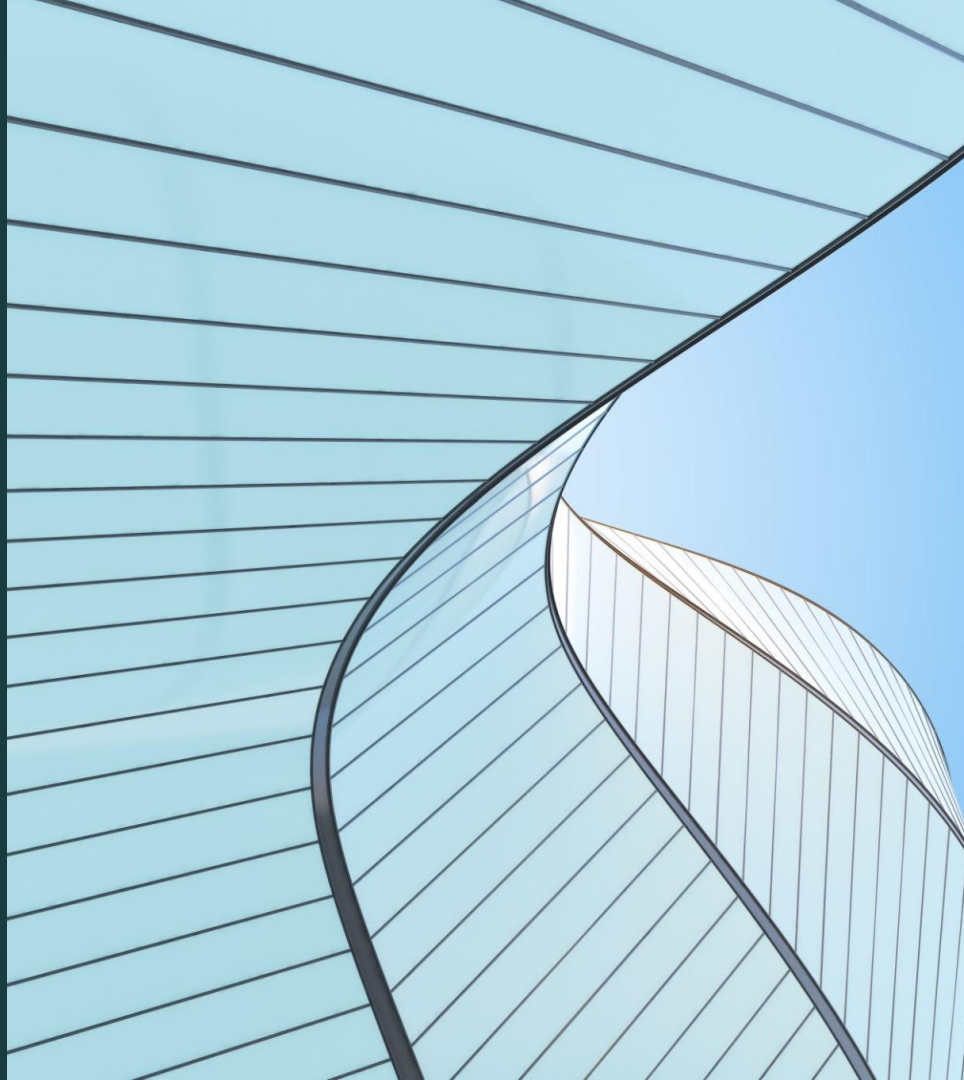
Team 5
24 October 2025

SmartPEN

EMG powered Art Simulator and image analysis.



Content *overview*

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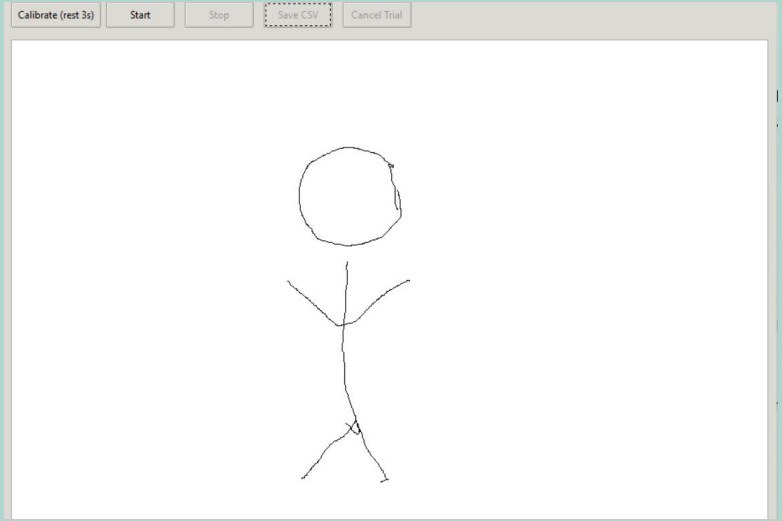
Goal: Implement gesture recognition for development of drawing tool.

Secondary Goal: Image recognition of drawn material for categorization and gestures for image details.

THE PROBLEM



Drawing created from final deliverable.

Research Question:

Can the Myo armband function as a preliminary drawing tool?

Theoretical Protocol

The Myo Armband can classify gestures for classification, as well as use IMU data to draw!

01

Train classifier model for gestures

Use *myo-emg-dataset* from Kaggle

02

Develop drawing tool for sketching

Shape_capture method, similar to MS Paint

03

Incorporate gestures + drawing tool to make sketches with various thicknesses

External: save basic sketches to png images

04: Future

Use protocol to convert front, side and top view to isometric drawing

Benefit: construct images for preliminary product conception

myo-eng-dataset:

- 5000 samples, 30 readings/sample
- Format: numpy ndarray [N, 30, 8] (#number of samples, readings per sample, channels)
- SVM model to train data, test sample size = 0.2, train sample size = 0.8

Result: overall accuracy of trained set is 0.92 (from prior model)

4 gestures used:

A. 0-Neutral Gesture
B. 1-Flexion
C. 2-Extension
D. 7-Fist

Column 1	Precision	Recall	f1-score	Gesture Count
0	0.89	0.96	0.92	558
1	0.94	0.86	0.9	187
2	0.97	0.86	0.91	187
7	0.96	0.91	0.93	187

Developed SVM model and used the result to predict the class of the most recent 30 samples in real time.

Real-time data needed to be abs() and multiplied by 10 to match training data.

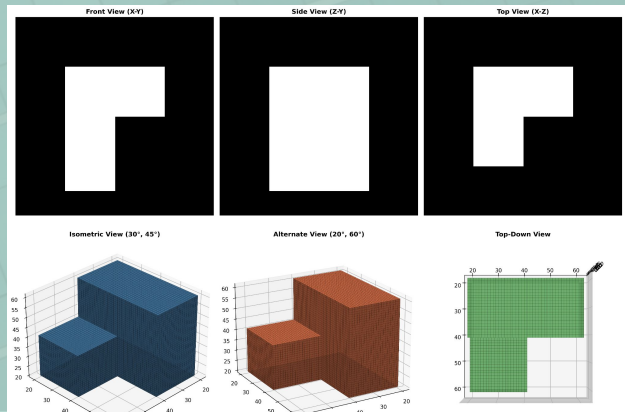
Results: Videos

Future application:

Three view sketch (gesture used to change view), automatically converted to isometric view

Tools:

1. Numpy, store 3D coordinates
2. MatPlotLib: 3D plotting (mpl_toolkits.mplot3d), Poly3DCollection for 3D faces



Thank you