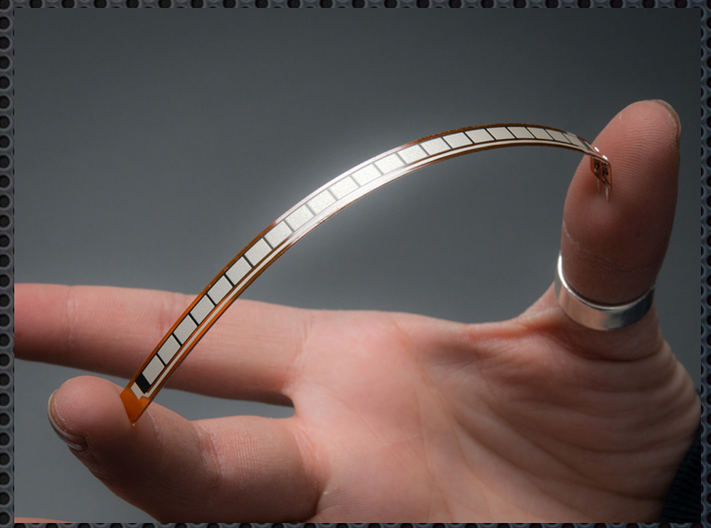
Gesture Recognition for Soldiers

The Problem Statement

- Most of the gesture recognition systems in the market use cameras.
- But this methodology cannot be used for soldiers due to insufficient lighting and restricted view of vision.
- Thus a system with sensors which are invariant to the environment differences had to be made.

The Construction

MPU-6050



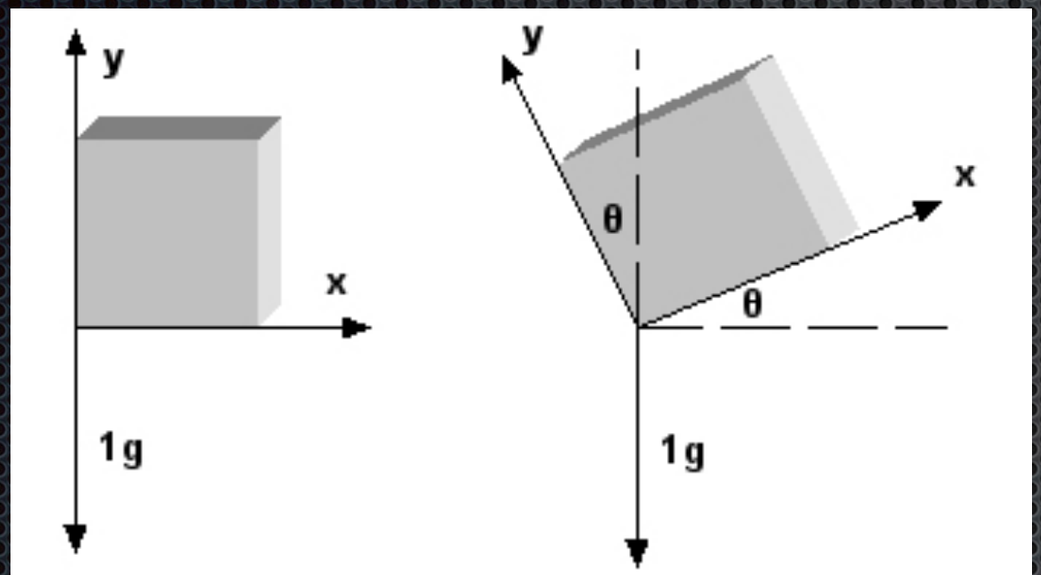
Flex Sensor

Arduino Mega

Gesture classification features.

