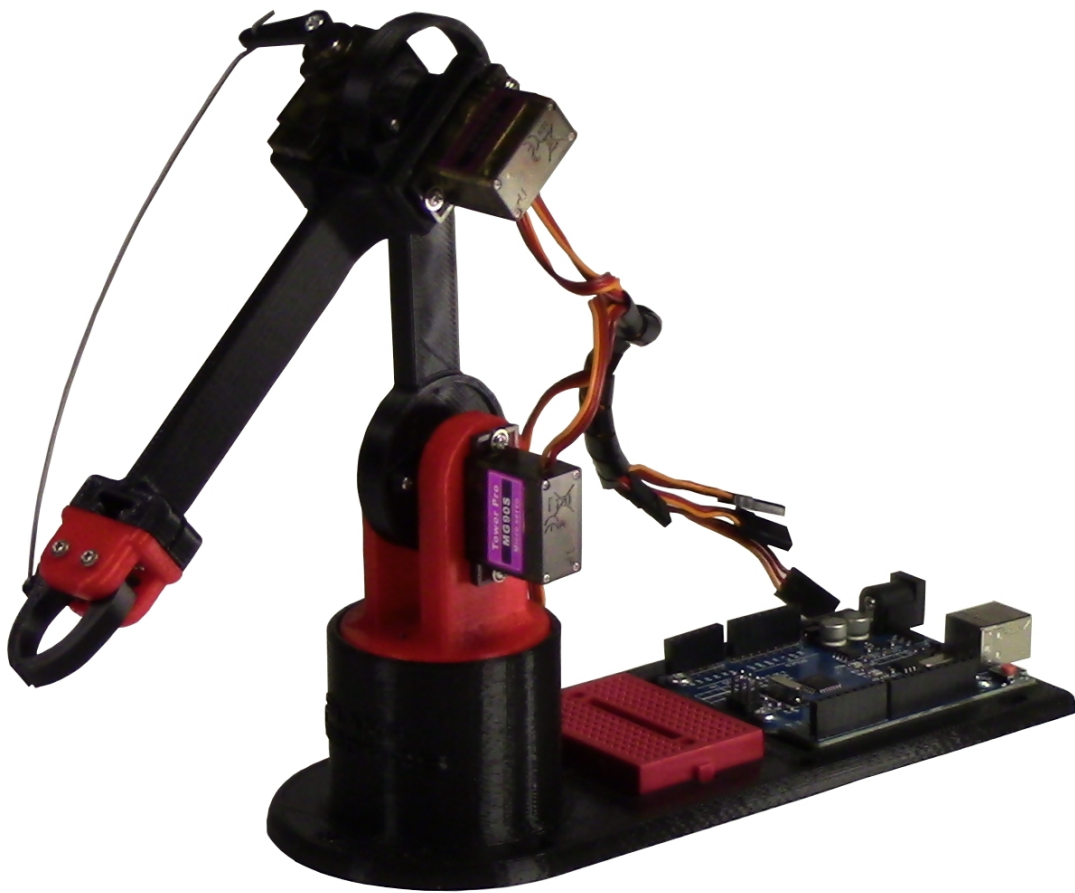


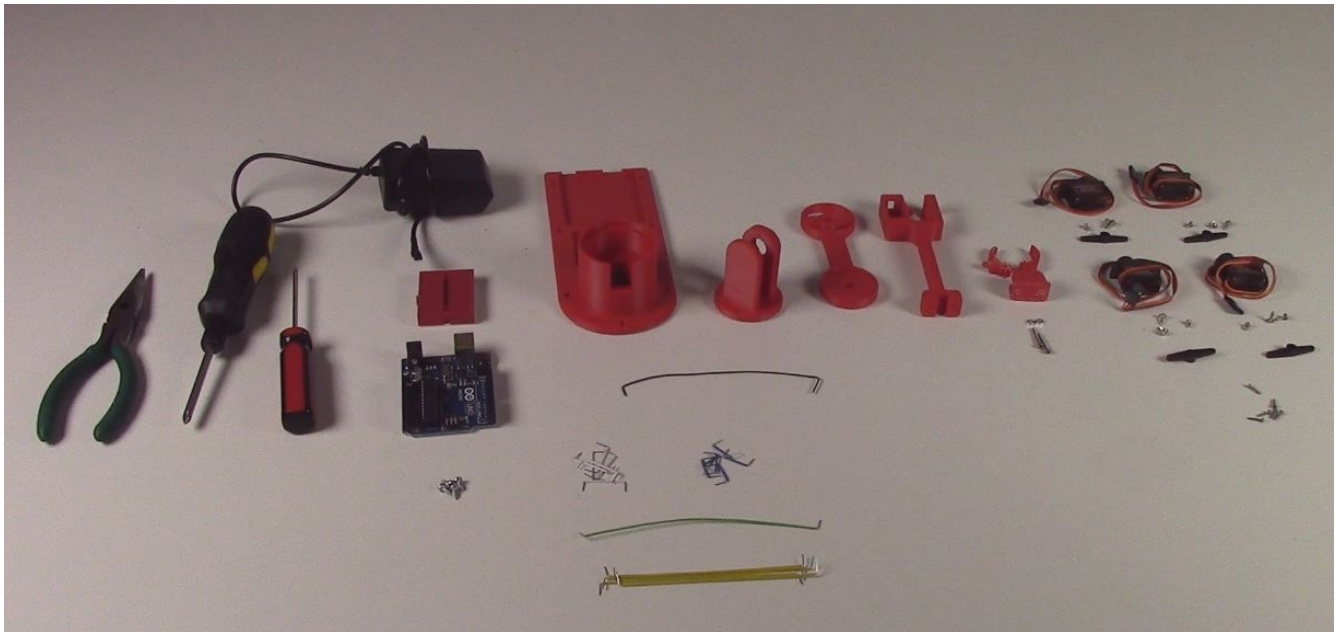
Assembling the Original LittleArm

Version 0.9 of Instructions (Updated 1/17/2017)



Contained in Each Kit

- 4x – MG90S Servos
- 1x - Arduino Uno
- 1x power supply
- 1x mini breadboard
- 10x - 5/16 Screws for Servo Horns
- 4x – Arduino mount screws
- 6x – flanged servo mount screws
- 1x base piece
- 1x shoulder piece
- 1x upper arm
- 1x forearm
- 1x – gripper palm
- 1x – right gripper finger
- 1x – left gripper finger
- 15x – jumper wires
- 2x $\frac{3}{4}$ gripper screws
- 2x gripper screw nuts



Tools needed

- Needle-nosed Pliers
- Standard size Philips head screwdriver
- Fine tipped Philips head screwdriver

A Video Tutorial of assembly can be found at this link.

