**Design/Purpose**

Building a small robotic arm to be used as a desk decoration as well as having the functionality of cleaning up items on the desk. Design should be open to accommodate for future adaptations/improvements.

**Requirements**

SYS 1.0 Device must be able to reach any object within 10 inches from the edge of the base in any direction.

SYS 2.0 Device must be able to lift and move objects up to 1lb in weight when fully extended.

SYS 3.0 Device must have five degrees of freedom.

SYS 4.0 Device must be able to detect desk objects and move them to their labeled location.

SYS 5.0 Device base must not have a diameter larger than six inches.

**Important Notes**

* Make sure to account for friction coefficient when determining the grip force of the claw.
* Attachments for the end of the arm should be able to be switched out relatively easy.

**Design Ideas:**

* Arm, shoulder, and wrist joints, will be spur gears with timing belts. Gears will be printed but timing belt bearings and any bolts/nuts needed will be purchased.
* Rectangular Base. Shoulder yaw will be done with spur gear and timing belt.
* Linkage based gripper (through linear actuator)
* Upper Arm Length 4-5 Inches
* Forearm length 6-7 inches
* Wrist + Gripper is 2-3 inches
* Raspberry Pi 3
* Separate Power Supply for Raspberry pi and motor drivers
* The roll motor is physically mounted inside the wrist, but it rotates the entire “hand” around its axis.
* Need to find separate motor drivers for all the motors and actuator.
* Need to find a 12 volt power supply that can handle all the motors and actuators 10 amps.
* Pick the same 4 drivers for all the motors to simplify things

**Calculations:**

* Required gripping force for claw 33Ncm
* Required wrist roll force .0154Ncm

**Timeline:**

* By 05/17 linkage sizes should be determined. Linkages for joints should be decided on. Controllers for robotic arm should be researched and determined.
* By 05/24 calculations should be done to find the torques required from the motors and what size gears. I should start to pick out parts. Make sure I have secured a SolidWorks license by then.
* By 05/31 parts motors and motor controllers should be decided upon. Should start to model the design of the arm.

**Tools/Software**

Solidworks, RoboDK,

**Resources:**

1. **Full Robotic Arm build (Inspiration)**

[**6-axis Robotic Arm - YouTube**](https://www.youtube.com/playlist?list=PLh-o7Bm9fcVy2MhcVkaGOmANr8j7dZ78-)

1. **Claw Design Idea**

<https://youtu.be/IalkWUN6wvE?si=rgnxBbWt3f68EyXA>



**Scorpion Robotics Initiative or S.R.I-01**