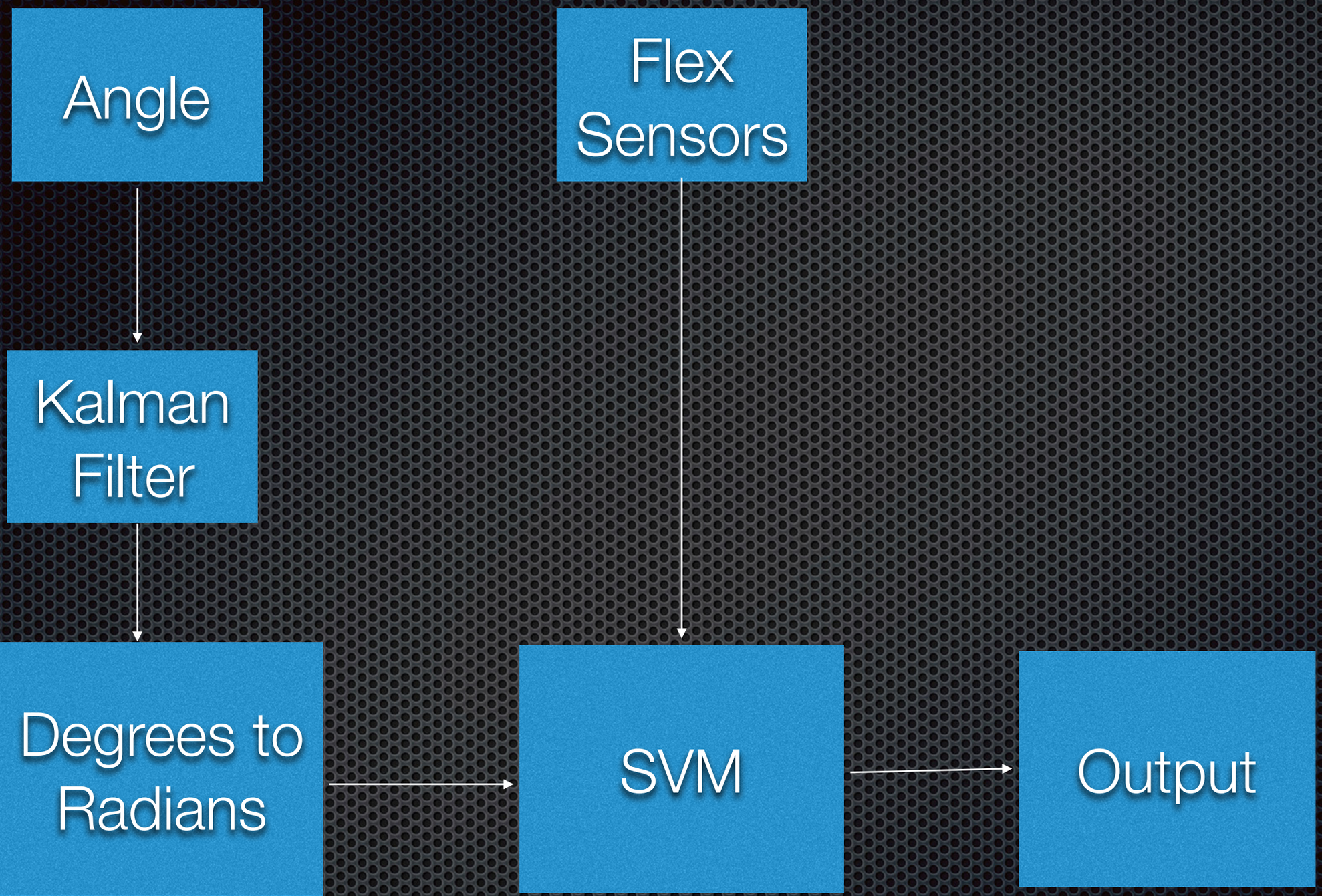
Static Gestures	Dynamic
Flex Sensors	Flex Sensors
Angle	Angle
	Acceleration
	Gyroscopic Acceleration

Algorithm for Static gesture recognition.

