

Single Arm HomeCage Assembly Instruction

Prerequisites:

1. Obtain all the latest version parts listed below:

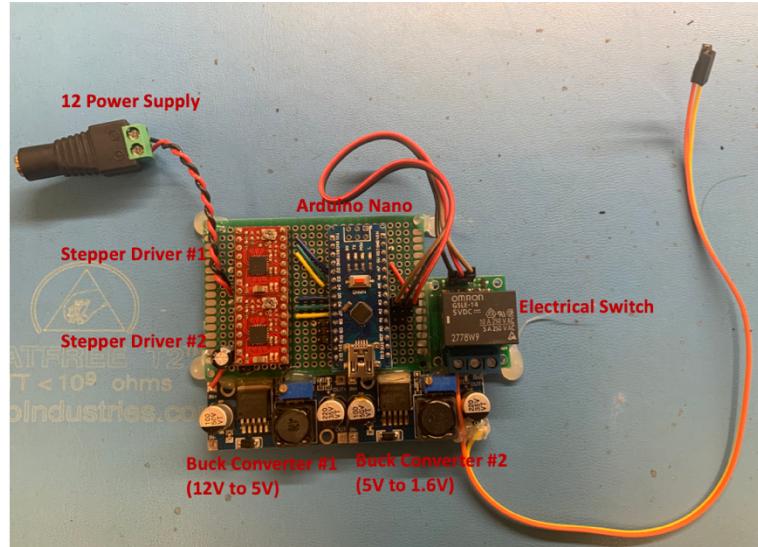
Base	x 2
Beam_breaker_mount	x 1
Cover_single	x 1
Handhopper	x 1
Leftarm_Ishape	x 1
LightHolder	x 1
Mirrorholder	x 1
Motorconnect	x 2
Tubeholder	x 1
FrontWall	x 1

2. All the 3D printing files (.x3g) in [SilasiLabGdrive/Wang's Design/MouseCage ThirdGeneration/3D PRINTER FILES](#)

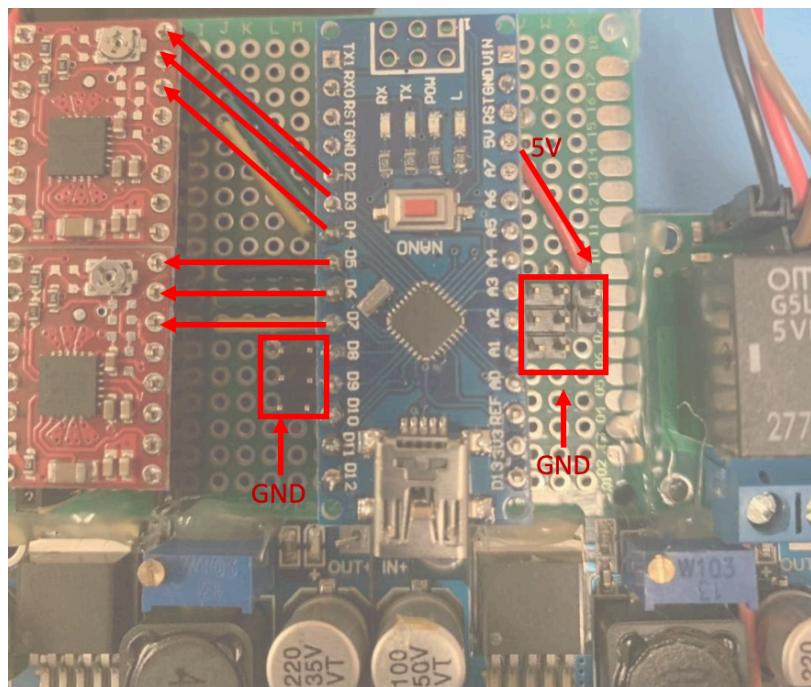
3. Obtain all parts listed below:

Arduino Nano	x 1
Stepper Motor Driver	x 2
Buck Converter	x 2
Electrical Switch	x 1
Female Power supply connection	x 1
Capacitor (Around 33 uf)	x 1
Stepper Motor	x 2
Servo Motor	x 1
Connect Limit Switch	x 2
3W IR Light	x 2
RFID Reader	x 1
Moving Stage	x 2
Beam Breaker	x 1
Mirror	x 1
Square Hollow Tube	x 1
Camera	x 1
12V Power Supply	x 1
Arduino Cable	x 2
5 x 7 cm PCB Board	x 1

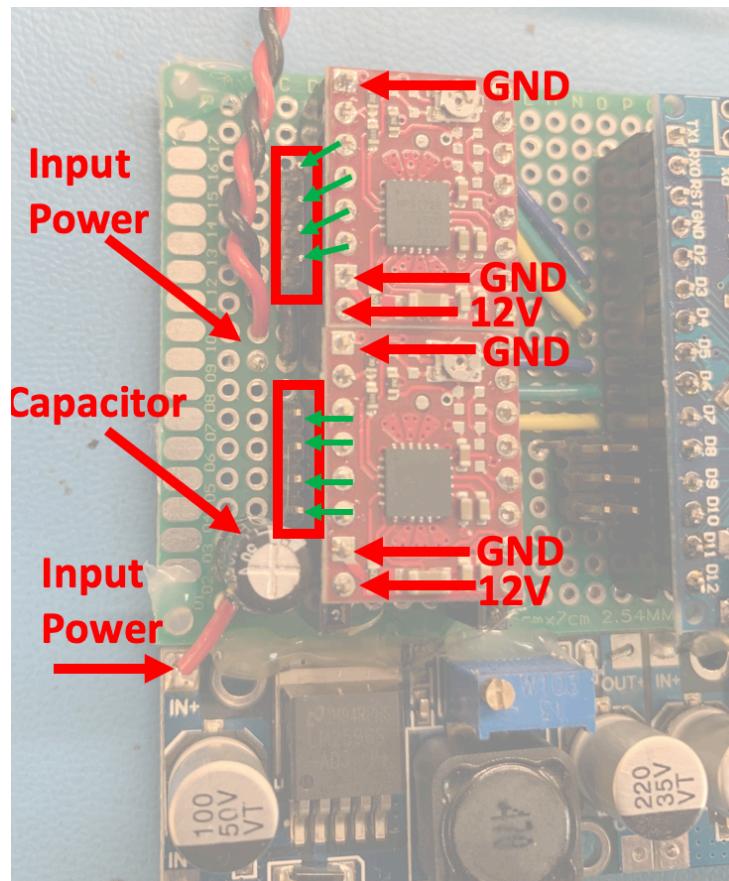
Soldering Components on a PCB Board:



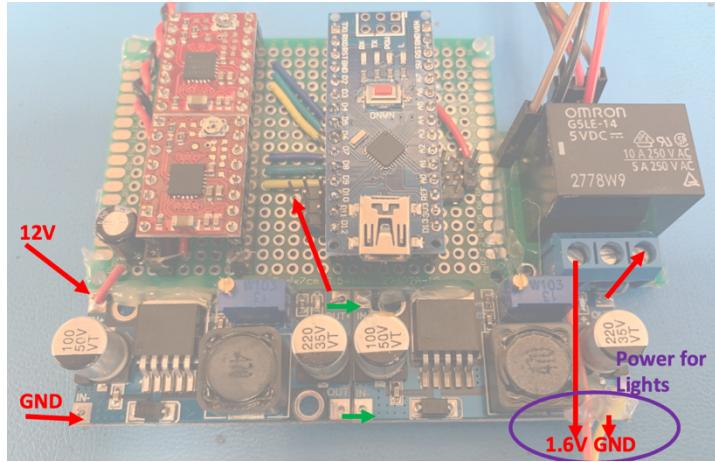
1. Soldering Arduino and stepper motor drivers as the figure above shows, leave 3 lines space at left and right of the circuit board. (do NOT breath in the solder)
2. Adjust the screw on the buck converter to let the output voltage to be 5V (for servo motor).
3. Adjust the second buck converter to let the output voltage to be 1.6V to 1.8V (for IR light).



