# SmartBoard


TEAM MEMBER:

YANJUN DUAN, MOHAMMAD AHMAD, WENKUN XIAO

Professor: DR.Carlo R daCunha

TA: Jordan Beverly


NAU NORTHERN ARIZONA UNIVERSITY

# Table of Contents



# Introduction

1. What is the smart board?

- Smart Board is combining of traditional whiteboard with a new type of smart whiteboard.

2. How to use it?

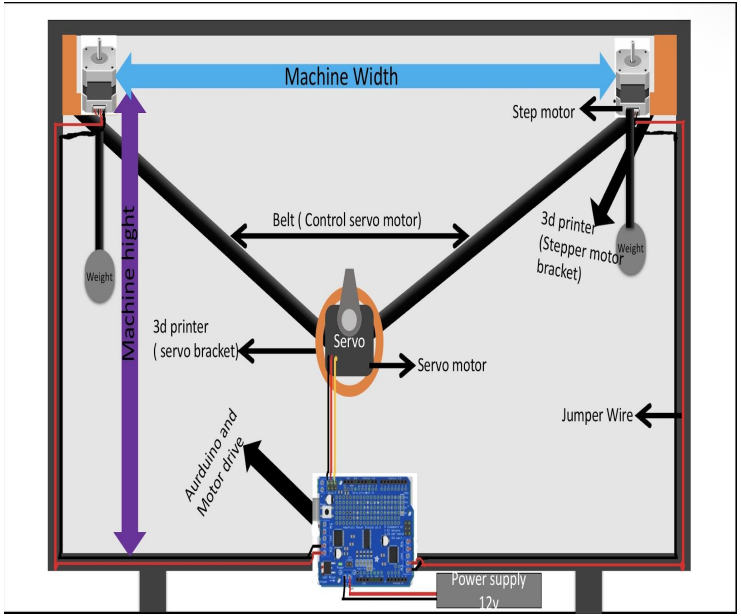
- Controlling the board remotely.

3.Why we chose this project?

- Smart whiteboard that pushes the physical boundaries of a traditional whiteboard.

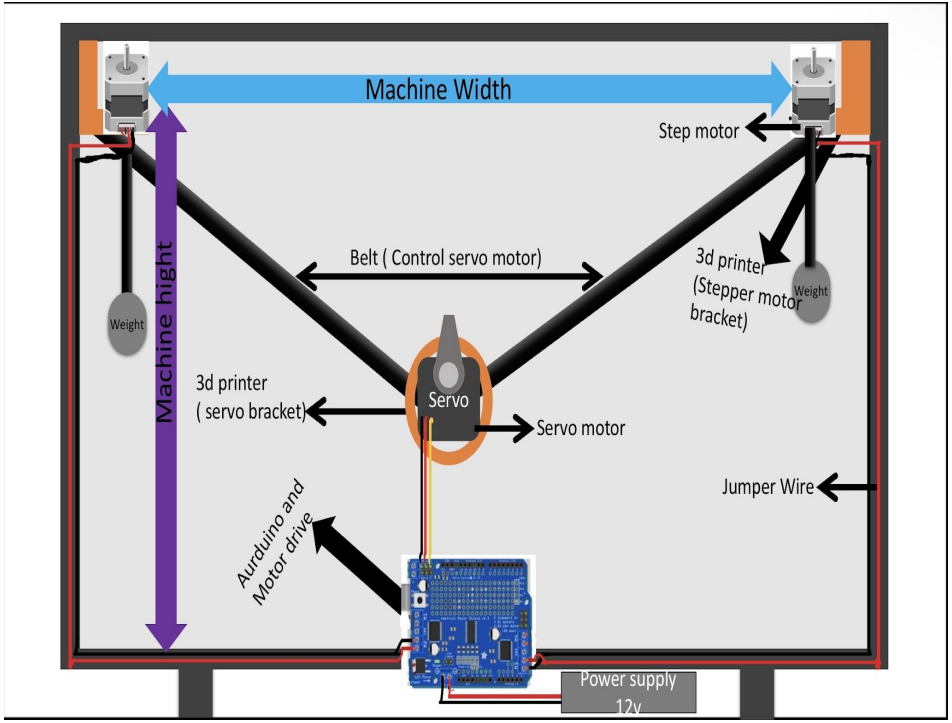
# Problem Statement

- Many professors prefer to use whiteboards in their offices.
- Smart Board can save the contents.
- For people who prefer to study online.
- Can draw complex things



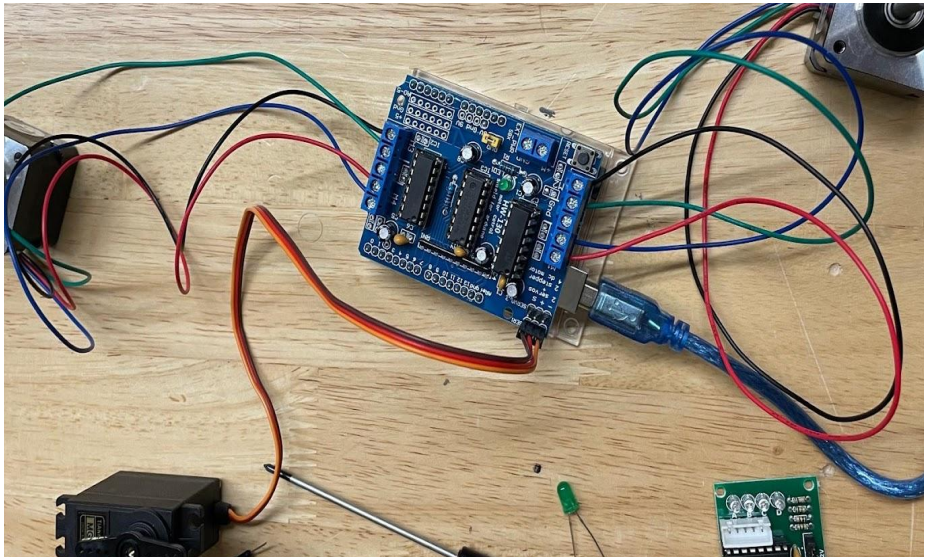
# Solution Statement

1. Requirements of the project.
2. Architecture of the project.
3. Prototype of the project.

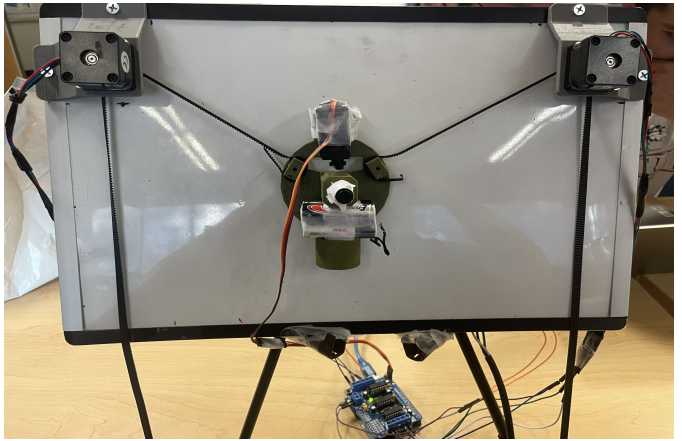


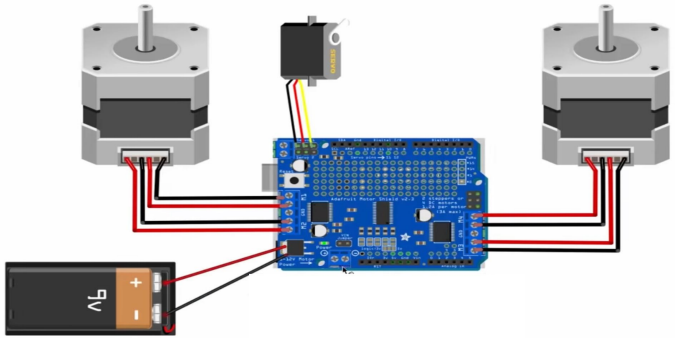
# Requirements

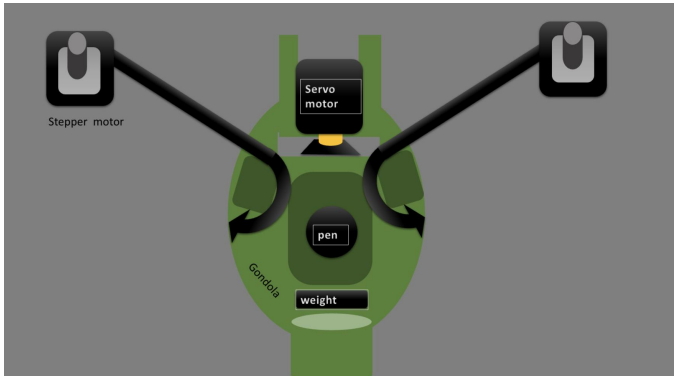
- Write new notes and save them.
- Can be controlled remotely.
- Have high accuracy.
- Easy to move.
- Have lower cost.