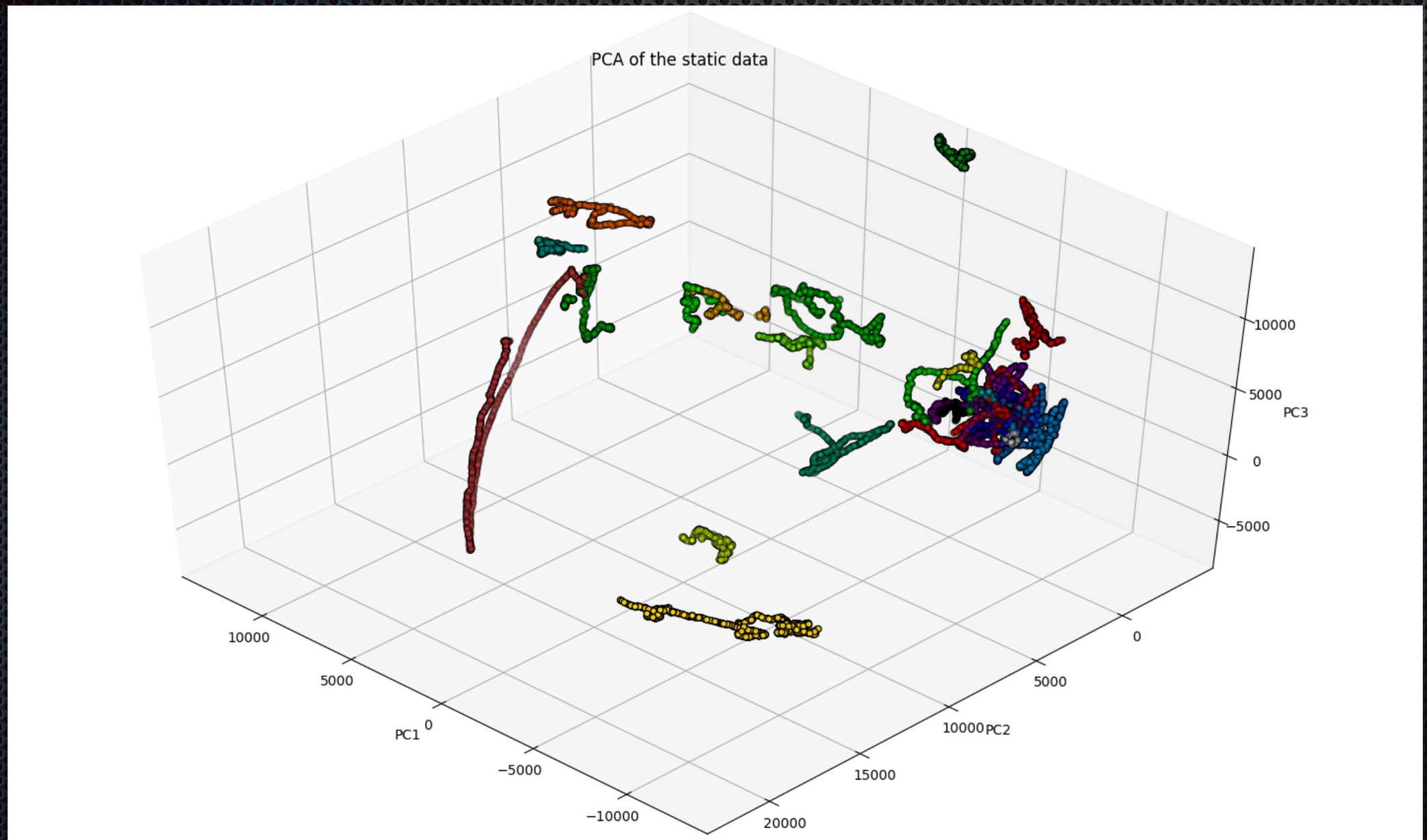


$$Ax = \arctan\left(\frac{X}{\sqrt{Y^2+Z^2}}\right)$$

