ROCO503 IMU Report

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# Introduction:

This report details solutions to the tasks set out in the “ROCO503 IMU Coursework 2017-18” document.  
Each task is broken down into four sections:

* Problem statement – Outlines the task boundaries and interpretation
* Hypothesis – Provides a theoretical assessment of the problem and the expected results of the task
* Methodology – Details the step-by-step procedures performed to collect the data for analysis
* Results – Assesses the collected data, comparing and contrasting where appropriate

Finally, the report is concluded with a summary of the tasks performed by each team member, and a brief overview of what has been accomplished.

# Task 1: Noise Analysis

## Problem Statement:

* Quantification of noise present within the Phidget 21 Spatial 1044 along all 3 axes for the accelerometer and gyroscope sensors.
* Identification of dominant frequency bands causing aforementioned noise.
* Demonstrate the effects of filtering with respect to dead-reckoned positional data, contrasting against the stationary ground truth.

## Hypothesis:

## Methodology:

## Results:

# Task 2: Filtering Effects

## Problem Statement:

* Observe differences in dead-reckoned positional data with respect to known motion patterns, specifically:
  + Pendulum motion with known mass and length
  + Vertical motion up and down, aided with a pulley system
  + Z-based motion along a horizontal plane, aided with a smooth table
* Compare and contrast aforementioned positional data for filtered and unfiltered datasets

## Hypothesis:

## Methodology:

## Results:

# Task 3: Comparison with Ground Truth Data

## Problem Statement:

* Perform Task 2 measurements again whilst capturing ground truth data
* Compare and contrast dead-reckoned positional data for filtered and ground-truth datasets

## Hypothesis:

## Methodology:

## Results:

# Task 4: Complementary Filter

## Problem Statement:

* Implement a complimentary filter as set out in the coursework specification document
* Perform Task 3 measurements again with application of the complementary filter
* Compare and contrast dead-reckoned positional data for filtered; complementary filtered and ground-truth datasets

## Hypothesis:

## Methodology:

## Results:

# Task 5: Extended Assessments

## Problem Statement:

* Assess the performance of the system for dead-reckoning the position of the IMU in real time:
  + In 3D space, aka not limited to axial or planar movements
  + Over larger distances
  + Under variable IMU orientation
* Assess efficacy of alternative complementary filter setups

## Hypothesis:

## Methodology:

## Results:

# Conclusion: