



# **MSE 312 FINAL PROJECT PRESENTATION**

**TEAM : PHOENIX**  
(GROUP 25)

A decorative graphic in the top-left corner of the slide. It consists of several overlapping geometric shapes: a large light blue circle, a dark blue square with concentric circles, a purple triangle, and a pink square with a white semi-circular pattern. The background of the slide is a light beige color.

# AGENDA

- Introduction
- Basic Approach for Solution
- Actual adopted and Improved Solution
- Challenges and Justification
- Demonstration
- Q&A

# INTRODUCTION



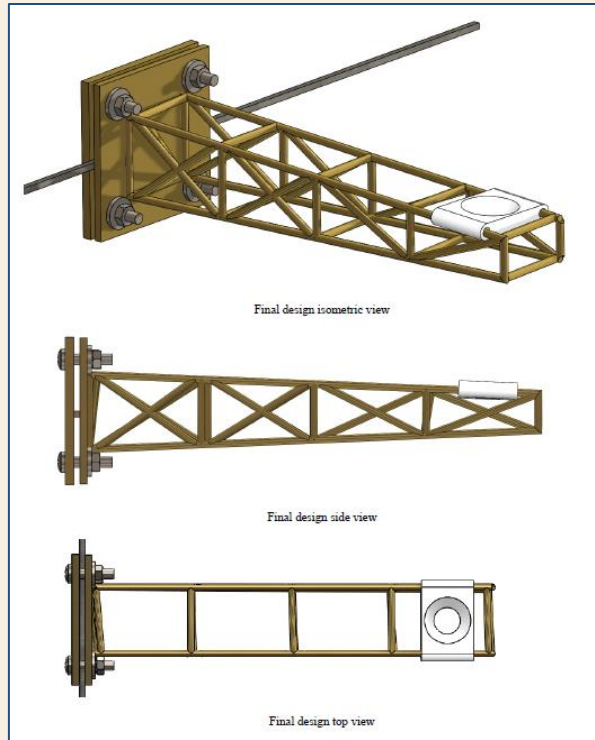
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# FINAL DESIGN AND BASIC MECHANICAL APPROACH



Final Mechanical Design from – Mechanical section

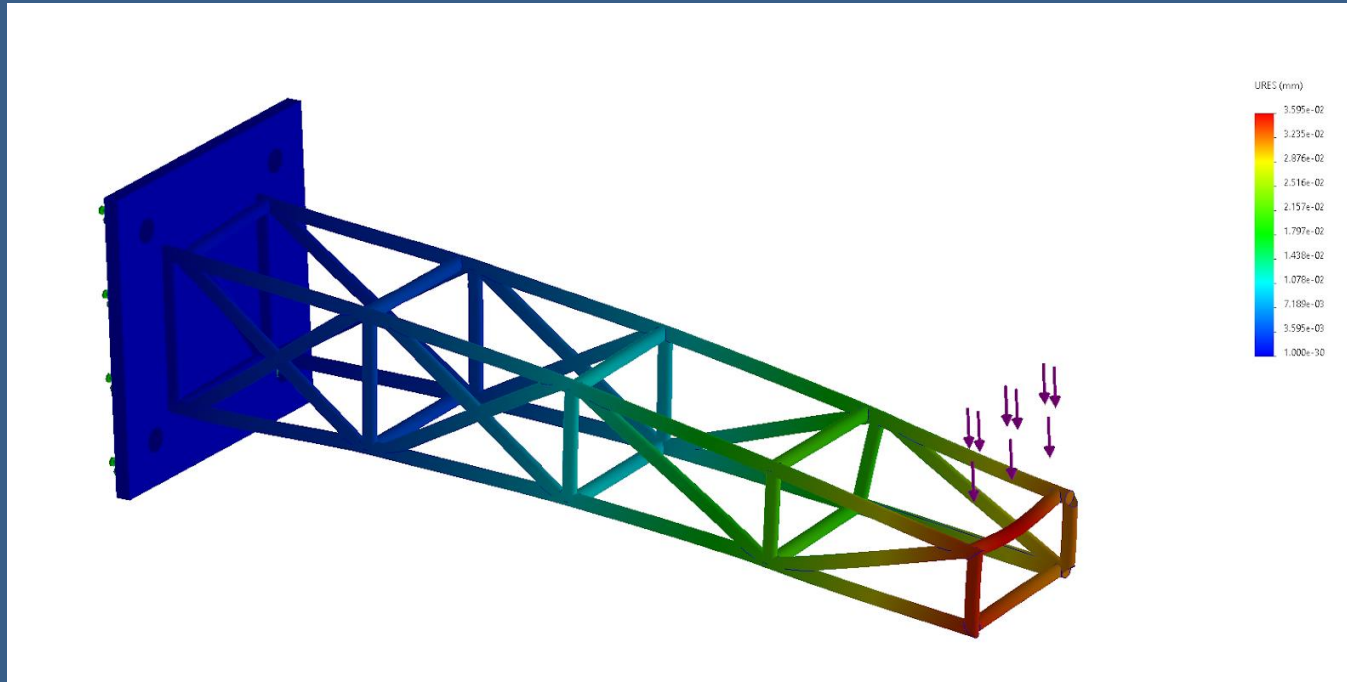
Use the knowledge from lab experiments as building blocks