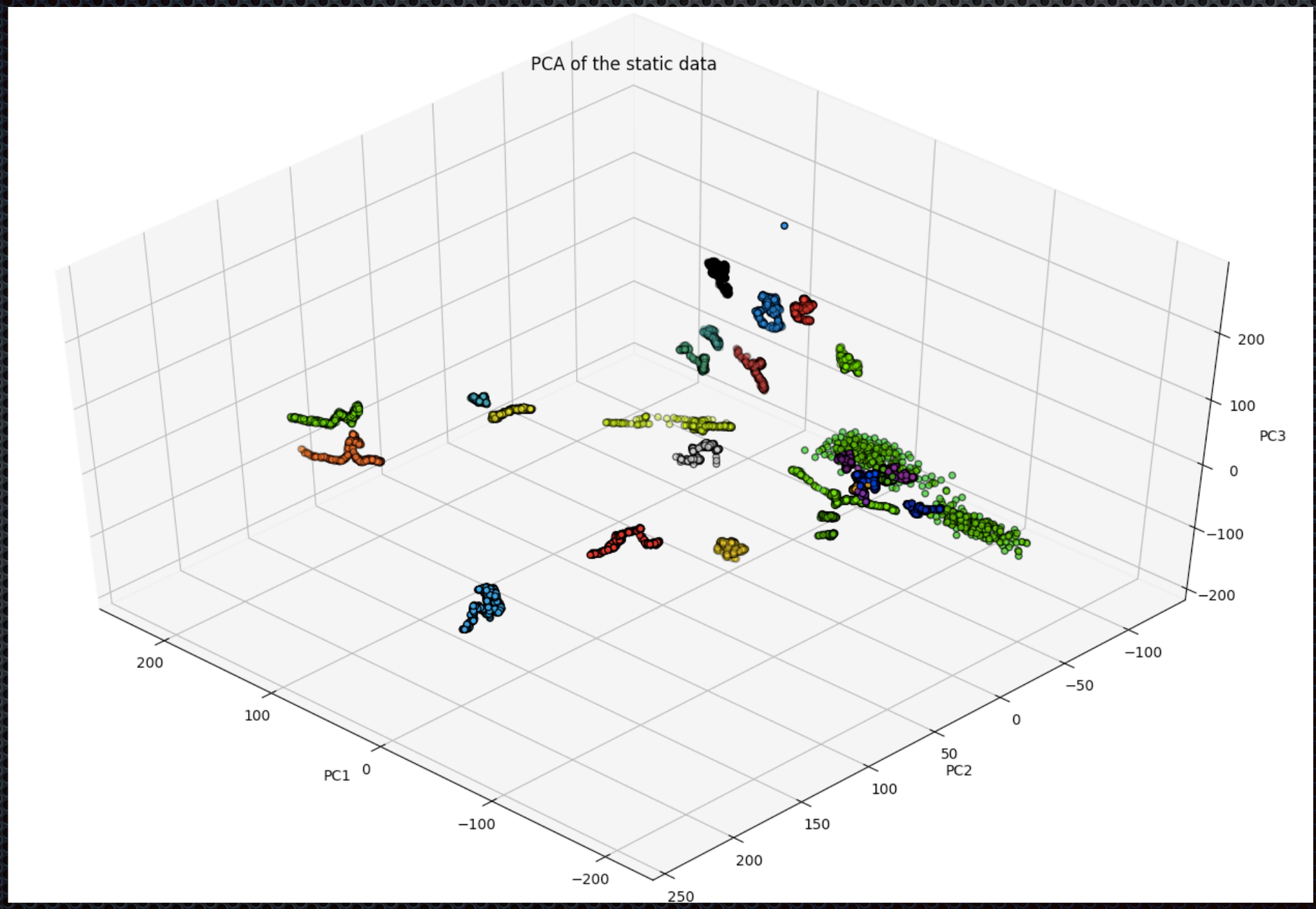
$$Ay = \arctan\left(\frac{Y}{\sqrt{X^2+Z^2}}\right)$$


