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An open-source automated surgical instrument for microendoscope implantation

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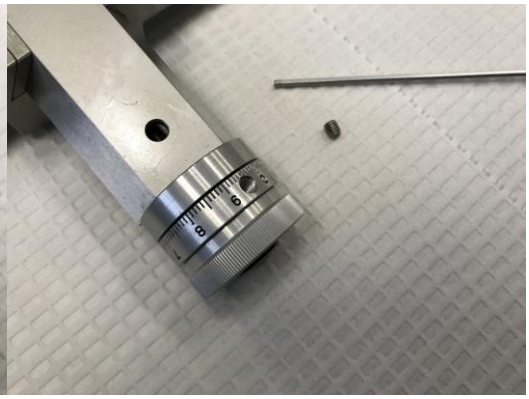
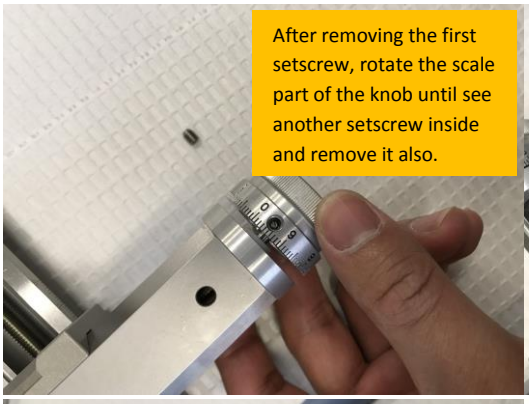
Part list

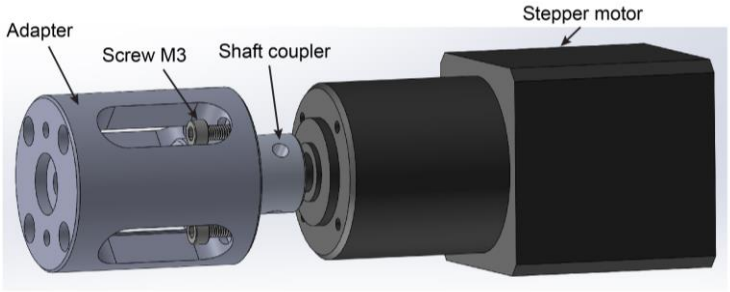
	Name	Company	Catalog number	Quantity	Link
1	Stepper motor	Phidgets	3326_0	3	42STH38 NEMA-17 bipolar stepper motors with 14:1 gearbox https://www.phidgets.com/?tier=3&catid=24&pcid=21&prodid=345
2	Stepper motor controller	Phidgets	1067_0	3	PhidgetStepper Bipolar HC https://www.phidgets.com/?tier=3&catid=23&pcid=20&prodid=1029
3	Motor-Stereotaxic Adapter	Custom design	N/A	3	The adapters were CNC-machined (Millitnow.com); The 3D models are also included here. (Solidworks and STEP files) https://github.com/liang-bo/AutoStereota
4	Shaft coupler	AliExpress	N/A	3	5*8mm Motor shaft Rigid Steel coupling https://www.aliexpress.com/item/5-8mm-Motor-shaft-Rigid-Steel-coupling-8mm-A-Diameter-5mm-B-Diameter-16mm-OD-22m/1566611975.html or ones with similar specs
5	M3 x 8mm Socket Head Screws	Thorlabs or McMaster-Carr	N/A	12	https://www.mcmaster.com/standard-socket-head-screws https://www.thorlabs.com/thorproduct.cfm?partnumber=HW-KIT5/M or ones with similar specs
6	Software	Developed in MATLAB (Mathworks, MA) environment.	N/A	N/A	https://github.com/liang-bo/AutoStereota
7	Small animal stereotaxic instrument	Kopf	Model 963	1	Ultra-Precise Micro Manipulator Model 961 / 10 micron resolution, all axes, including
8	Mini-USB Cable 60cm 24AWG	Phidgets	3036_0	4	https://www.phidgets.com/?tier=3&catid=28&pcid=24&prodid=186 or ones with similar specs
9	PhidgetInterfaceKit 8/8/8 w/6 Port Hub	Phidgets	1019_1B	1	https://www.phidgets.com/?tier=3&catid=96&pcid=76&prodid=1035 or ones with similar specs
10	Power adapter	Phidgets	3024_1	1	https://www.phidgets.com/?tier=3&catid=61&pcid=54&prodid=175 or ones with similar specs

