

FINAL PROJECT

LAB 1 GROUP 3

RBE 2001

ALFREDO J., BRYCE MARTIS, NATE R.

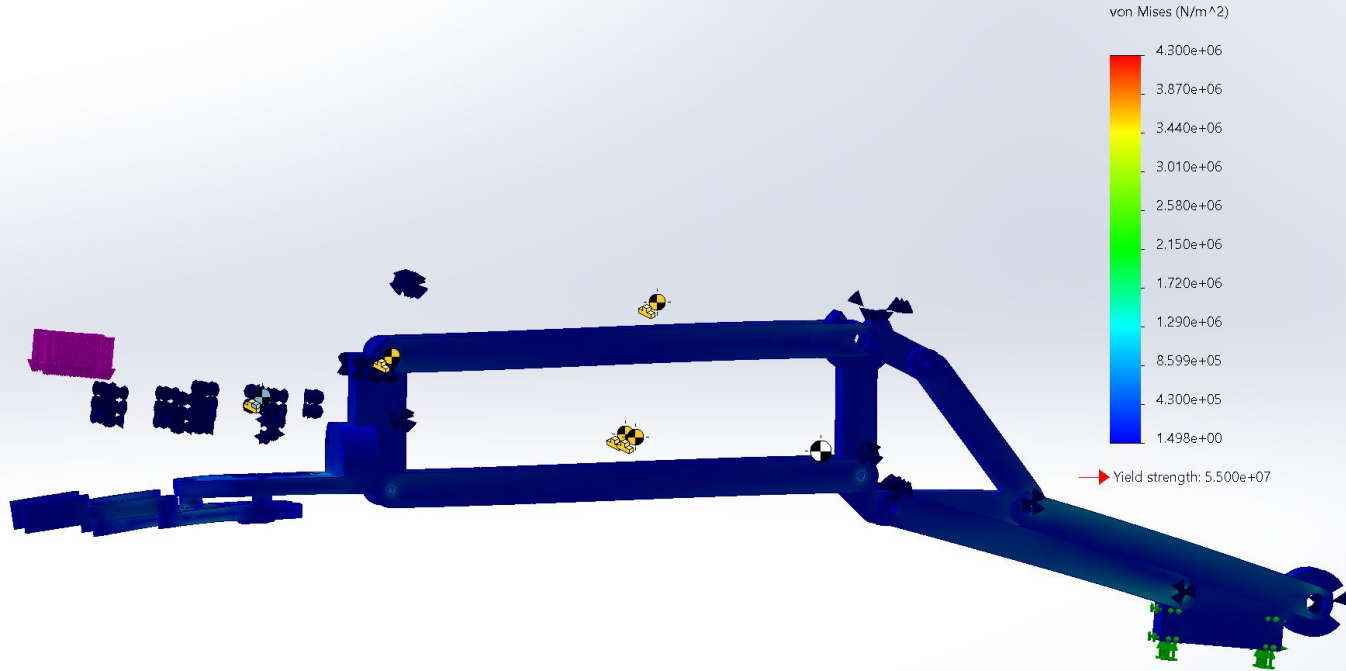
Different heights

Our robot reaches different heights using a robotic arm that uses two independent four bar mechanisms.

Able to grab the boxes with a geared claw that uses two smaller four bar mechanisms for each finger of the claw.