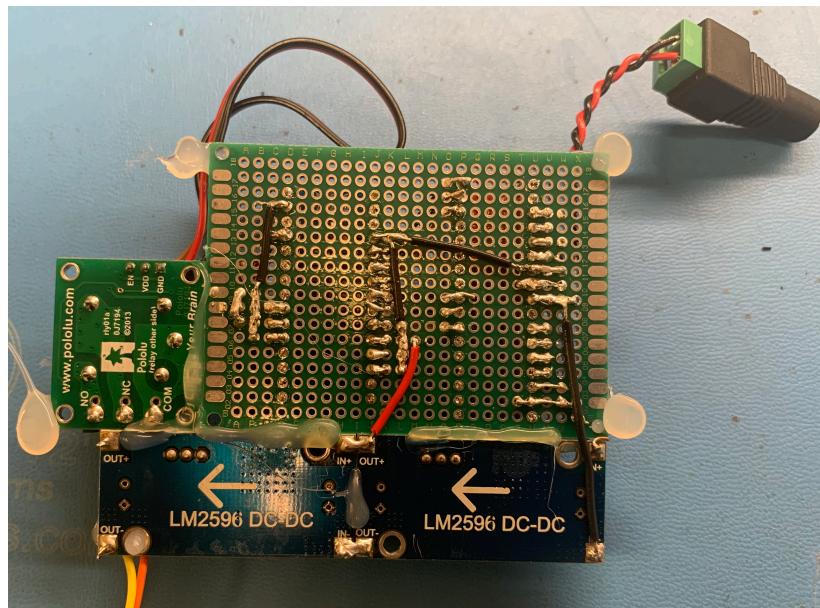
4. Soldering male headers as shows in red boxes above near D8, D9, D10, A1, A2, A3.
5. Connect the stepper driver pins and Arduino together as the red arrow shows above. (D2, D3, D4 for bottom stepper motor, and D5, D6, D7 for upper stepper motor)
6. As the graph above shows, connect all the left column pins in the left red box to the GND pin on the Arduino.
7. Connect all the left column pins in the right red box to the GND pin on the Arduino. Connect all the middle column pins in the right red box to the GND pin on the Arduino. Connect all the right column pins in the right red box to the 5V pin on the Arduino.



8. Connect the input power to stepper driver as the figure above shows, make these two stepper drivers and the buck convertor #1 to be parallel.
9. Soldering a 33uF capacitor parallel to the power supply.
10. Soldering 4 pins for each stepper driver as the figure above shows in red boxes and connect them to stepper drivers.