<https://www.youtube.com/watch?v=vQcxS8zM150>

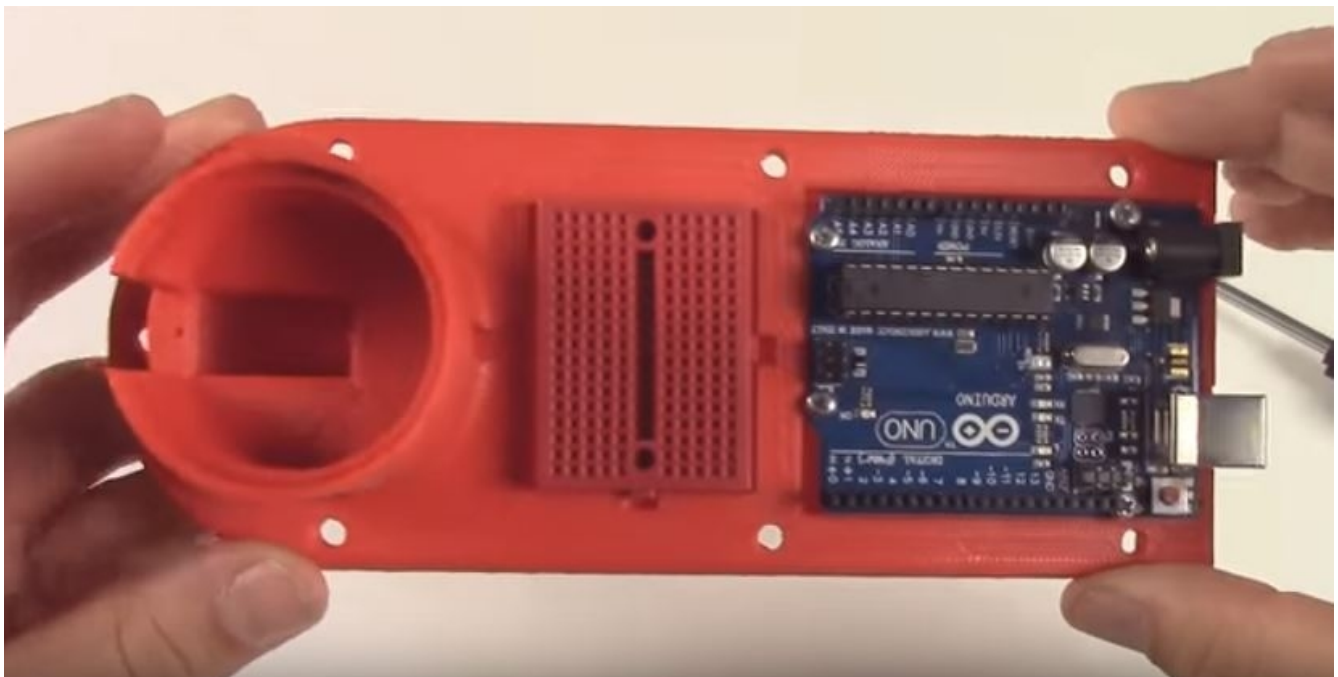
Install Software

1. Go to the Downloads page of the LittleArm Website - <http://littlearm.weebly.com/downloads.html>
2. Download the most recent software package (If using Linux you may download just the python and arduino package).
3. Uncompress the folder.
4. Click on the .exe file to start GUI. (Note: GUI will only start when an arduino is connected to the computer.)
5. You may create a shortcut to the .exe for simpler access in future.

Note: Some antivirus software will block the LittleArm Software. The Antivirus should have an option to "Allow" running of the software in order to activate the GUI.

Assemble Base

1. Remove adhesive from breadboard and place into matching depression in Base.
2. Place arduino, with USB port facing backwards, into matching depression in base
3. Use the short Arduino mounting screws to secure arduino.
4. Insert servo into matching depression in Base so that hub is in the center.
5. Secure the servo using 2 flanged servo mounting screws.



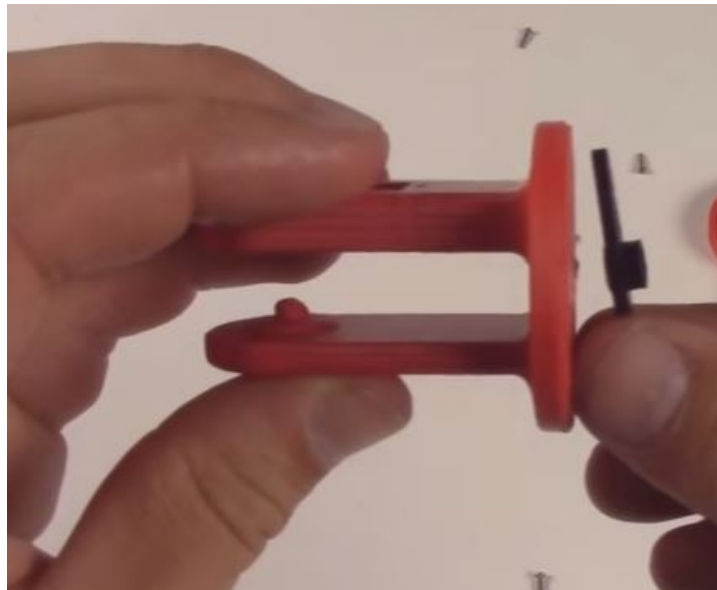
Prepare the Arm to Attach Servos.