Angle
Flex Sensors
Kalman Filter
Degrees to Radians
SVM
Output

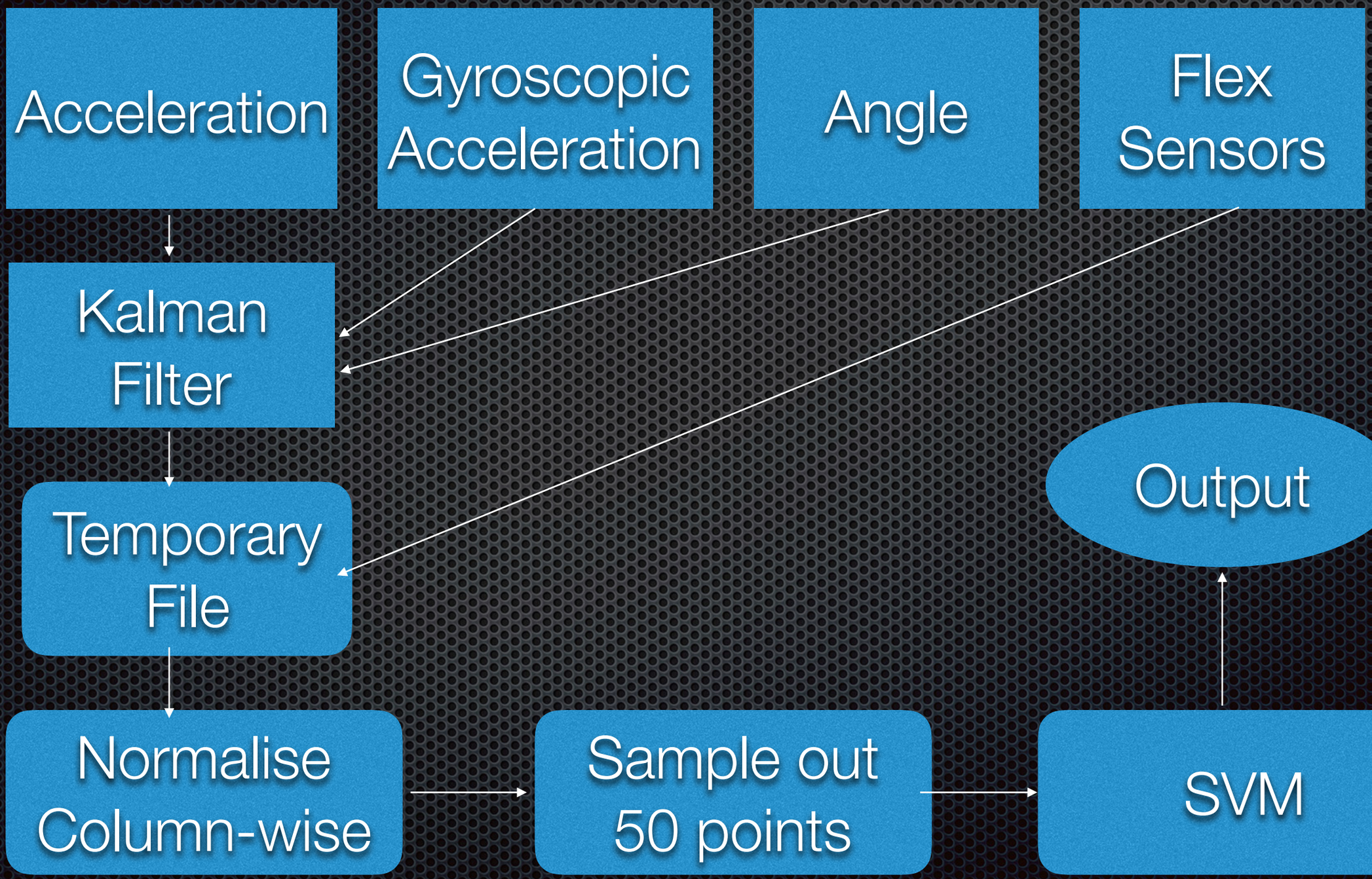
PCA for static gestures using all features.



