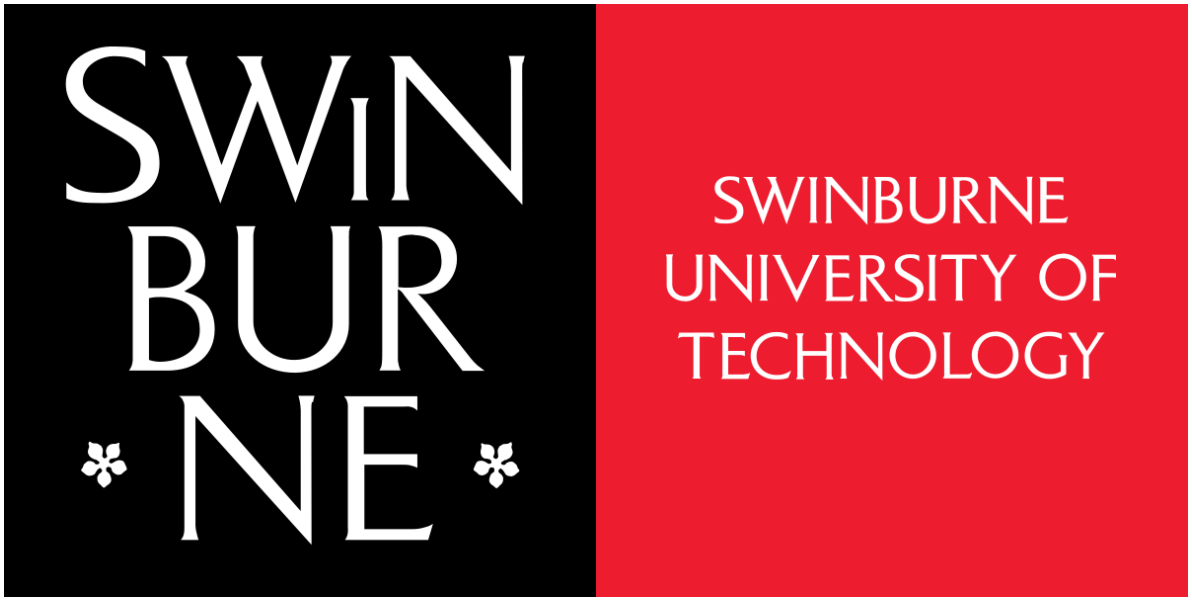
**Course Name:** Artificial Intelligence for Engineering (COS40007)

**Studio Session:** Studio 1 - 7

**Studio Tutor:** Irfan Mirza




# Title: Portfolio Assessment 2 - “Systematic Approach to Develop ML Model”

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**GitHub Code Link:** https://github.com/AshrafToor/COS40007_AIE/tree/main/Assessment2

**Submission Date:** 30-03-2025

## Summary Table of Studio 3: Activity 6

| SVM Strategy | Accuracy |
|---|---|
| Train-Test Split | 92.5% |
| 10-Fold CV | 86.2% |
| Hyper parameter Tuning | 92.5% |
| Top 10 Features | 87.8% |
| PCA (10 components) | 92.0% |

## Summary Table of Studio 3: Activity 7

| Model | Accuracy |
|---|---|
| SGD Classifier | 88.4% |
| Random Forest | 91.7% |
| MLP Classifier | 92.5% |

## Step 1: Data Collection

**Columns:**

- Frame
- Right Lower Leg (x, y, z)
- Left Lower Leg (x, y, z)
- Class (0 = Boning, 1 = Slicing)

## Step 2: Create Composite Columns

- RMS values (xy, yz, xz, xyz)
- Roll
- Pitch

## Step 3: Data Pre-processing

- Mean
- Standard Deviation
- Min
- Max
- Area Under Curve (AUC)
- Number of Peaks

Total features: 18 columns x 6 stats = 108 features

## Step 4: Training

SVM, SGD, Random Forest, and MLP were trained using various strategies. The summary table is included above.

## Step 5: Model Selection

1) SVM with hyper parameter tuning is the best model because of its accuracy (92.5%).

2) MLP Classifier outperforms all other models, handling non-linear relationships effectively in high-dimensional data.