Shoulder

1. Retrieve the shoulder piece.
2. Select one of the double arm horns.
3. Pre-start 2 of the 5/16 screws into the horns. The screws should be placed into the second hole from the outside of the horn.



4. Align the horn with the holes at the base of the shoulder. Ensure that the toothed hub of the horn is pointing down so that it can attach to the servo in the base.
5. Screw the horn to the shoulder firmly.



Upper Arm

1. Prestart 2 double arm servo horns with 5/16 screws.
2. Align the horns with the holes on both ends of the upper arm. Ensure that the toothed hubs of the horns are directed outward from the arm.
3. Secure the horns firmly to the upper arm.



Gripper

1. Prestart 2 5/16 screws into the palm of the gripper.
2. Align the palm with the holes at the end of the forearm.
3. Secure the palm firmly.



4. Insert the tabbed right pincher of the gripper to the right side of the palm using a $\frac{3}{4}$ inch screw and nut. (Note: Nut is not necessary for the gripper to function properly)
5. Insert the left pincher into the left side of the palm so that it appears symmetric with the right pincher, allowing the gripper to operate normally.
6. Do not tighten the screw greatly. That will impede the movement of the gripper.
7. If you would like to secure the nut better apply a small amount of glue or solder.



Install Servos

All of the servos are simple to install. The parts focus where they have to go. But there are some considerations.

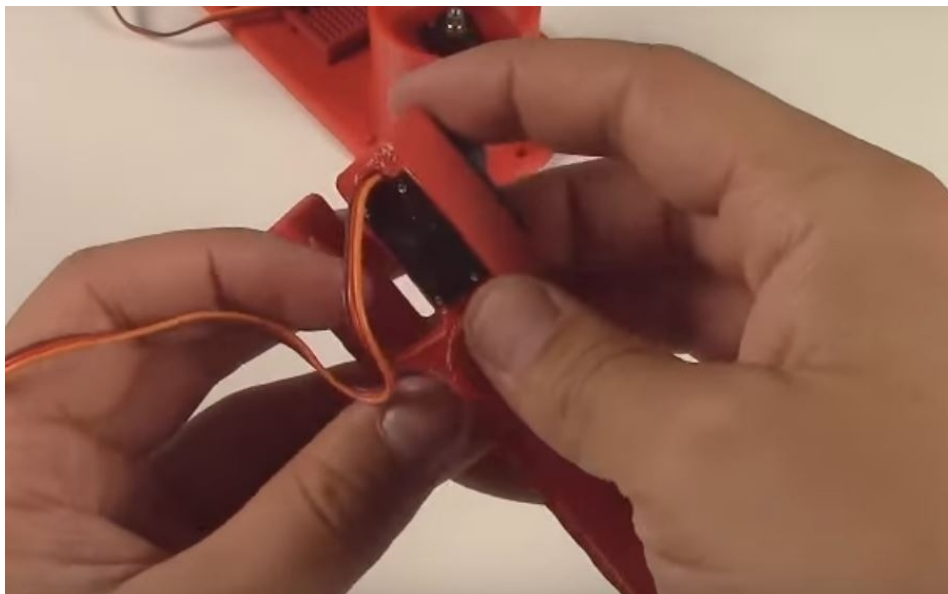
Considerations on servo installs:

1. Be gently when spreading parts to place servo into horn and attach upperarm, forearm, shoulder.
2. Mind the wire so that you do not shear it off when pressing it into the slot.
3. All servos (except the gripper servo) require two mounting screws.