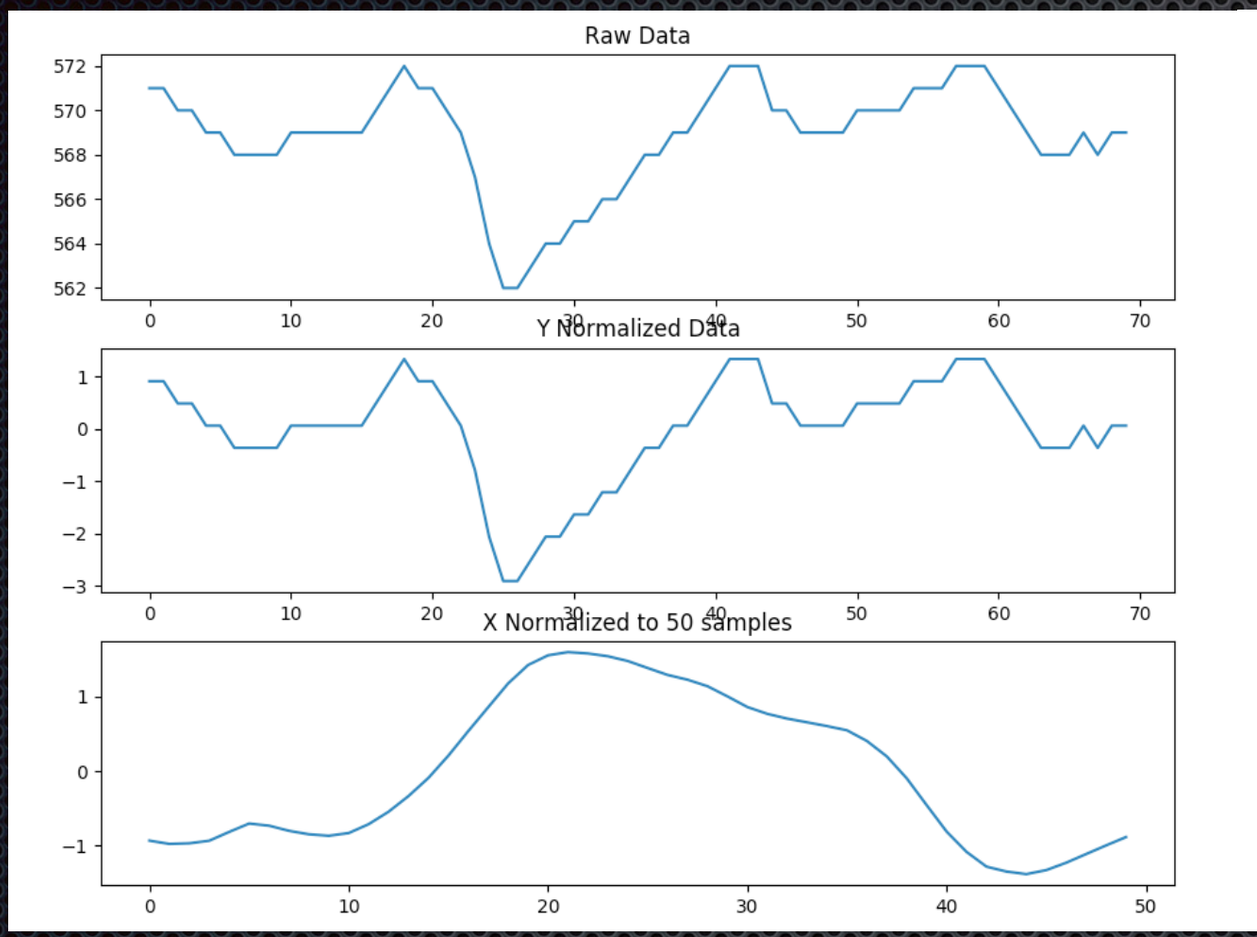
PCA for static gestures using the first ten features.

