (ACT)** to autonomously plug in a charger

What We Built and Why:

- We developed a robotic system capable of detecting, aligning, and inserting a charger into a small socket using ACT guidance. This automates a precise task that is challenging for humans and robots due to the small size and resistance of the charger port.
- Success Rate: 5 out 6 (83%)
- Run Time: 200 sec







Takeaways

Main Insights:

- Dual-camera input improves spatial understanding and depth perception.
- Friction and gripper limitations can significantly impact task success.
- Video-based training with ACT helps the model generalize to small positional errors.

Technical Learnings:

- How to record demonstrations and train ACT for robotic manipulation.
- Deploying the ACT model for sequential decision-making.
- Overcoming mechanical limitations like insufficient friction or broken grippers.
- Enhancing ACT performance with improved video inputs and dual-camera setups.