Multi-Manipulator Extensible Robotic Platforms

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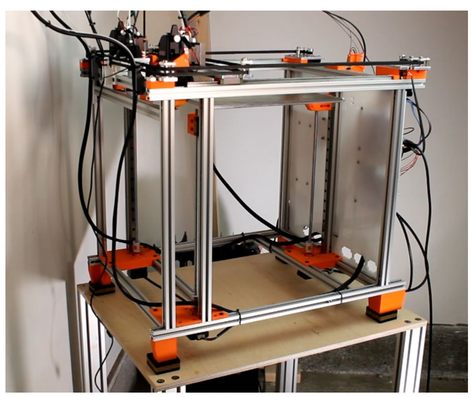
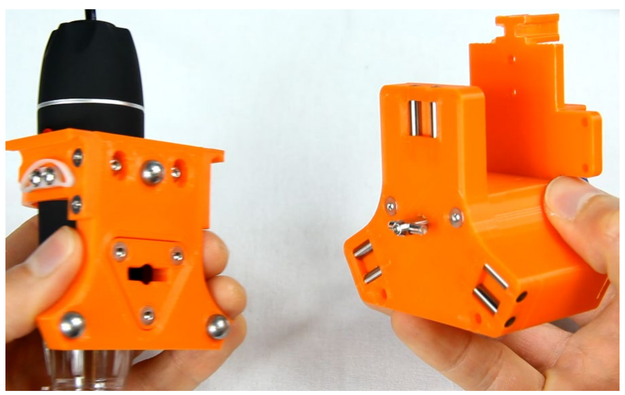
Robots have historically been used for dull, dirty, and dangerous tasks. We instead seek to develop robots that assist experts with scientific exploration, including iterative development of new processes and workflows. To do so, we will contribute open-source co-robotic automation and programming tools.

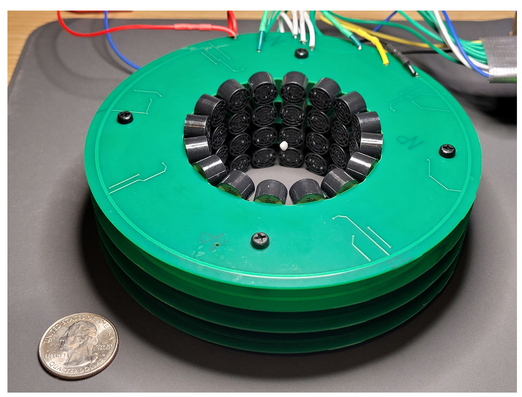


Tool-changing motion platform

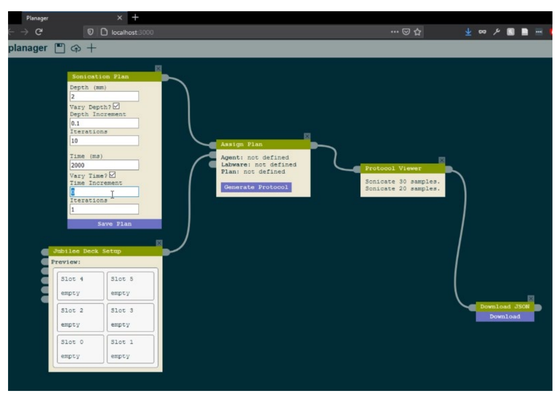


Microscope end effector with tool mount

Sonication end effector



Contactless manipulator uses ultrasonic levitation



Browser-based end-user programming environment

1. Open-source extensible motion platforms with automated tool-changing
2. Novel contactless ultrasonic manipulators
3. End-user programming environments for authoring automation workflows

Intellectual Challenges:

- High speed control of separate motion platform and end effectors
- Novel ultrasonic manipulation capabilities
- Open-source systems that can be built and customized by non-experts

Broader Impacts:

- Enabling scientists to use co-bots in their own experiment workflows and applications
- Teaching students machine design and customization with a low-cost but highly precise platform
- Lowering the threshold to developing computer-controlled processes

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