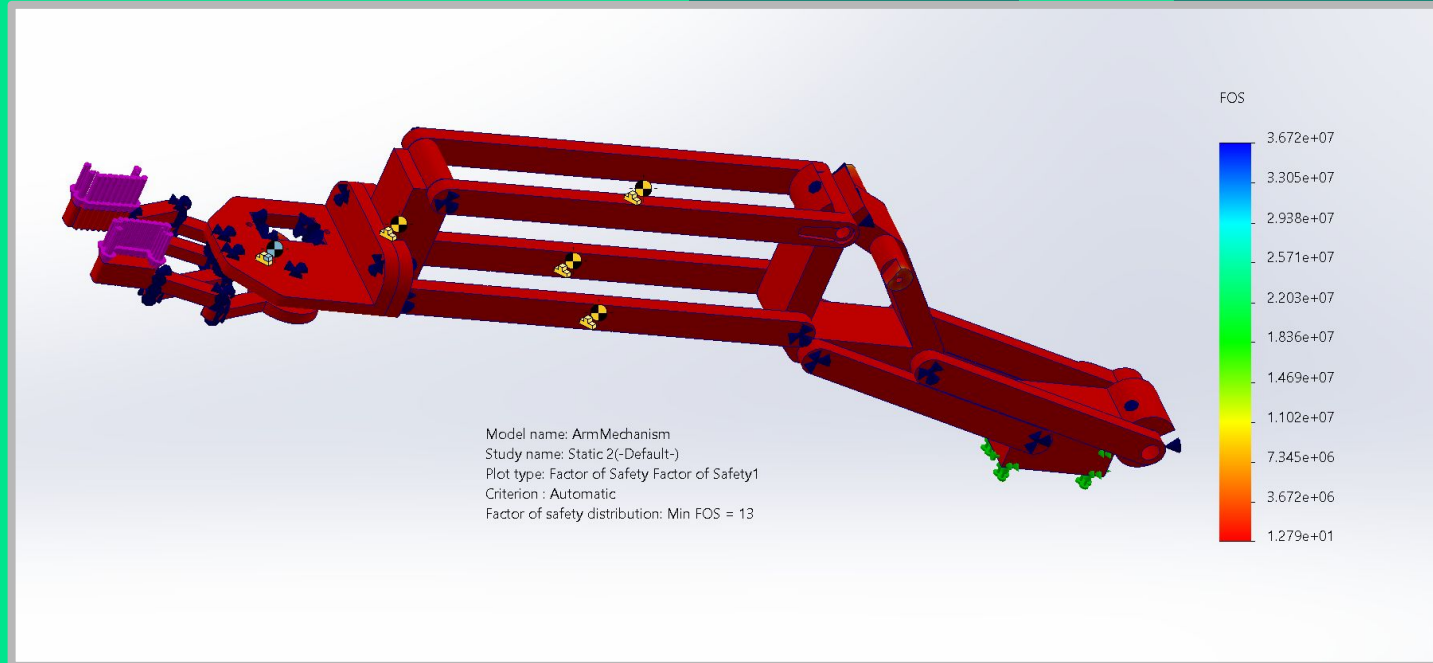
WORST CASE STATIC CONFIGURATION

FEA

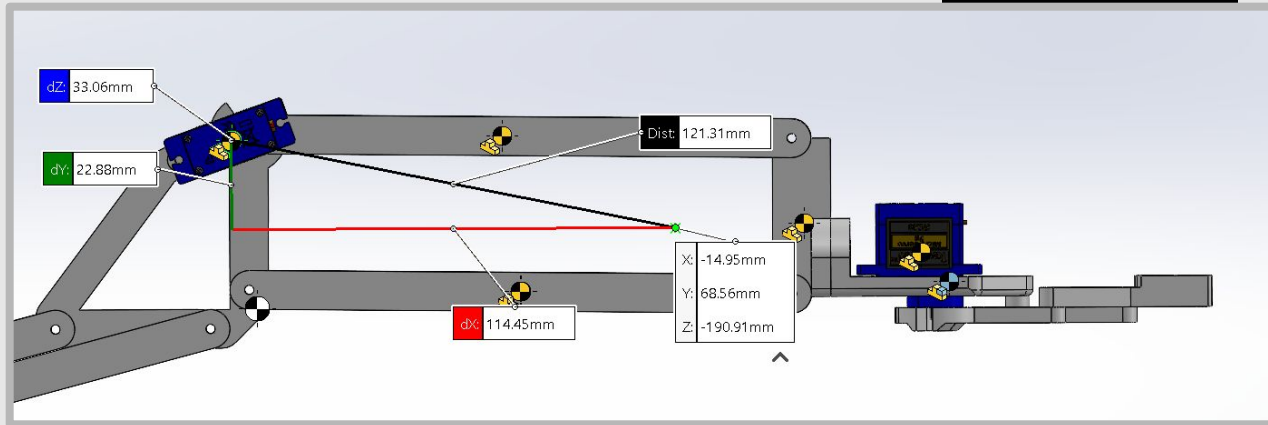
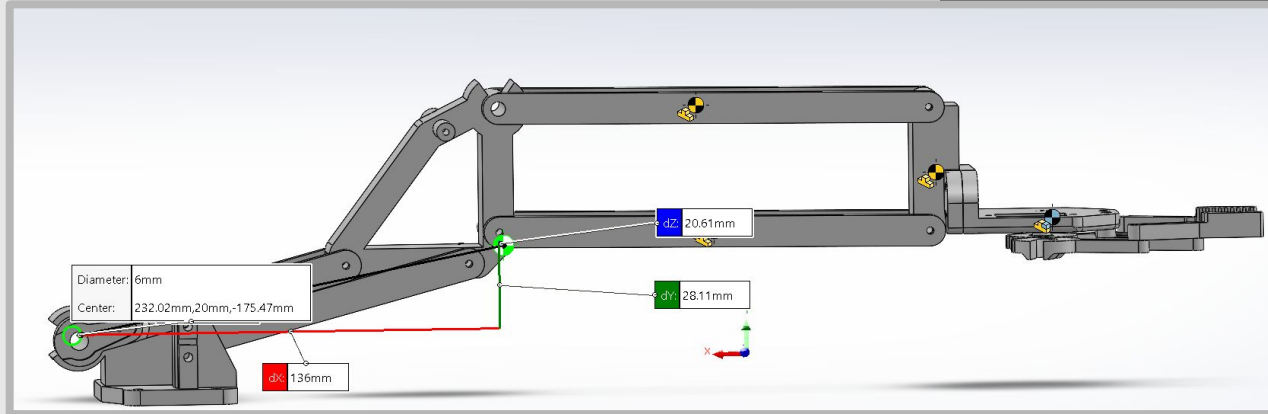


MATERIAL

Our material chosen was PLA. This material has a yield strength of around 55 MPa with a FOS of 13



Torque



The torque on the (MG996R)
is about (13.6cm)(0.14194kg)
= **1.93 Kgf*cm**

2.2 Kgf*cm ← for the servo of
the claw (MG90S)

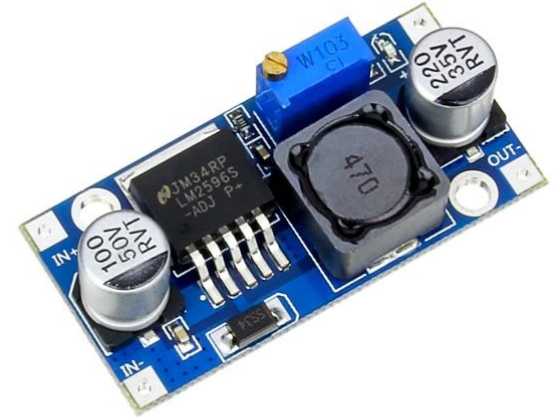
11 Kgf*cm ← for the servo at
the base of the arm
(MG996R)

The torque of the (MG90S) is
about (11.445)(0.07318kg) =
0.08375451 Kgf*cm

Power System

Our bot takes advantage of a single LM2596 buck converter.

- tuned to take in the 9V from the VSW and output 6V
- powers three MG90S servos and one MG996R servo
 - The stall current of each MG90S is 900mA +/- 50 mA and a running current of 500 mA
 - The stall current of each MG996R is 2.5 A and a running current of 500 mA
- The theoretical, maximum combined current of these servos is a total of 5.2A
 - However, in our testing, the total current consumed by the arm mechanism never exceeded 2.5 A, which is within the spec 3A limit of the LM2596 buck converter and the 5A limit of the VSW on the Romi 32U4



ARM CODE

updateServos()

- Potentiometer based arm values
- Simulation of arm movement

Helper Methods

- NormalizeVec2D
- readPotentiometer
- closeClaw and openClaw

ArmMoveToPoint()

- Desired angles for each joint
- Unit vector calculation
- Servo angle interpolation

Arduino Servo Library

- 4 Servos
- Timer Issues (Timer 3 vs Timer 1)

THANK YOU!

Any questions?