Integrate the two-button switch and make it functional

Be able to set a home position for the arm by pressing one button

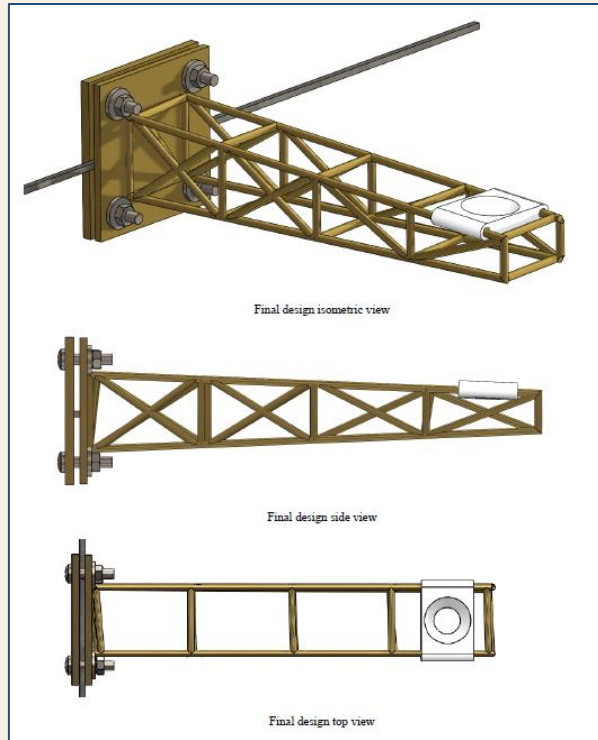
Shooting the ball when second button is pressed

# FINAL MECHANICAL DESIGN



1. When the load of 5N is applied, the deflection is about 0.003595 mm max
2. Experimental Deflection= 3-29 mm (100 times more)
3. Total weight 160g
4. Experimental rotational Inertia 547421.25  $\text{gmm}^2$  vs (28% more than SolidWorks)

# MECHANICAL DESIGN CHALLENGES



Soldering:

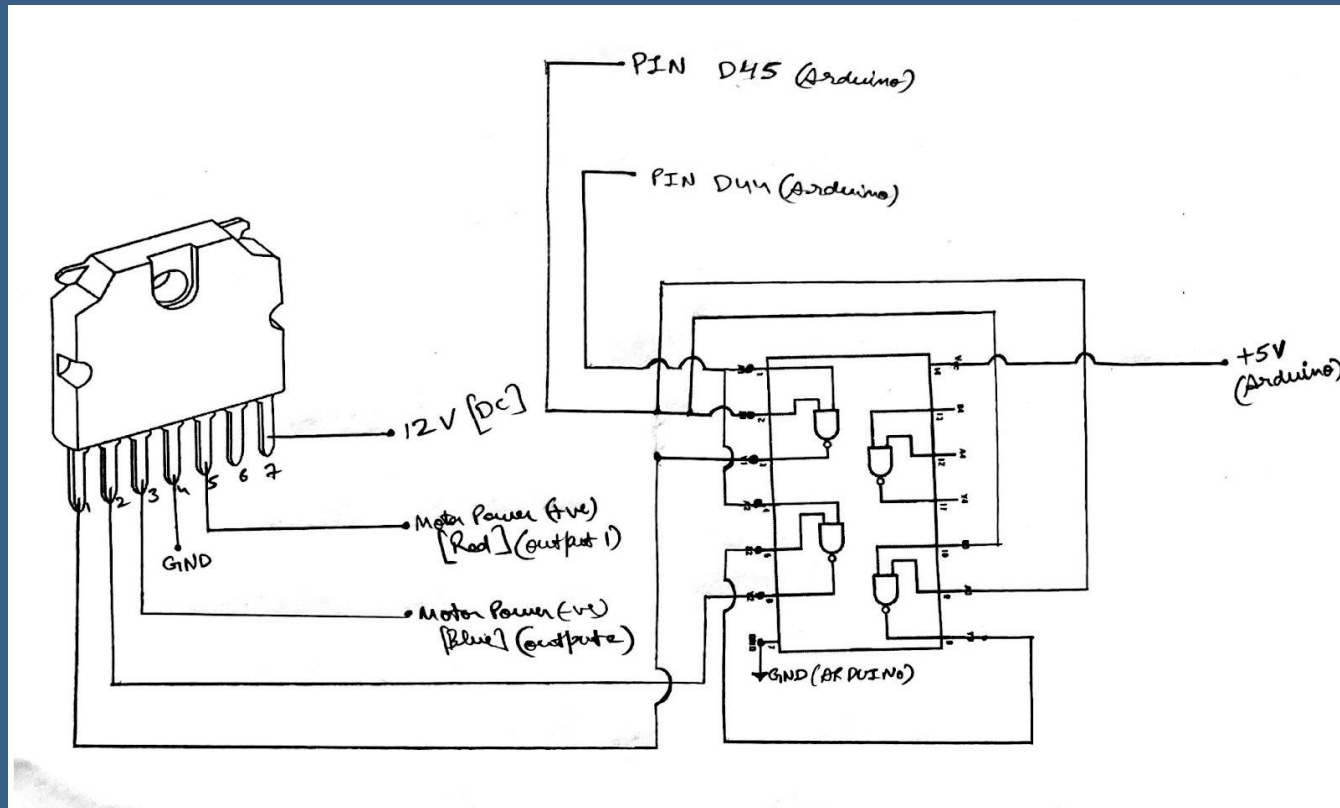
The brass trusses straight

Cross x-sections

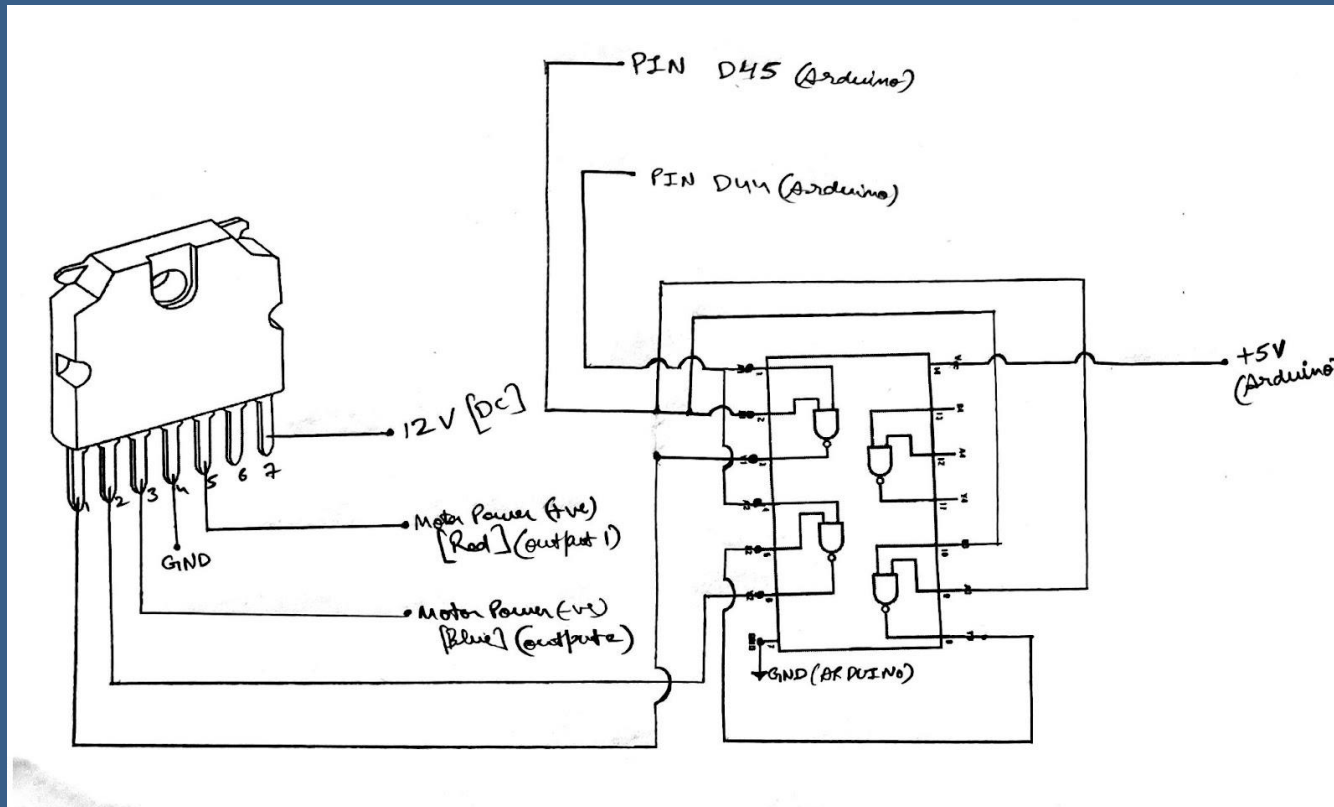
Hand Calculations:

MOI 3D dimension

# ELECTRONICS AND CONTROLS



# ELECTRONICS AND CONTROLS DESIGN



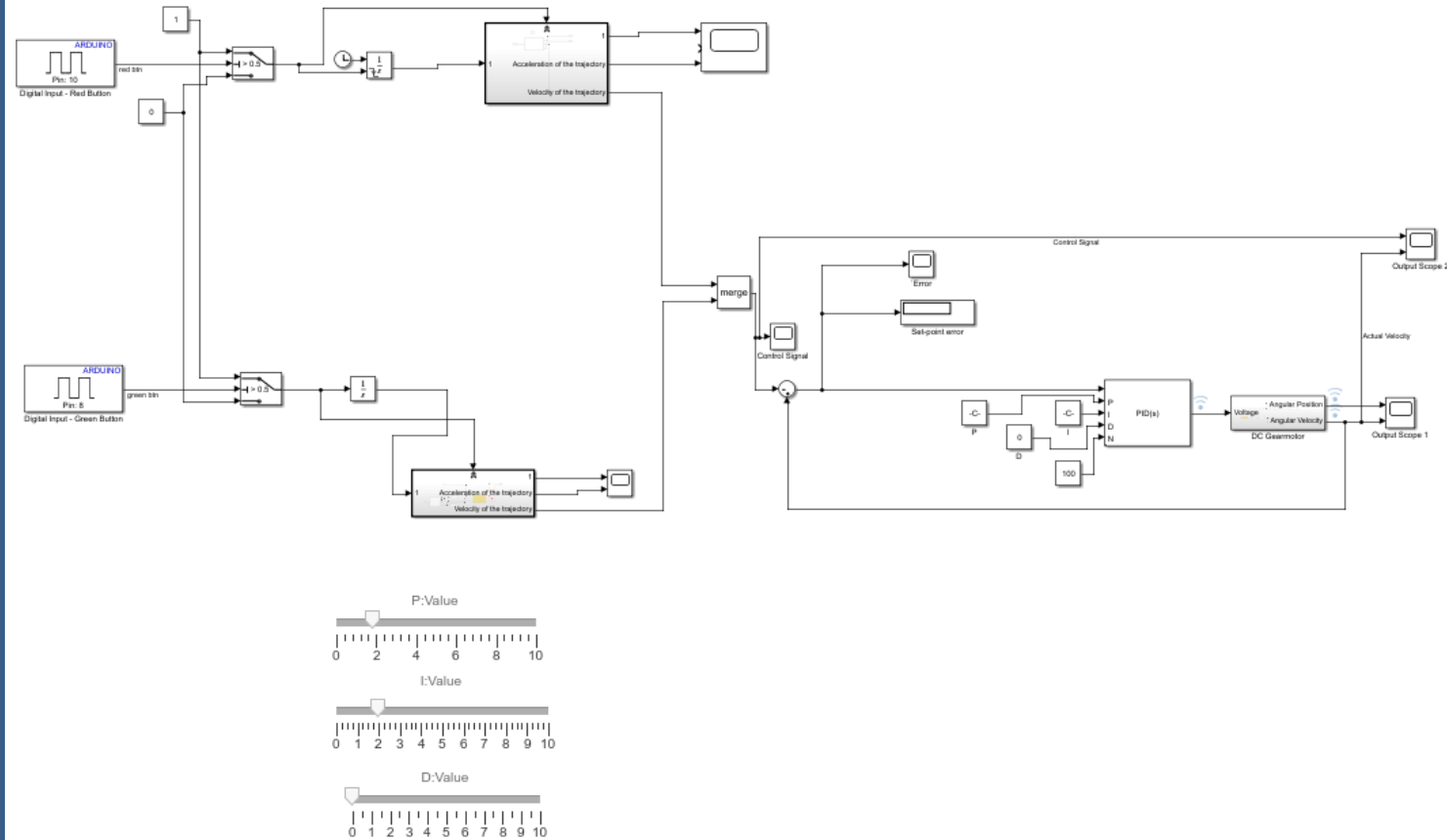
Utilizes the knowledge from the four electronics labs.

