AME40453 - Automation and Controls
C8 Pre-Lab Assignment

First, go to the Google sign-up sheet and select one of the following: BiCopter, Active Damper on a Pendulum, or Programmable Logic Controller (PLC).

BiCopter OR Active Damper on a Pendulum

1. Write down which of the lab exercises you have chosen.
2. Write out the rotational equation of motion for the system. Include proportional and derivative feedback $\tau = k_p(\theta - \theta_S) + k_d\dot{\theta}$ in your equation.
3. Re-arrange the equation to be in form of a damped harmonic oscillator.
4. Derive a formula for the natural resonance frequency $\omega_n{}'$ in terms of the feedback gains and system parameters.
5. Derive a formula for the damping ratio ζ' in terms of the feedback gains and system parameters.

Programmable Logic Controller (PLC)

1.You will use the Arduino Opta PLC. Look through the user manual for the Opta PLC and bookmark it on your computer.

https://docs.arduino.cc/tutorials/opta/user-manual/

2. Arduino has developed a new IDE platform capable of programming ladder logic. Browse the website for the Arduino PLC IDE software to see what it is all capable of doing.

https://www.arduino.cc/pro/software-plc-ide/

3. Download the Arduino PLC IDE software and install it on you or your lab partner's laptop. (Contact the instructor if neither of you have a Windows laptop.) Instructions for the installation and PLC set-up can be found here:

https://docs.arduino.cc/software/plc-ide/tutorials/plc-ide-setup-license/