Intrinsic Optical Signal Imaging Hardware Instruction Manual

BMEG CAPSTONE 2024-2025

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**List of equipment**

| **# ID** | **Equipment name** | **# of Items Vendor Cat. No. / Comments** |
| --- | --- | --- |
| **1** | Primary Computer (Monitor) | 1 |
| **2** | Secondary Computer  (Laptop) | 1 |
| **3** | CMOS camera | 1 ThorLabs CS165MU SN: 22632 |
| **4** | Arduino Uno Rev3 | 1 Arduino Bar: 7630049200487 |
| **5** | Emission filter  (525-nm bandpass filter) | 1 Edmund Optics 87-801 |
| **6** | Emission filter  (700-nm bandpass filter) | 1 Edmund Optics 88-018 |
| **7** | Lens 1 | 1 Nikon Nikkor 85 mm f/2 AIS manual focus lens |
| **8** | Lens 2 | 1 Nikon |
| **9** | Camera mount | 1 ThorLabs |
| **10** | Macro Focusing Rail | 1 NiSi Model #: NM-180S |
| **11** | Polymer Sheet | 3 |
| **12** | Base Breadboard | 1 ThorLabs |
| **13** | Neopixel Ring 24 x 5050 RBG LED with Integrated Driver | 1 Adafruit 1586 |
| **14** | T-Rail | 1 McMaster |
| **15** | L bracket mini | 1 McMaster |
| **16** | L bracket support | 3 McMaster |
| **17** | Adjustable Rigid Stand | 1 ThorLabs MP100-MLSH |
| **18** | Bolts |  |
| **19** | XY translation stage | 1 |
| **20** | Ear Bar+Mount | 2 |

**Equipment Setup**

1. Bolt L bracket supports on three sides of T-rail using \_\_\_\_
2. Cut polymer sheet in rectangle to fit exact width and length of L brackets, drill holes in location of Lbracket support holes and bolt middle L bracket to breadboard and other two to the polymer sheet using \_\_\_\_\_\_
3. Drill another hole in polymer sheet to line up with breadboard hole to anchor disallowing pivoting and bolt using \_\_\_\_\_
4. Cut polymer sheet to fit Macrofocusing rail and T-rail by side then drill two holes in line with T rail and bolt in using \_\_\_\_
5. Drill holes lining up with Macrofocusing rail in polymer sheet and bolt in ensuring large knob on top using \_\_\_\_
6. Bolt L bracket mini into Macrofocusing rail adjustable plate using \_\_\_\_
7. Cut polymer sheet to fit Camera mount with equal length of 3” on both sides of L bracket mini and bolt to L bracket mini using \_\_\_\_
8. Drill six holes at end of polymer sheet that line up with camera mount holes and bolt camera mount on top of polymer sheet using \_\_\_\_\_\
9. Attach both Nikon lenses in unison to the camera mount facing down towards the breadboard.
10. Attach both emission filters to the bottom of lenses.
11. Bolt adjustable rigid stand to breadboard directly next to T-rail using \_\_\_
12. Bolt XY translation stage to adjustable rigid stand using \_\_\_\_
13. Screw in Ear bars and mount onto the XY translation stage.
14. Tape anesthesia tubing directly in front of ear bars and then underneath adjustable rigid stand.
15. Hot glue arduino onto top of camera mount and plug wires into computer.
16. Solder wires into the neopixel light ring and hot glue to the 3D printed ring stand.
17. Attach the 3D printed ring stand to bandpass filters.
18. Connect neopixel light ring wires to arduino and connect arduino to computer running main code.
19. Cut \_\_\_\_ and bolt to xy translation stage in between ear bars using \_\_\_
20. Position monitor roughly 18 in from mouse.
21. Connect monitor to computer running stimulus code.
22. Connect anesthesia tubing to an isoflurane device.
23. Screw thorlabs camera onto top of camera mount and connect to computer running main code.
24. Bolt feet into the base of the breadboard for stability using \_\_\_\_.

**Running Trial**

1. Wipe down the entire setup with alcohol or disinfectant wipe.
2. Move the entire setup to the anti-vibration table or chamber.
3. Ensure setup is level and positioned at the correct distance from the monitor being used.
4. Connect the monitor to the computer running stimulus code.
5. Attach anesthesia tubing to corresponding input and output of isoflurane setup.
6. Adjust ear bars to fit the mouse in and hold in desired position.
7. Move the nose cone onto the mouse nose.
8. Adjust location of mouse using xy translation stage.
9. Adjust angle and distance of camera using macro focusing rail.
10. Connect arduino wiring to computer and establish connection.
11. Switch to specific trial instructions.