# Architecture

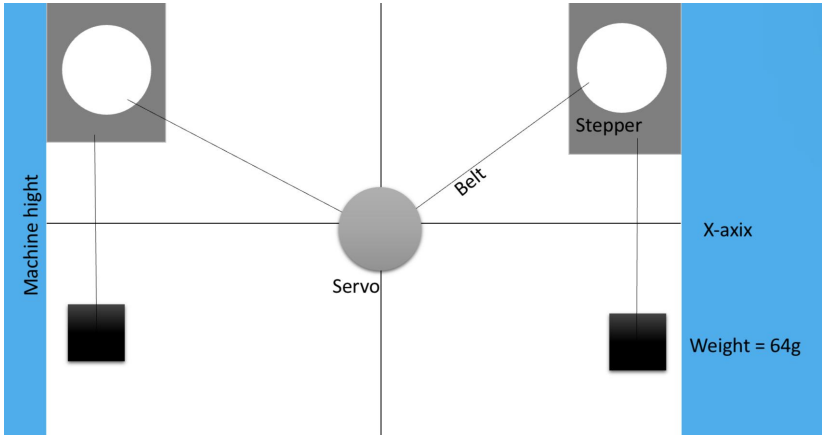



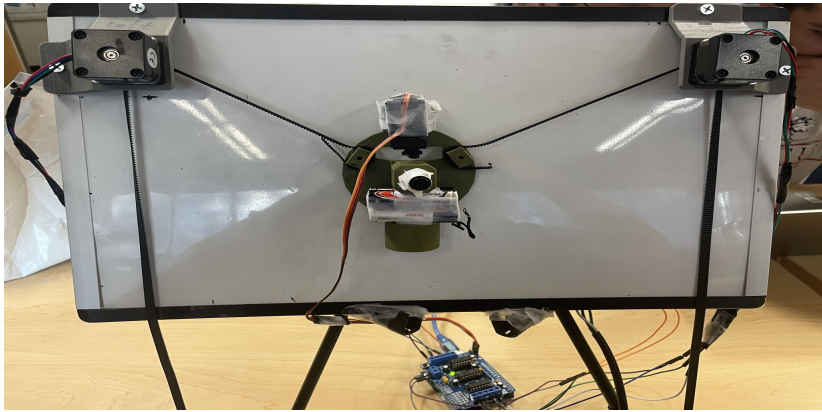


# Prototype

1. Stepper motor.
    - Control the Belt
2. Servo motor.
    - Left the gondola.
3. Arduino uno.
    - Control servo and stepper motor
4. Processing software.
    - Download the vector and draw it

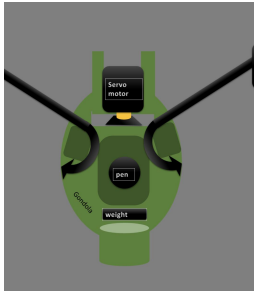


# Update on Challenges

Raspberry → Arduino

Counterweight




Gondola

- Change from Raspberry Pi to Arduino
- We use some weight to balance the stepper motor

- Change the Gondola until find the perfect shape
- Use extra power supply

# Testing Plan

**Testing**
- Functional testing
- Usability testing
- Safety testing

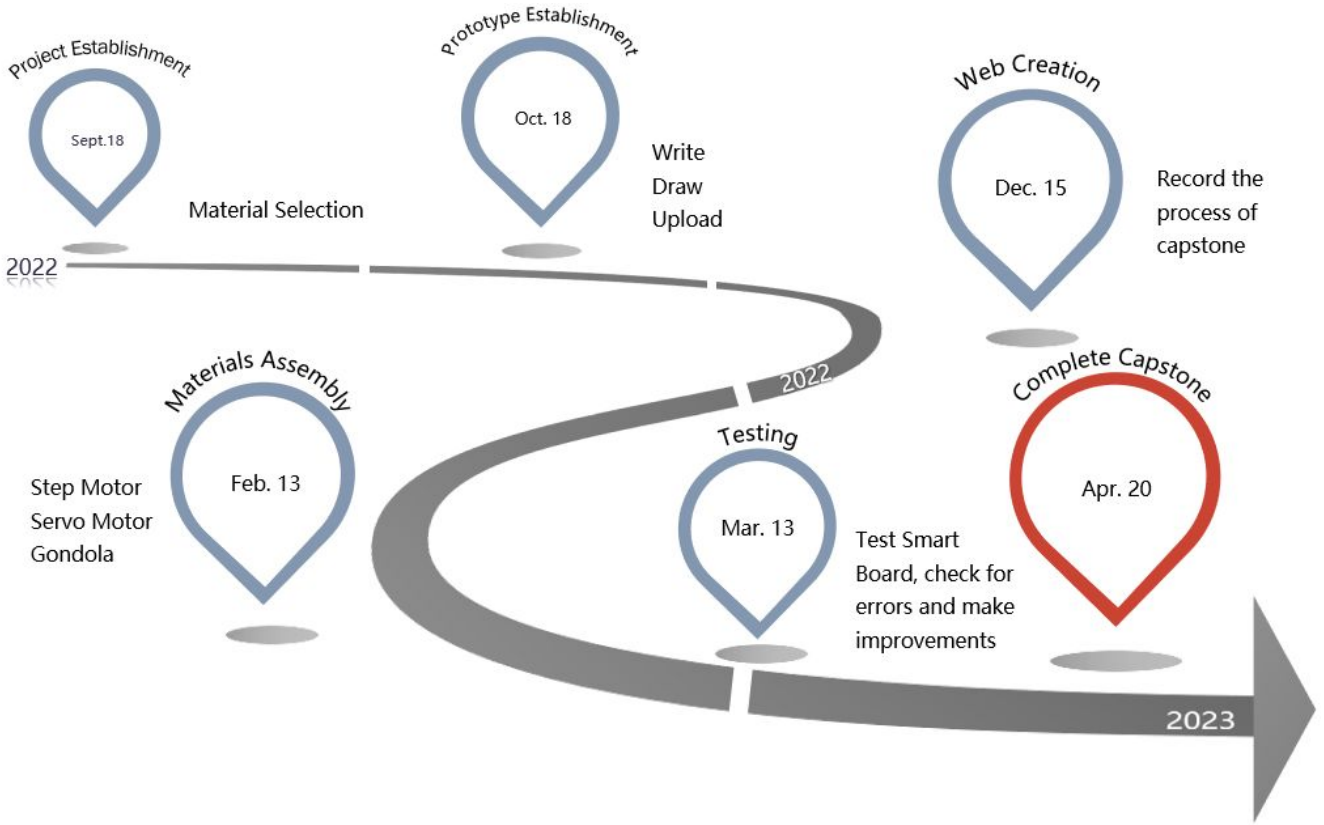
**Testing Approach**
- Test case development
- Test execution
- Defect reporting and tracking