ForeArm Servo

The servo for the gripper in the forearm is likely the most confusing to place. Follow the photos below for visual aid.

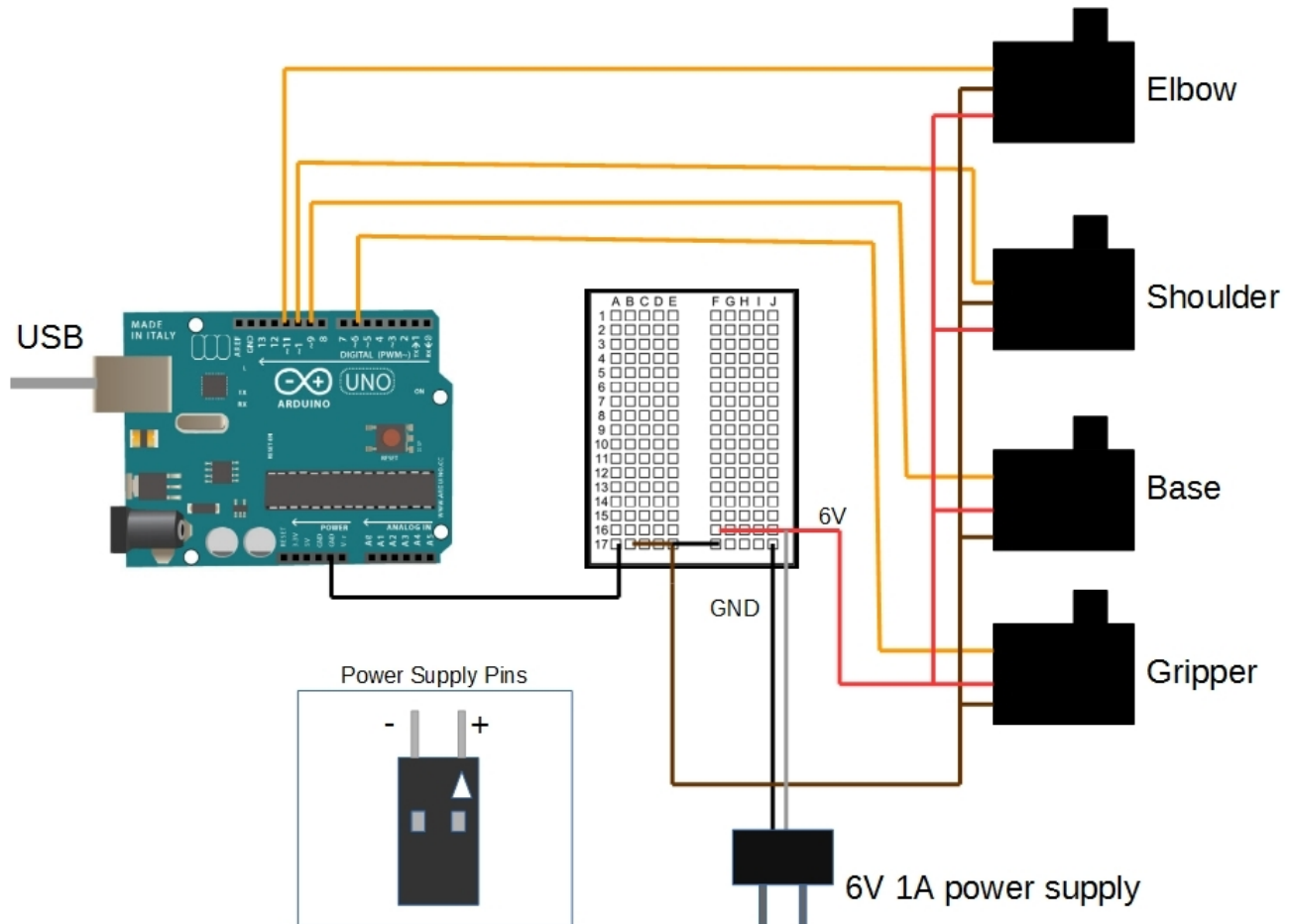
Note: The Servo for the gripper does not require mounting screws.





