Work Package/Deliverables (WPD): Simulation of Inverted Pendulum

Sections 1-7 need to be completed prior to commencing the WPD. Once the assignees and respective reviewers approve the completion of WPD, proceed with sections 8-11.

1 What is the requirement for this WPD:

A simulation using a model of an inverted pendulum shall be created. It will start upright, with no noise. Later, noise can be added so that it falls.

2 What is required for this WPD:

MATLAB and Simulink
Mechanical model of an inverted pendulum

3 Why is it necessary to complete this WPD:

It is necessary for the ability to create, verify and validate balancing system design.

4 How should the WPD be completed, What task is required:

Task 1:

- Form a mathematical model for an Inverted Pendulum with a simple mass point on some upright, weightless arm.
- It is required so that simulation can be done.

Task 2:

- Realise the mathematical model in Simulink, with the pendulum starting upright.
- This is the foundation of the simulation.

If everything went as planned, the pendulum should remain upright without any noise.

Task 3:

- Add noise so that the pendulum falls.
- This is to verify that the simulation works as intended.

Complete on 2023-10-03. Adding additional goals:

Task 4:

- Add controllable engine to simulation that provides torque to the pendulum.
- Allow motor simulation.

Task 5:

- Add motor control system to simulation Just make it a simple P.
- Allow motor control simulation.

Task 6:

- Add Noise to angle and/or vel and/or acc.
- Test with noise.

5 Are there any dependencies of this WPD on other WPDs:

None.

6 Are there any WPDs dependent on this WPD

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7 Start time:

2023-10-02

8 Finish time:

Expected: 2023-10-04
Completed: 2023-10-03 Expanded goals 4,5; Expected: 2023-10-06

9 Does this WPD require a User manual - dependent on other WPD (Yes or No):

No.

10 Does this WPD require a User manual - independent (Yes or No):

Yes.

11 Does this WPD require a Troubleshooting guide (Yes or No):

To be decided.