SI4 M2M_intro challenge 2 Pizza Transporter

In the previous challenge we studied the Automated Pizza Oven. A pneumatic cylinder is used to transfer the "raw pizza" into the oven under the heater. The disadvantage of the current pneumatic system is it has only two end positions and they're not adjustable.

A new proposal has been done using a flexible transportation for moving the pizza plate or carrier with variable positions. One of the many advantages of this system is it can be used for different oven models with different capacities or length. The pneumatic system has been replaced by an electric actuator also called a DC servo motor and this motor is controlled by a controller aka PID Controller.

Task1

Your task is to do some research about PID controllers and to "tune" (by trial and error) the system to control the carrier position without causing an "overshoot" behavior by choosing the correct Kp-parameter.

An example of the current situation can be watched on "Pizza Transporter.mp4"

Previous research has been done and the interim results shows that "Kp -parameter" lies between **0.02 … 0.1** for the best behavior.

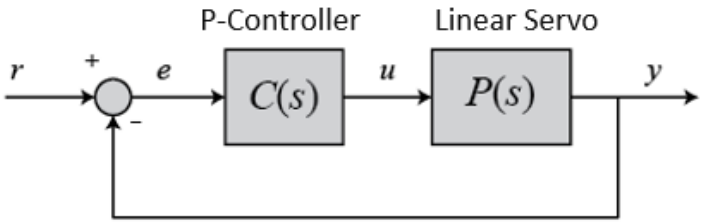


Figure 1 Block diagram of the Linear Servo with Controller

Task2

The current application has only two positions: "**0**" and "**60**".

Modify the current application for the following task.

Proof that your tuned Controller is "robust" by moving the carrier sequentially and endlessly to the following positions or setpoints as described in Figure 2 starting from "**0**" when pressing the "Enable Servo" button once.

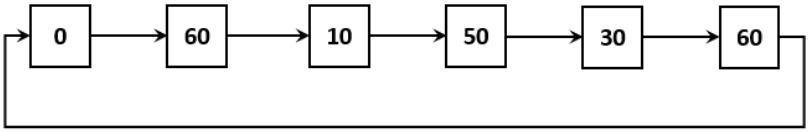


Figure 2 Servo-Move sequence

By pressing the "Enable Servo" again, the sequence will stop after executing the "last" sequence step. (60 → 0).

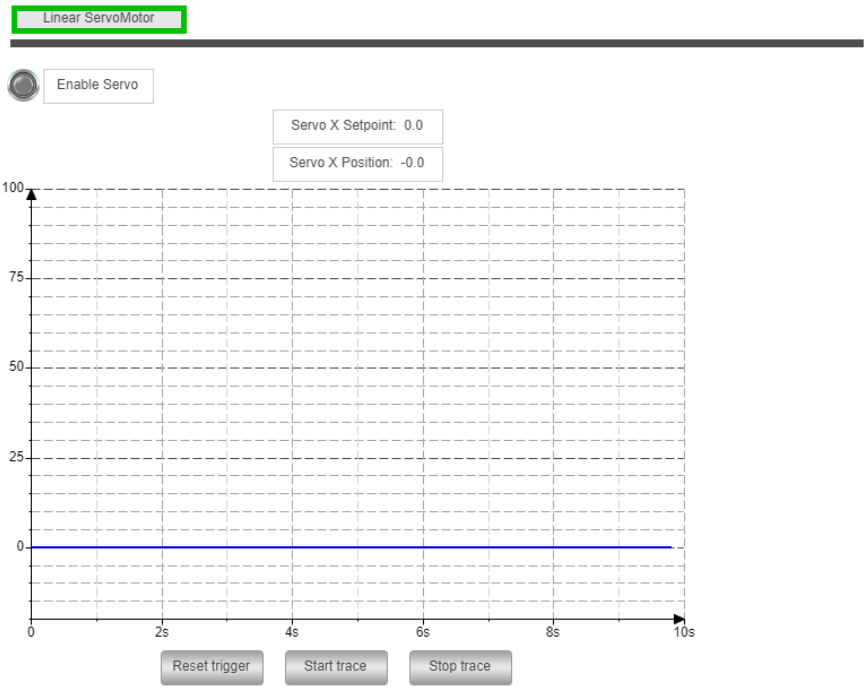


Figure 3 Servo Responses Screen

Download the archived solution "`OvenSliderControl.projectarchive`" and extract this archived solution, see Figure 4, and save it in your own project Folder.

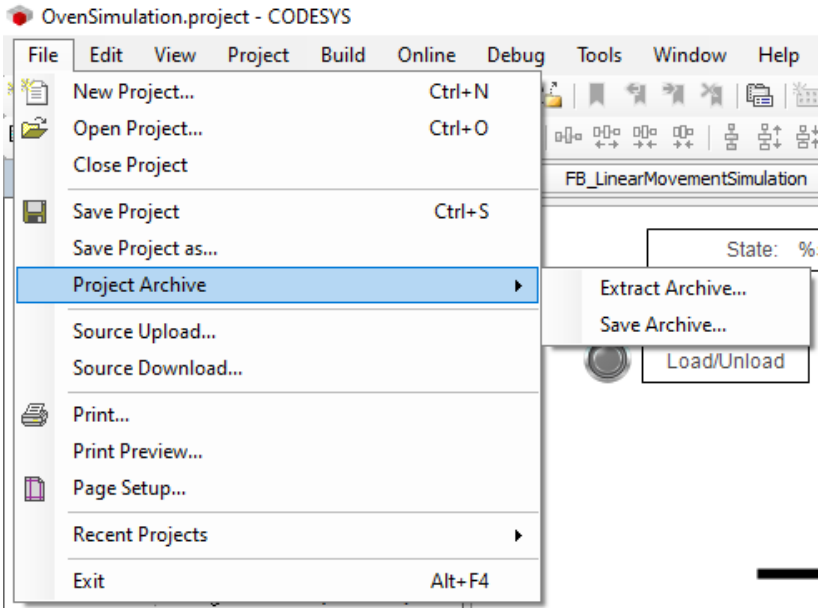


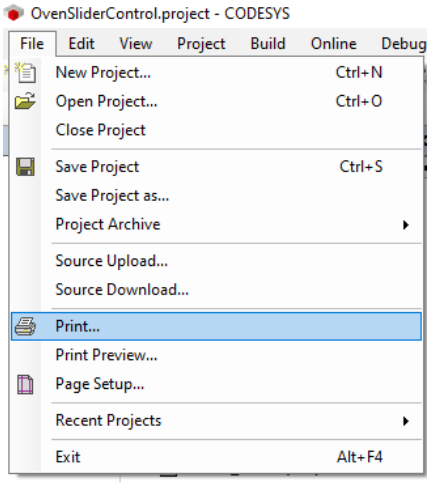
Figure 4 Open an Archived Solution with CODESYS...

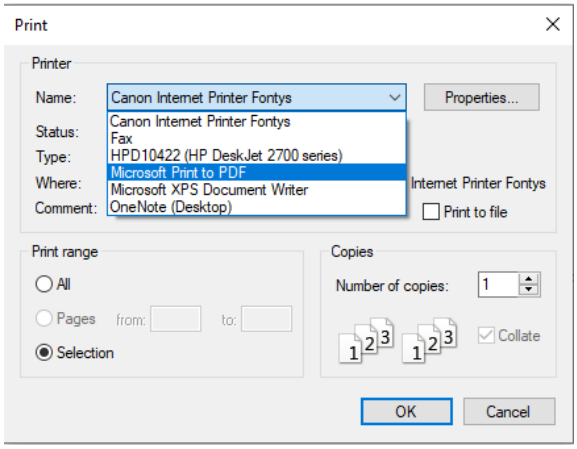
Deliverables:

Please submit your work results in Canvas as follows:

i. An archived project solution "OvenSliderControl.projectarchive" with your modified application.
ii. An archived screen recording of your demo.
iii. A separated pdf or docx file with your "PLC_PROG.PROG" source code of your application.

Printing your source code can be done by the following menu item:





You are free to discuss with other students, but you must submit your own original work. Submissions without a separated report (as *.pdf or *.docx file) and a separated archived project solution (*. `Projectarchive`) will not be graded!

Good luck!

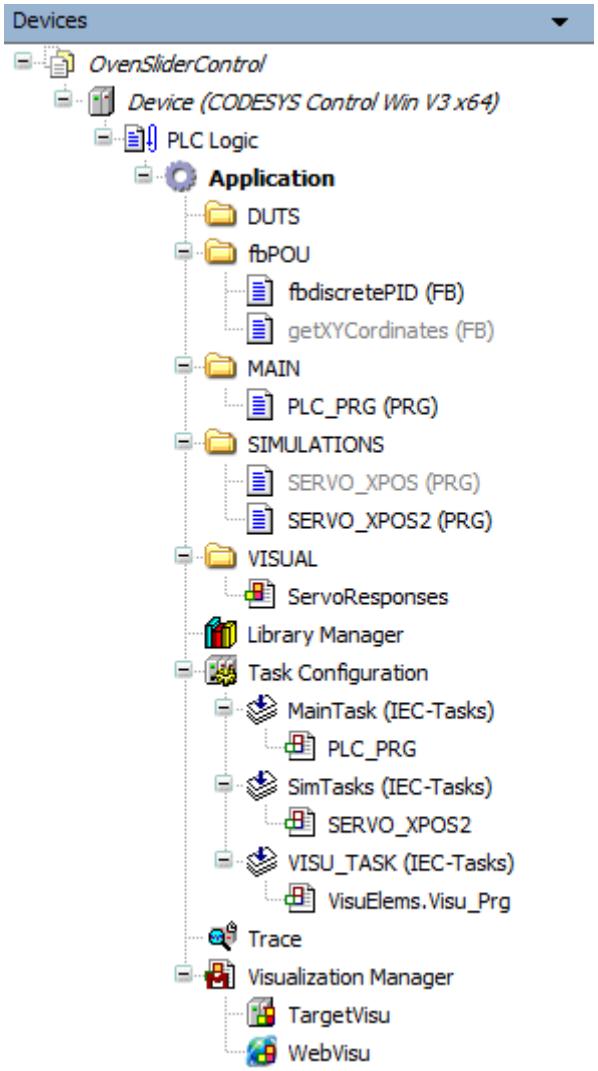


Figure 5 Project tree OvenSliderControl