Wiring

Assemble the electronics by following the diagram below.



Calibrate and Install Servos

1. Activate the software with the Servos powered.
2. Position each servo based on **Table 1**.
3. Deactivate power.
4. Attach arm components based on Table 1 and accompanying photos (Note: It is alright to move servos while unpowered in order to assemble arm.)
5. Use the needle-nosed pliers to attach the actuation wire to the gripper.
6. Secure the horn attached to the shoulder to the base servo with one of the horn screws. (Note: The only other horn that has to be screwed to a servo is the gripper. The shoulder and the elbow are secured by the structure of the arm.)

Servo	GUI Position	Arm Postion
Base	center	center
Shoulder	left	down
Elbow	right	down
Gripper	0 open	open

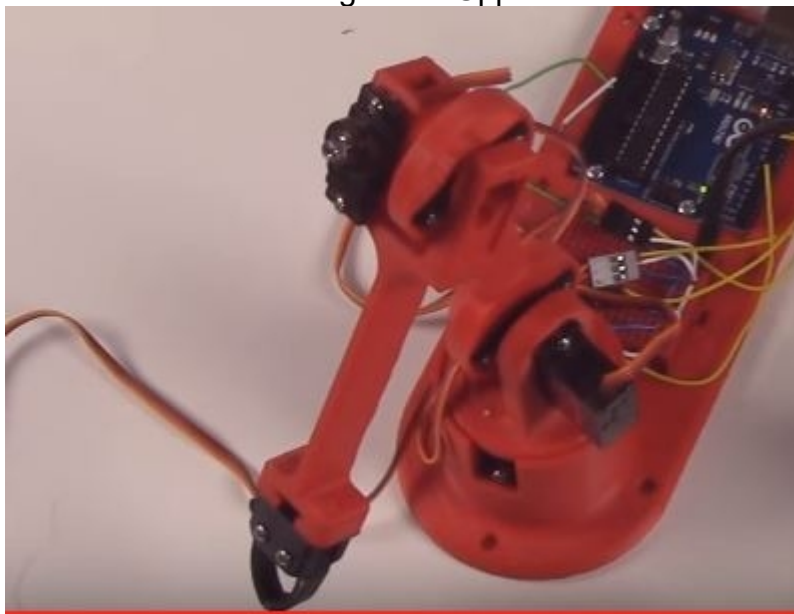
Table 1



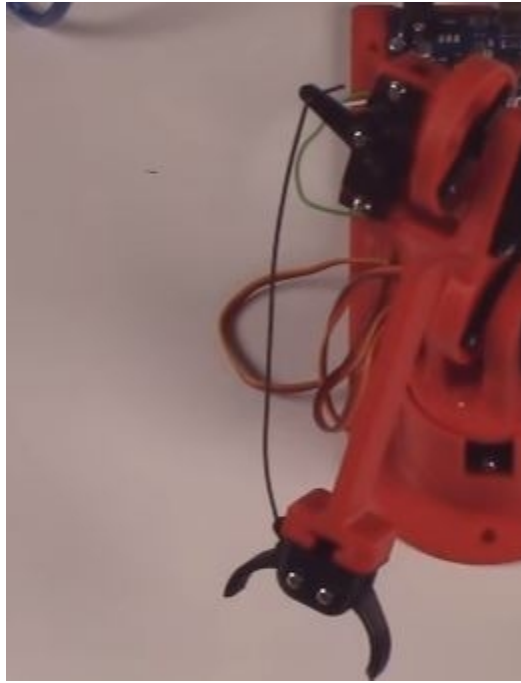
GUI Positions



Positioning of the Upper Arm



Positioning of the Elbow



Positioning of the Gripper

Enjoy Your LittleArm

