Automating Multi-probe Electrophysiology Insertions for Simultaneous Multi-region Recordings

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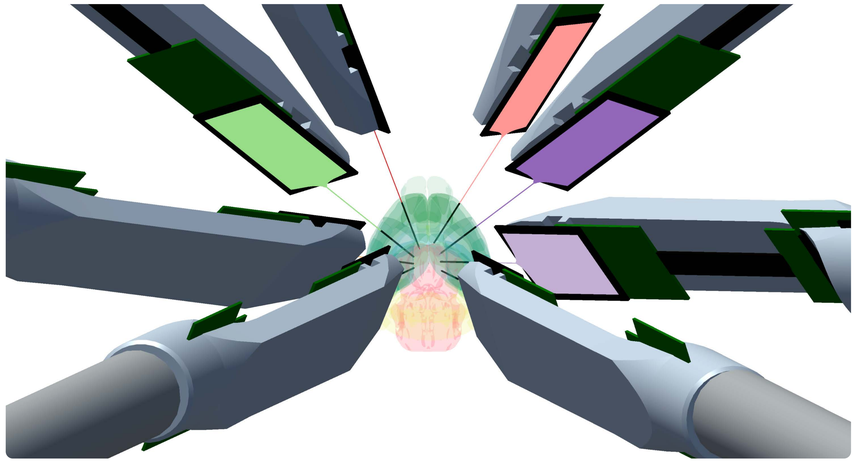
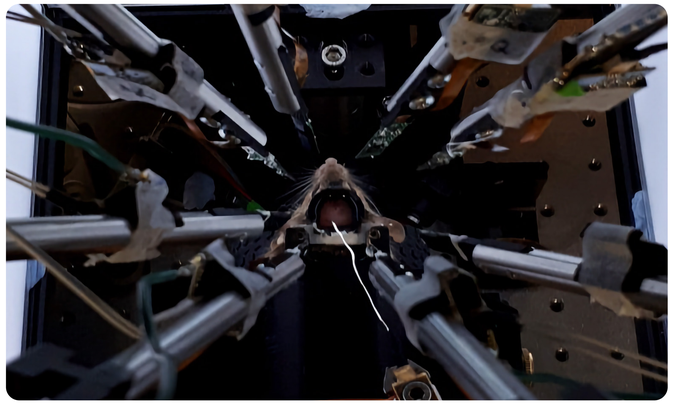
VIRTUAL BRAIN LAB

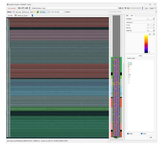
Plan an experiment in Pinpoint, let automation handle the rest!





Stringer *et al.* (2019) *Science*

Data Acquisition



Pinpoint can connect to data acquisition software such as OpenEphys and SpikeGLX to let you view anatomical information about your electrodes alongside live electrophysiology.

Ephys Link

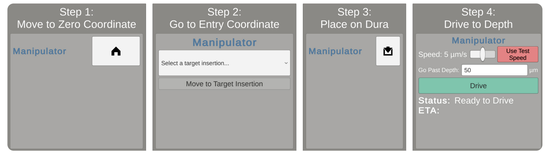
SocketIO Server
Platform agnostic communication system.

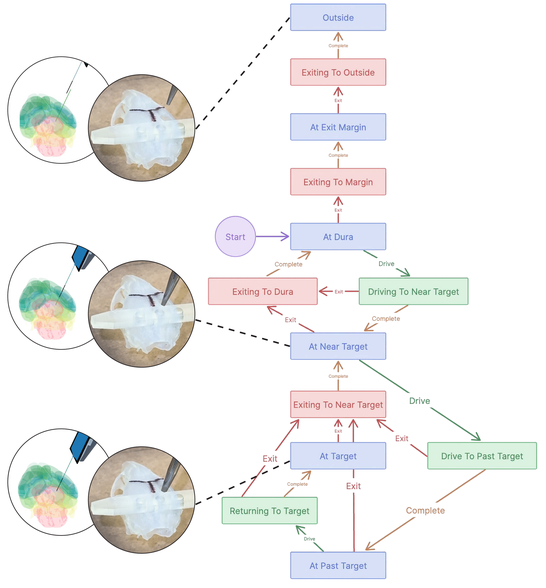
Unified Coordinate System
Consistent axis information across platforms.