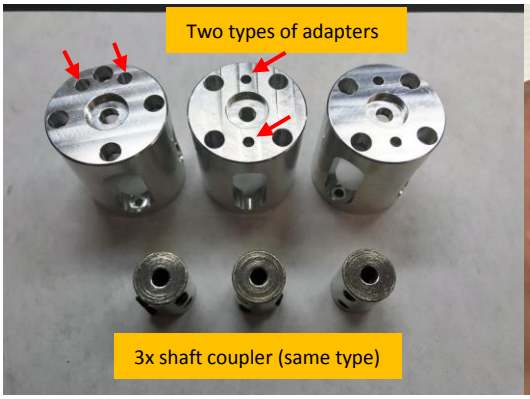
STEP #1. Disassemble the knobs of manipulators

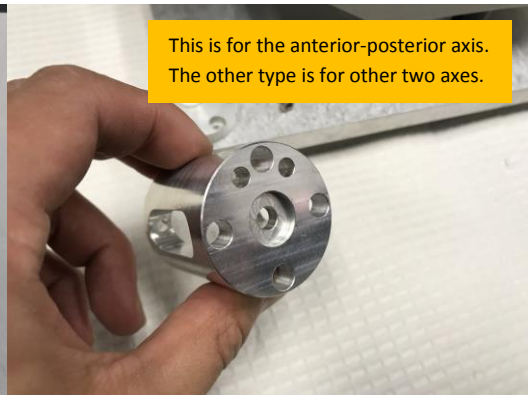


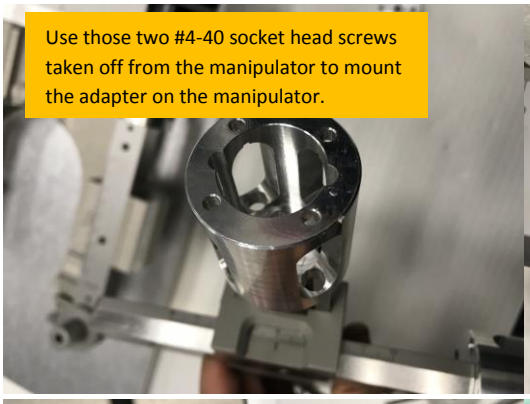


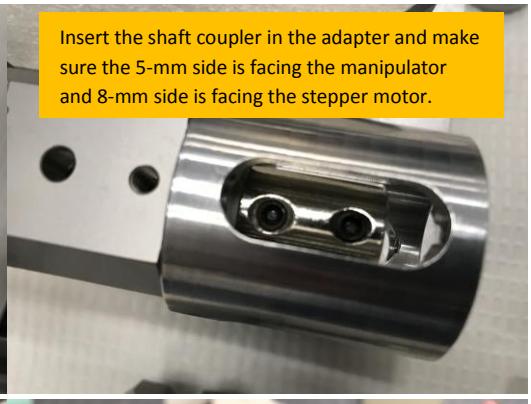
STEP #2. Mount the stepper motors

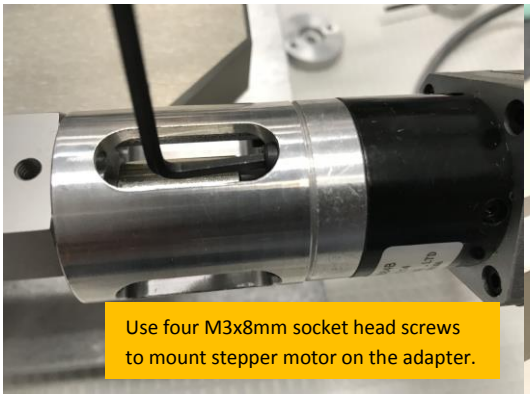




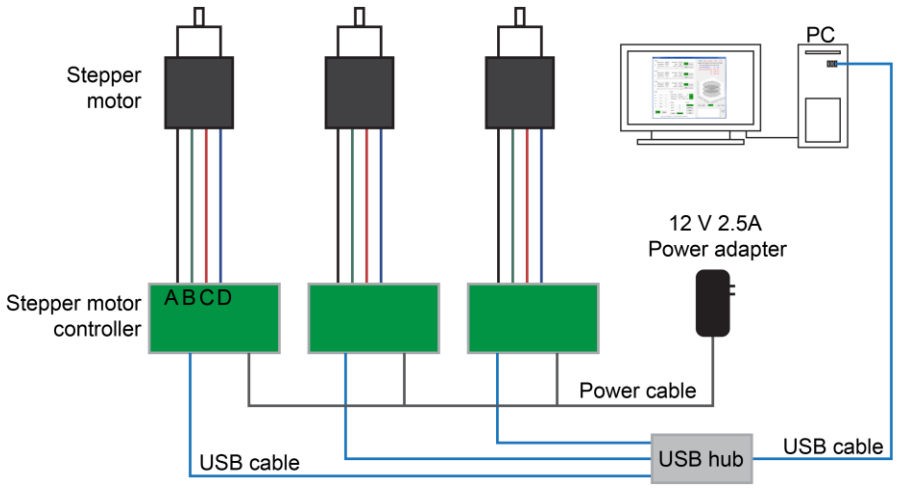


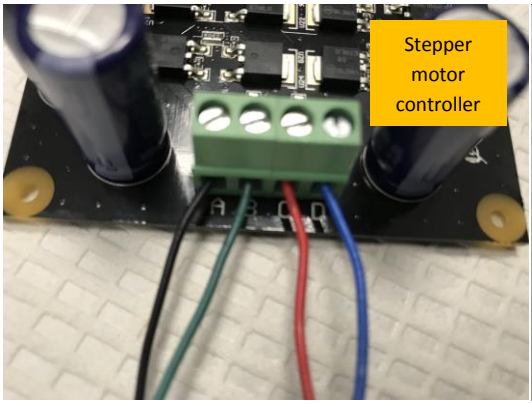


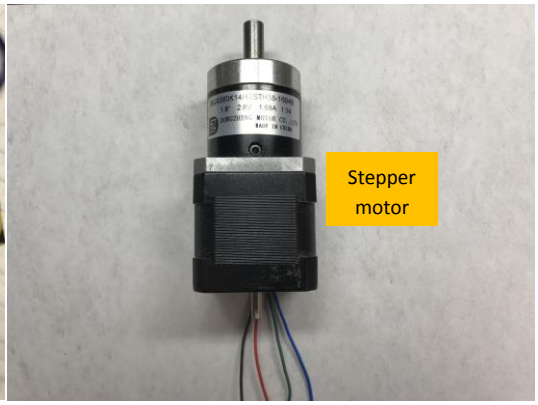


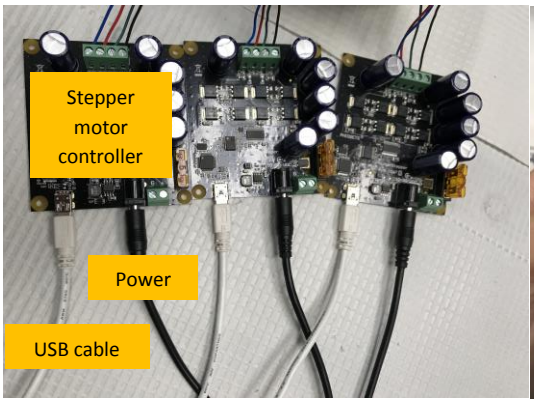


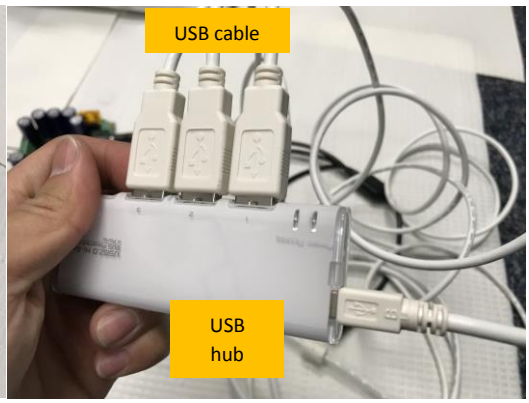
STEP #3. Wiring diagram

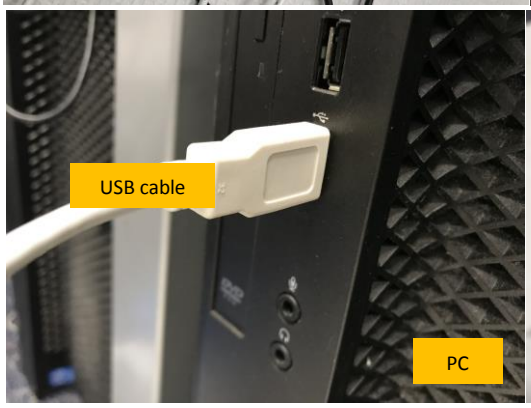