Drive a DC motor with a PWM signal

Provide different duty cycles to provide different input trajectories.



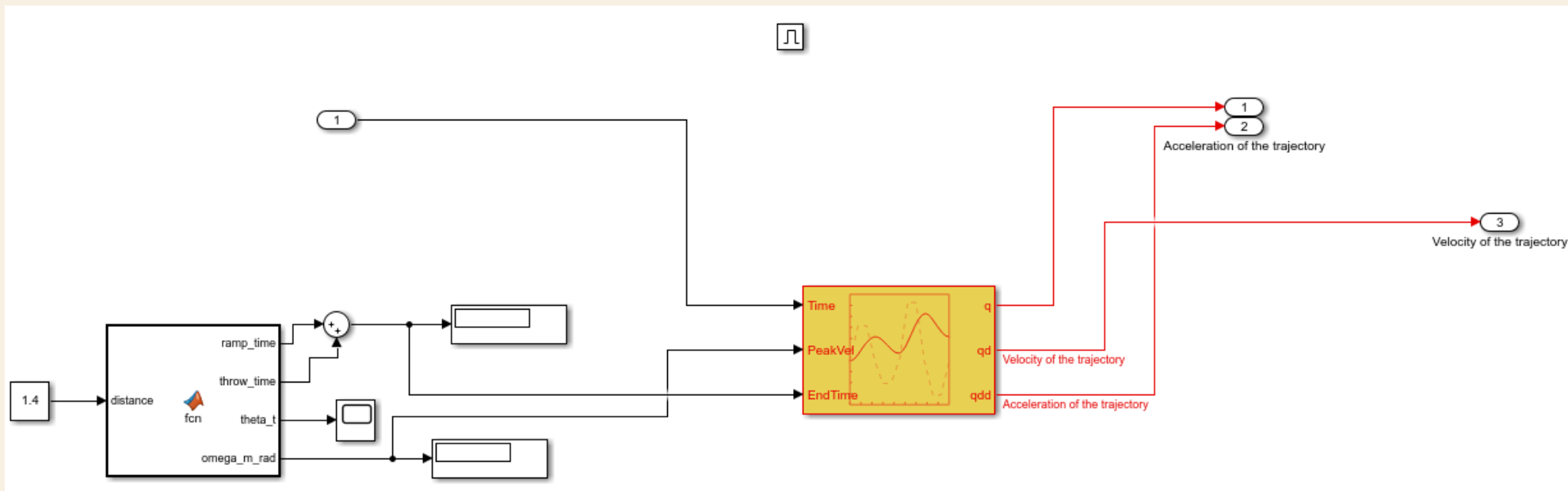
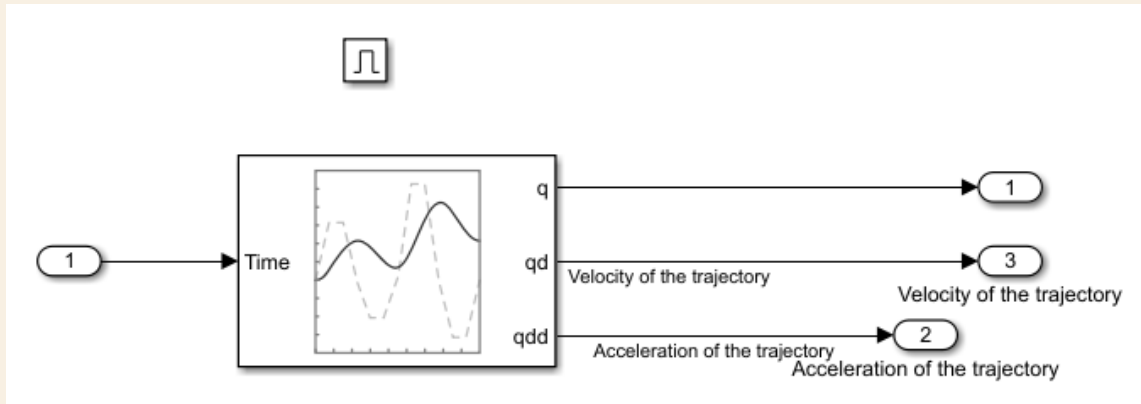
# CONTROL SYSTEMS DESIGN