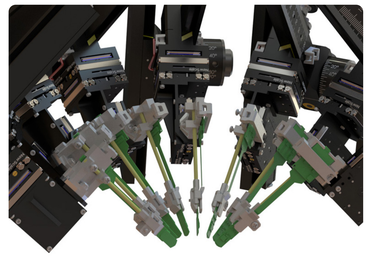
Safety Checks
Attach kill switches and prevent accidental motion.

Unified API
Single API to communicate with various manipulator platforms.

Pinpoint Copilot





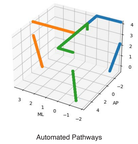


New Scale Linear Micro Stages

Sensapex uMp Micromanipulators

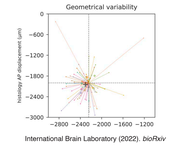
Why Automation

Efficiency
Speed up complex multi-probe insertions by running insertion in parallel.



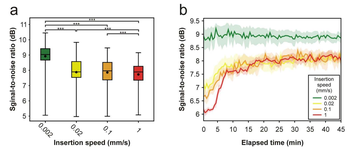
Automated Pathways

Reproducibility
Computers can re-run experiments with sub-micron precision.



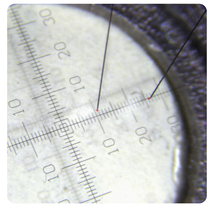
International Brain Laboratory (2022). *bioRxiv*

Enforce Best Practices
Maintain insertion speeds to achieve higher data yield.



Fiáth, R., Márton, A.L., Mátyás, F. *et al.* (2019) *Sci Rep*

Where we are going



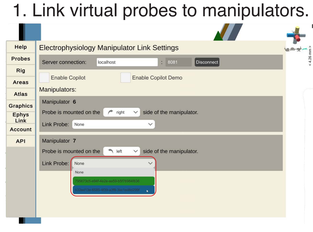
https://github.com/AllenNeuralDynamics/parallax

Automatic Calibration and Probe Tracking
Hands-free electrophysiology experiments via Parallax, a photogrammetry-assisted probe targeting software from the Allen Institute for Neural Dynamics.

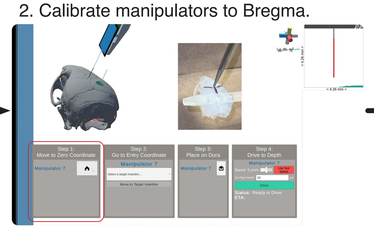
Outreach
We want to help you get Pinpoint and automation in your lab. We also want to support the manipulators you use. Scan the QR code to get in touch!

Run an Automated Experiment

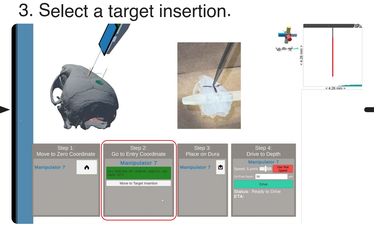
1. Link virtual probes to manipulators.



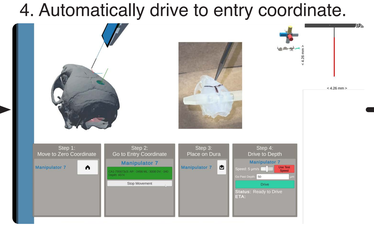
2. Calibrate manipulators to Bregma.



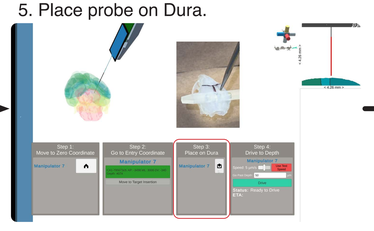
3. Select a target insertion.



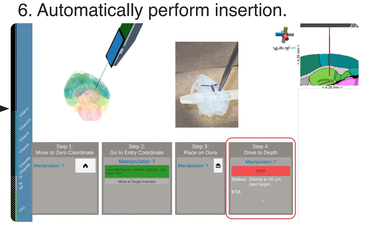
4. Automatically drive to entry coordinate.



5. Place probe on Dura.



6. Automatically perform insertion.



Pinpoint and Ephys Link are developed and maintained by KJY and DB. NS provided project support and guidance. Sensapex and New Scale provided manipulator support. Poster designed with support from D. Ahmed and S. Delehanty.

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The BRAIN Initiative

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