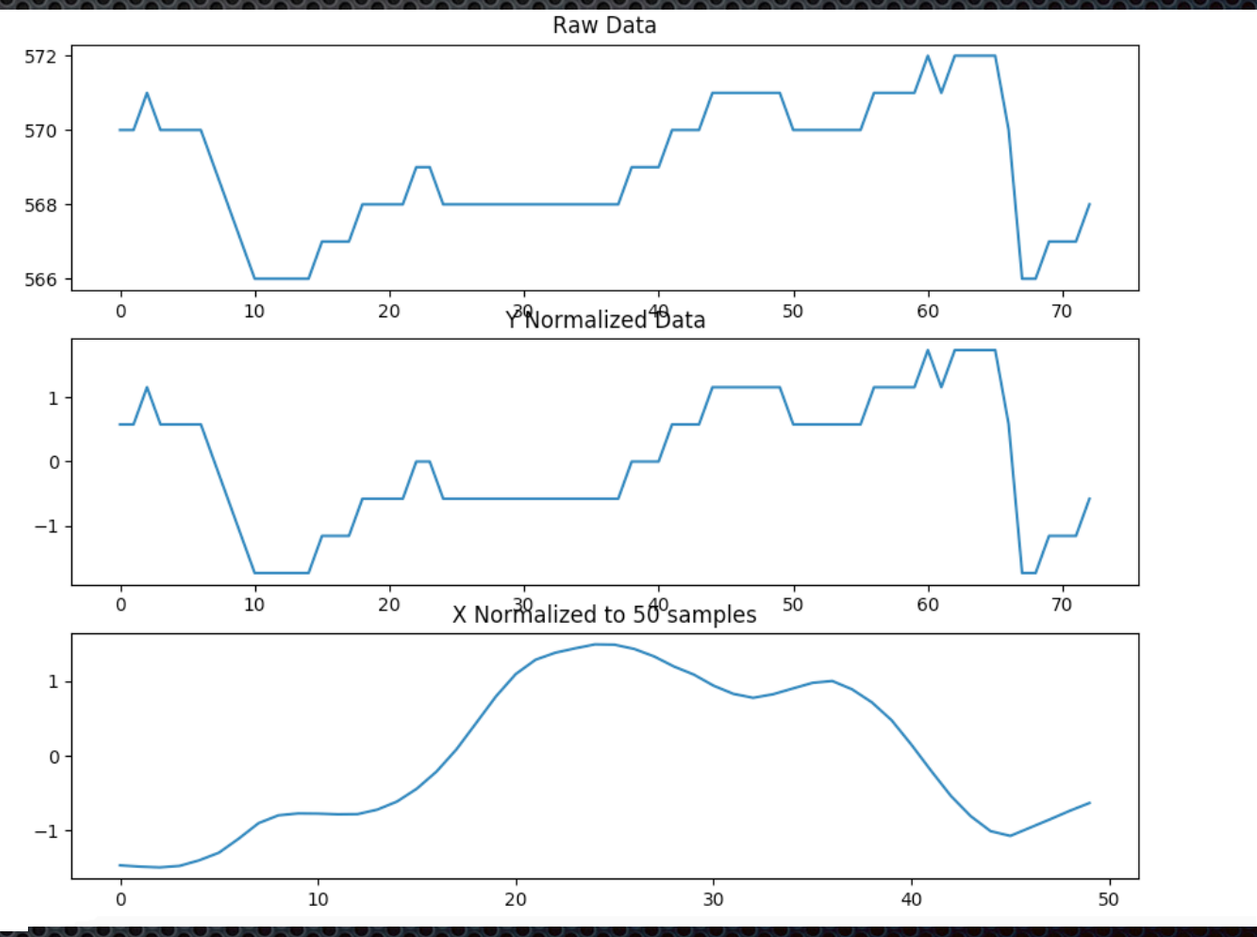


Algorithm for Dynamic gesture recognition.

