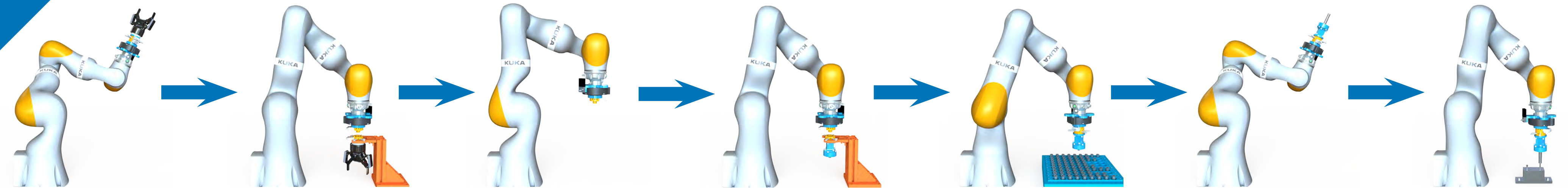




DRAPER

Autonomous Tool Changer

Draper is a not-for-profit engineering R&D company that creates innovative solutions. As part of their research in mobile manipulation (“MoMap”), Draper is developing an autonomous robotic system that can work in a complex human environment to perform a car’s oil change. Olin students began creation of a tool changer for this robotic system; they developed the code, built the apparatus, and tested the tool changer’s ability to perform simple mechanical tasks.



The tool changer can switch between gripper and ratchet configurations using an integrated commercial tool changer. In addition, the ratcheting assembly enables switches between socket-driven tools.