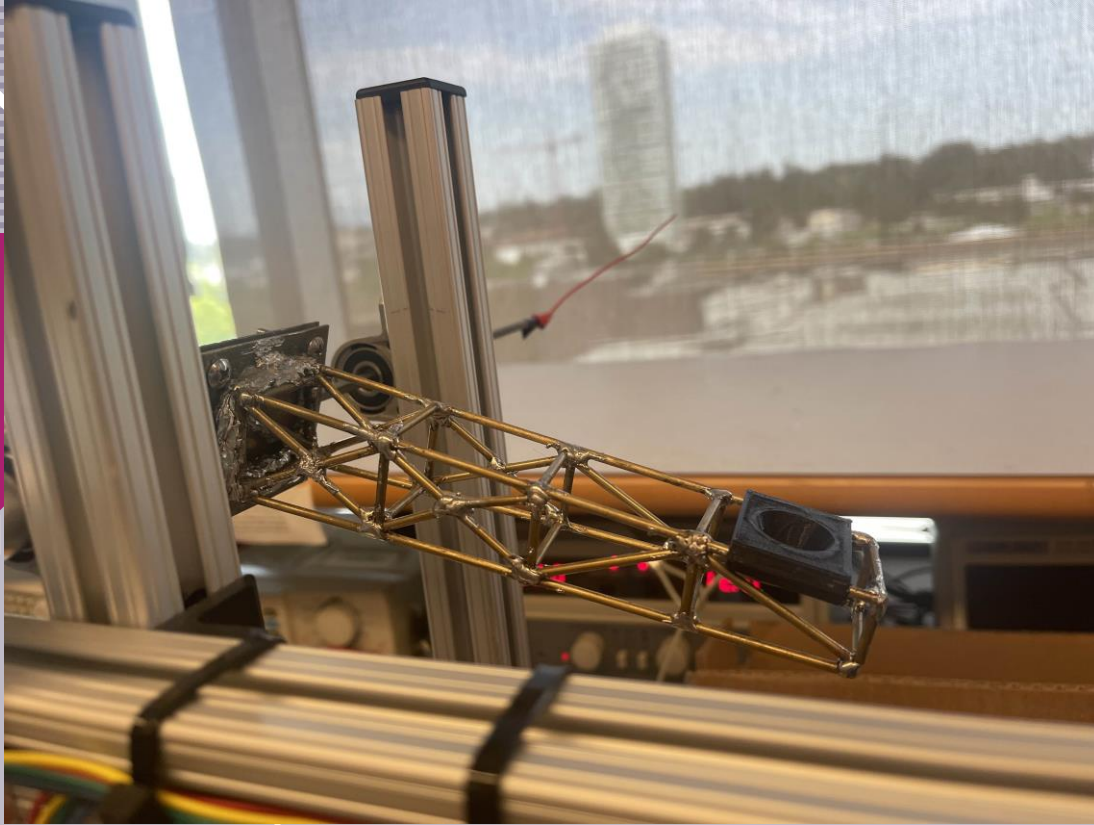
# CONTROL SYSTEMS UI

Red Button - Subsystem

Green Button - Subsystem



## ***LOADING POSITION***

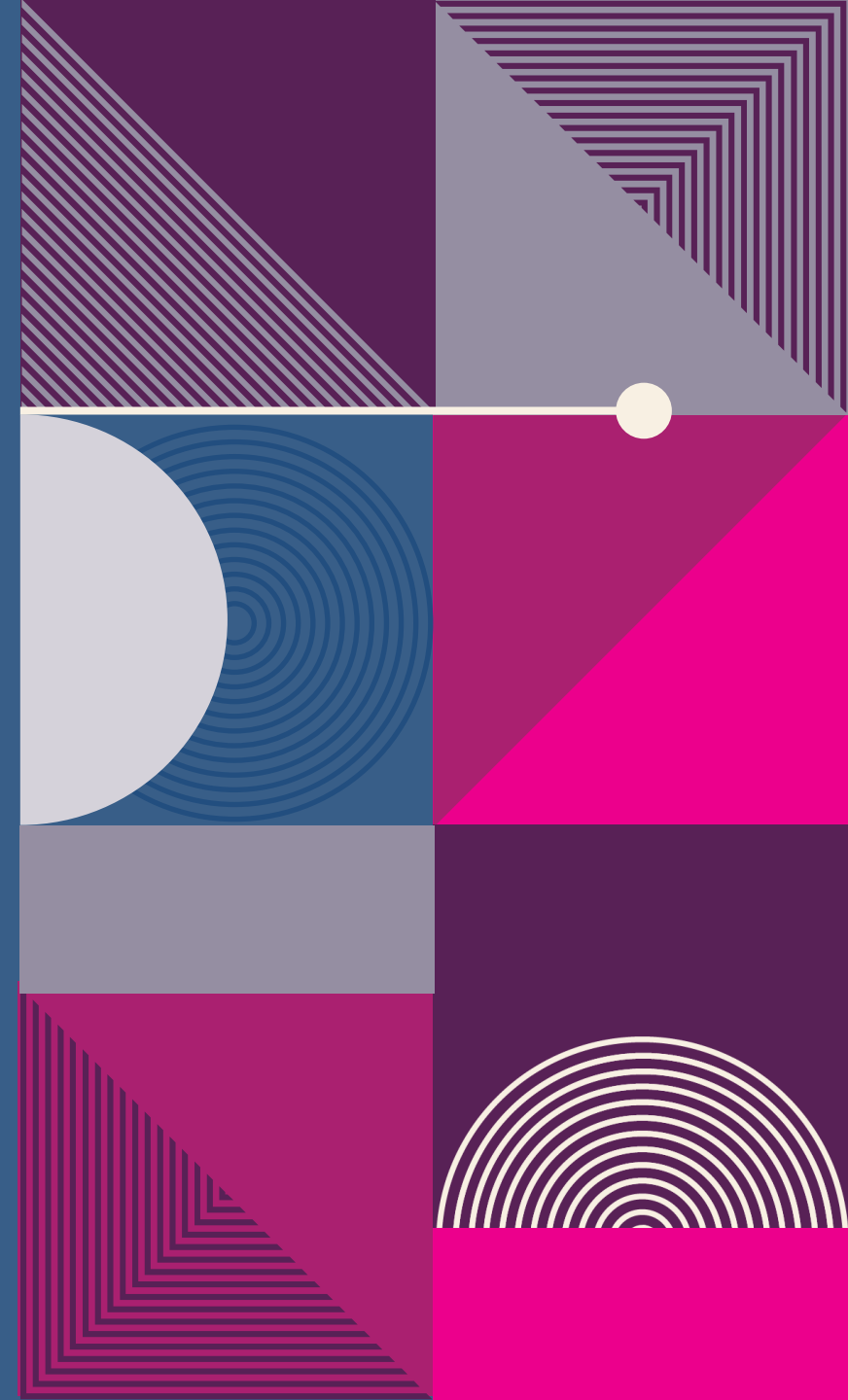


## ***SHOOTING POSITION***



# CONTROLS CHALLENGES & HOW WE OVERCAME THEM

- Understanding the Trapezoidal Velocity Block and its operation
  - Used MATLAB's *help* to understand its functioning
- Motor Drive circuit: component failure
  - Replaced the faulty part and resoldered the new part
- Implementation of the projectile formula for variable distance
  - Optimized the system's response to hit target within 1[m]-1.4[m]



The image features a dark blue background. On the left side, there is a vertical strip with a purple-to-pink gradient. Within this strip, there are two sets of concentric circles: a white one near the top and a pink one near the bottom. The main area of the image is a white rectangle containing the word "QUESTIONS" in a large, white, sans-serif font. The text has a slight 3D effect with a shadow. Behind the text, there are several overlapping squares in various shades of blue and green, some of which are semi-transparent, creating a layered, abstract design.

# QUESTIONS



# THANK YOU

MSE 312 - Summer 2024

Team Phoenix

Group 25