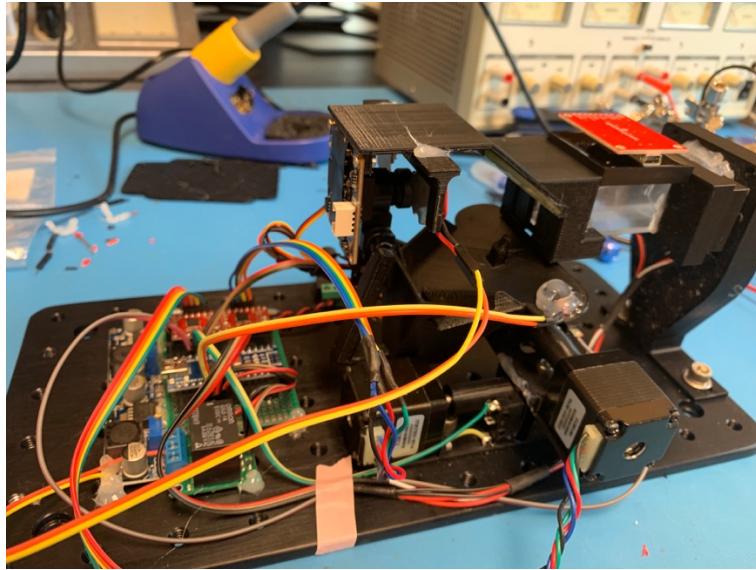


11. Connect the positive output of buck converter #1 to a pin near the Arduino pin D8 as the middle red arrow at the figure above shows and connect it to the input of the buck converter #2.
12. Connect the negative output of buck converter #1 to positive input of the buck converter #2.
13. Connect the positive output of buck converter #2 to the right pin on the electrical switch and put a jump wire from the left pin on the electrical switch.
14. Connect a jump wire at the negative output of buck converter #2. (Used to power the IR Light)



15. Connect stepper driver GND to Arduino GND.
Check to make sure all grounds are connected.

Assemble 3D Printed parts



Assemble all the 3D printed parts like the figure above shows.

Tips:

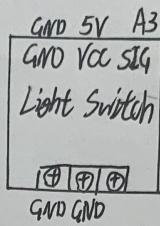
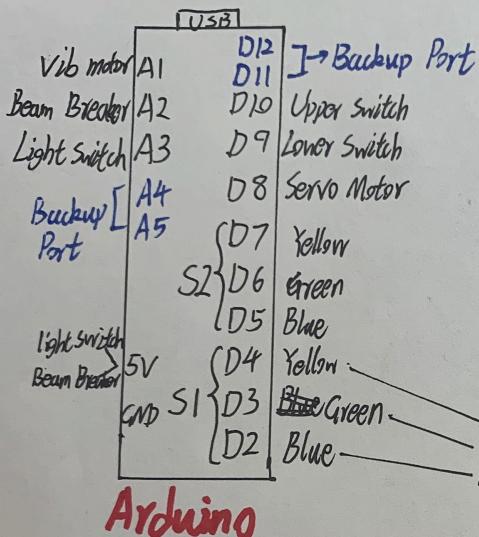
- Mount the lights on the light holder and soldering them in parallel after.
- Turn the moving stage to find the limit of the starting position and then use super glue to glue the contact limit switch on.
- Use hot glue to fix all the lose connection parts.
- Make sure the arm tip is at the middle of the front wall when the upper moving stage moves to middle. (test this with code)
- The stepper motor couplers rely on friction, so don't turn the stepper motor when the moving stage already reaches the limit.
- Make sure the front surface is outside when you glue the mirror.
- Change the camera focus by turning it clockwise.
- Make sure the camera cable is at the right side when you mount the camera on the mirror holder.
- Use only one screw for mounting the stepper motor to the base.

Connect Components on the PCB Board:

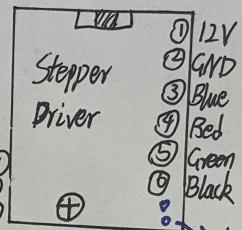
Simple and easy.

- Connect all the component to it's right pin.
- Distinguish signal pins, GND pins, 5v pins
- The beam breaker and the electrical switch use the 5v power from the Arduino, and the servo motor use the 5v power from buck converter #1.

Check the figure below for other details.

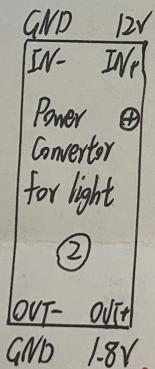
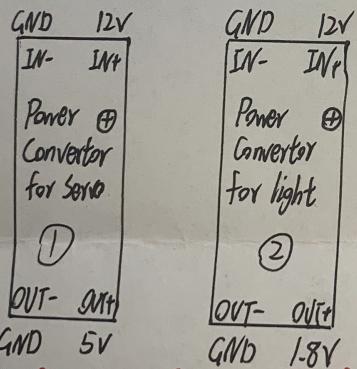


**Electrical
Switch**



**Stepper
Driver**

→ also GND



**Buck Convertor
#1**

**Buck Convertor
#2**