STEP #4. Software installation and configuration

1. Install Phidget drivers: click Phidget-x64_2.1.8.20150109.exe
https://www.phidgets.com/downloads/phidget21/libraries/windows/Phidget-x64/

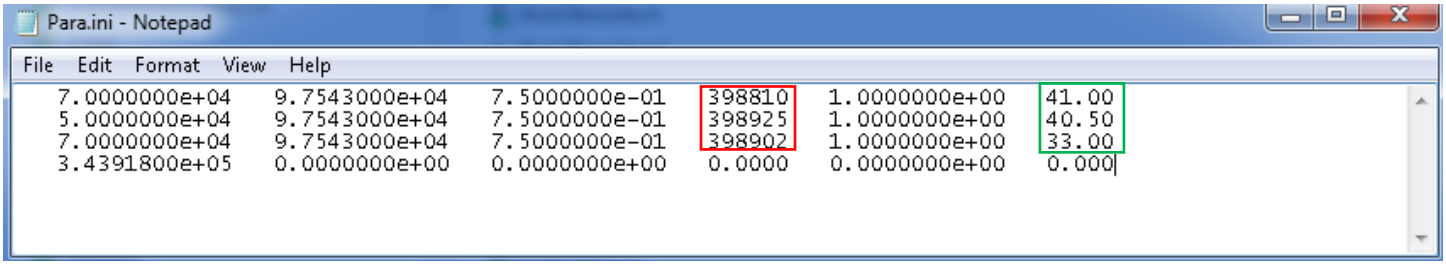
2. Install Matlab Compiler Runtime V8.4 for Windows 64 bit OS: Click MCR_R2014b_win64_installer.exe
https://www.mathworks.com/products/compiler/matlab-runtime.html

3. Install AutoStereota: Click AutoStereotaInstaller_MCR.exe
https://github.com/liang-bo/AutoStereota/Installer/

4. Warning: DO NOT CHANGE THE DEFAULT PATH!!! AutoStereota MUST BE INSTALLED IN C:\Program Files\AutoStereota\

5. Calibration:

   1) Open C:\Program Files\AutoStereota\application\Para.ini
   2) Change the values as indicated by the red box. These are the serial numbers of the three stepper motor controllers. You can find them on the PCB board corresponding to each axis. (See below figures). Row#1: lateral-medial axis; Row#2: dorsal-ventral axis; Row#3: anterior-posterior axis;
   3) Change the values as indicated by the green box. These are the readout values from the manipulators.



6. Finally you can launch AutoStereota! (Connect to the power first!)