**Pass/Fail Criteria**
- All functional requirements must be met.
- Usability testing must receive an average score of 8/10 or higher.
- Safety testing must identify and address all hazards.

# Testing Matrix

| Test Case ID | Test Case Description | Test Data | Expected Result | Actual Result | Pass/Fail |
|---|---|---|---|---|---|
| TC001 | Verify that the robot can move in all directions | User input | Robot moves in the specified direction | Robot moves in the specified direction | pass |
| TC002 | Verify that the robot can detect and avoid obstacles | Obstacle placed in front of robot | Robot stops or changes direction to avoid the obstacle | Robot stops or changes direction to avoid the obstacle | pass |
| TC004 | Verify that the robot can draw on the whiteboard | User input | Robot draws the specified shape or text on the whiteboard | Robot draws the specified shape or text on the whiteboard | pass |

# Update on Schedule



# Conclusion

- Smartboard  is a machine designed to draw or write on a whiteboard automatically. It can be controlled by a computer program (processing software).
- Such robots have many uses, including in classrooms, meeting rooms, and research facilities, where they can enhance the efficiency and productivity of tasks that require repetitive writing or drawing.
- After conducting research and analysis, it can be concluded that whiteboard robots have several advantages over traditional whiteboard usage, such as:

1. Time-saving: Whiteboard robots can complete tasks in less time than humans, allowing for increased.

2. Remote control: Whiteboard robots can be controlled remotely so it will easy to use.

3. Accessibility: Whiteboard robots can be programmed to write or draw comlex thing.

# Reference

Reference

[1] "XY Plotter Drawing Robot using Arduino Polargraph," Instructables, 2021. [Online]. Available: https://www.instructables.com/XY-Plotter-Drawing-Robot- Arduino-Polargraph/. [Accessed: May 10, 2023].

[2] "Whiteboard Drawing Robot," Thingiverse, 2014. [Online]. Available: https://www.thingiverse.com/thing:575487. [Accessed: May 10, 2023].

[3]Yao Cai, Qiang Zhan, M. Ceccarelli, G. Carbone, Shuangji Yao and Zhen Lu, "Design and simulation of a DSP controller for a LARM Hand," 2010 2nd International Asia Conference on Informatics in Control, Automation and Robotics (CAR 2010), Wuhan, 2010, pp. 361-364, doi: 10.1109/CAR.2010.5456824.

[4]MertArduino. "Make Arduino XY Plotter Drawing Robot (Polargraph)." Hackster.io. [Online]. Available: https://www.hackster.io/mertarduino/make- arduino-xy-plotter-drawing-robot-polargraph-b4fe36 [Accessed: May 10, 2023].

[5]Hackster.io. "A 3D Printed Whiteboard Robot That You Can Build Yourself." [Online]. Available: https://www.hackster.io/news/a-3d-printed-whiteboard-robot- that-you-can-build-yourself-c368a49e037f. [Accessed: May. 10, 2023].

# Questions?

# Thank you

NAU NORTHERN ARIZONA UNIVERSITY