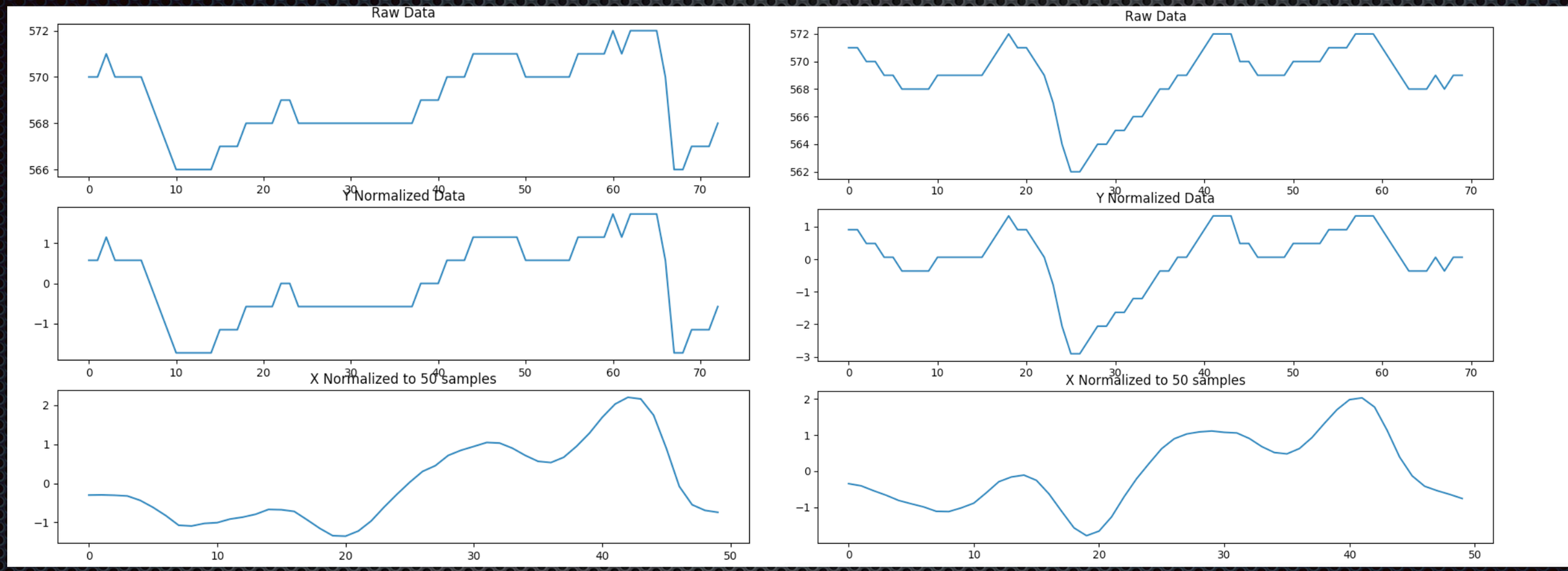


Comparison of x-axis acceleration for the “Door” gesture.





Comparison of y-axis acceleration for the “Door” gesture.



Salient Features of the System

- No hindrance in motion.
- Light weight.
- The system can recognise 27 static gestures and 13 dynamic gestures.
- Can be improved by using a Neural Network and gathering more data.
- Number of static gestures can be increased
- An easy mechanism to collect new data points.
- The size of can be reduced by using a custom made board.
- Can be made wireless.