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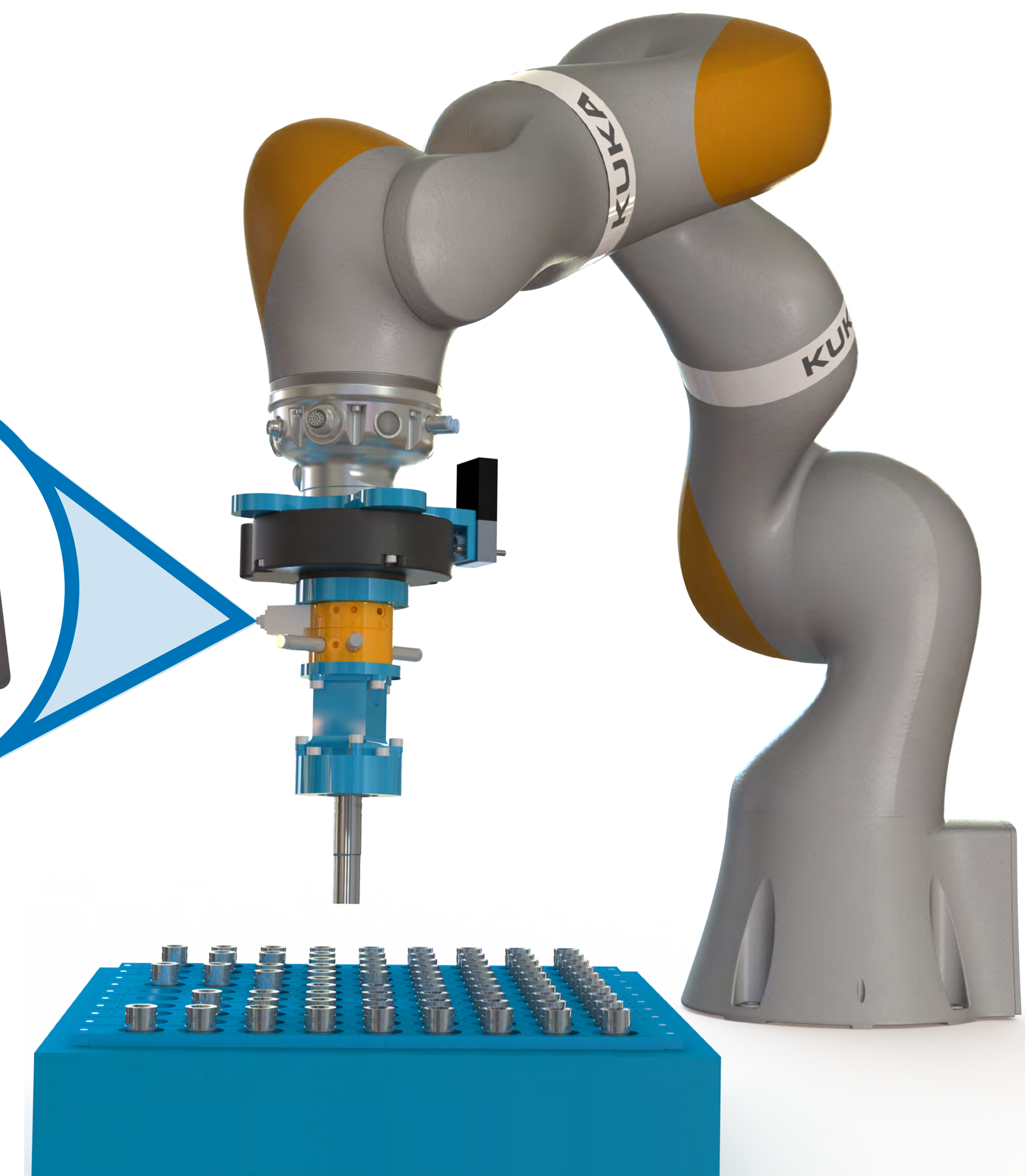
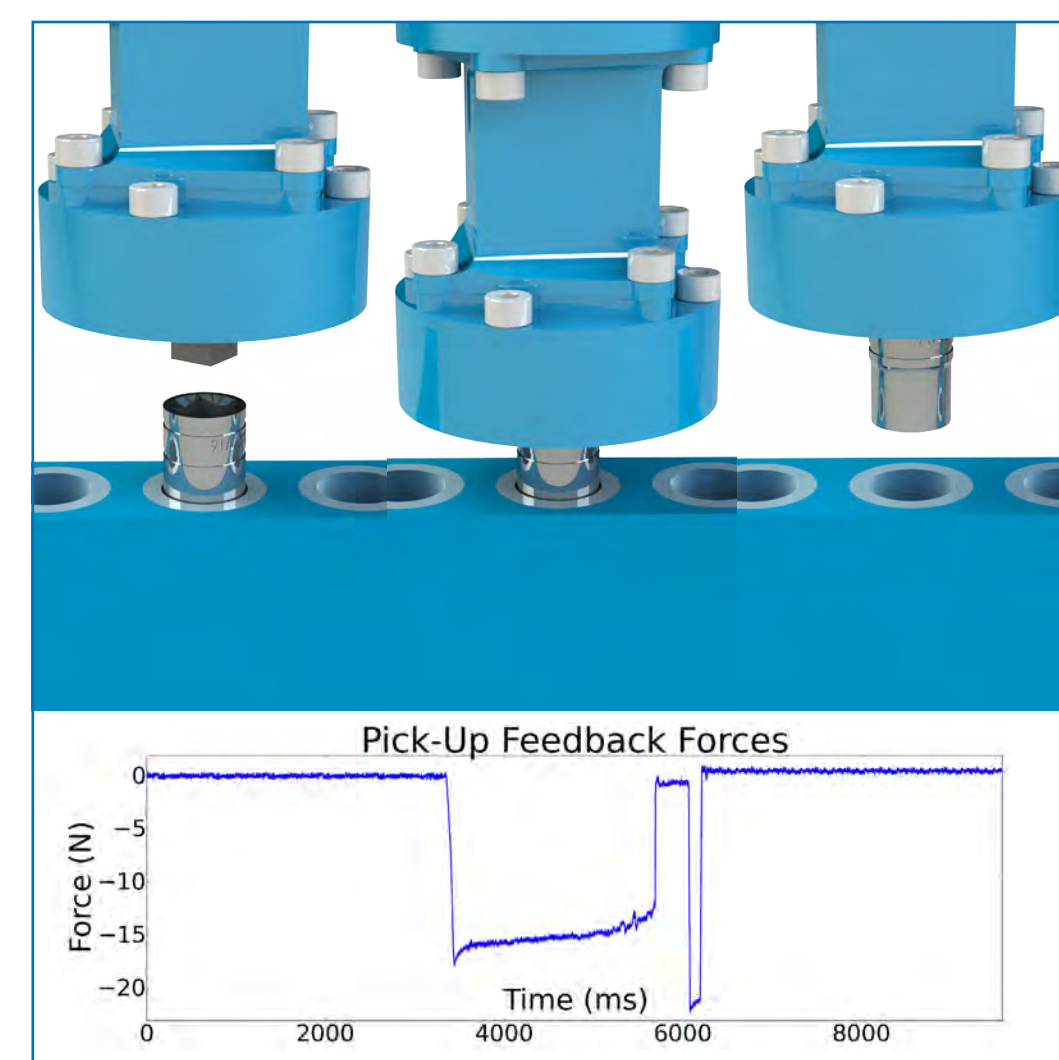
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Socket set CAD from GrabCAD’s Mitchell Crowther.

The gross arm motions are processed by a human-safe, low-level controller on the arm. Tool change actuation is handled by a set of custom relays controlling the pneumatic flows.

Torque and force feedback is used by the system to execute fine motor motions, such as interactions with bolts and pick-up maneuvers.



This Olin-made, modular tool rack was machined out of ABS and holds the tools drive-side up. Silicon rubber lines each hole to grip the tool during pick-ups and add cushioning during drops.