VERSION 1.1

PDE3422 – Industrial Automation and Control (2017/2018 Assessment)
Assignment 1 of 2 – (70% of module)

Task:
The following controlled sequence is to be programmed using Festo didactic equipment and Siemens S7-1200 PLCs equipped with KP700 HMI.
The sequence is described as:

$$\left[\begin{pmatrix}\mathrm{A}+\\ \mathrm{B}-\end{pmatrix},1\mathrm{s},\begin{pmatrix}\mathrm{A}-\\ \mathrm{B}+\end{pmatrix},\mathrm{B}-,\left[\begin{pmatrix}A+\\ V+\end{pmatrix},\mathrm{Ts},\begin{pmatrix}A-\\ V-\end{pmatrix}\right]^{\mathrm{n}},\mathrm{V}+,1s,A+,\left[\begin{pmatrix}V-\\ A-\end{pmatrix},\mathrm{Ts},\begin{pmatrix}V+\\ A+\end{pmatrix}\right]^{\mathrm{n}-1},\begin{pmatrix}V-\\ A-\\ B+\end{pmatrix}\right]$$

- V is a virtual cylinder to be displayed only on the HMI
- A is a single acting spring return cylinder
- B is a double acting cylinder with cushioned end stops
- n is an integer as 1, 2 or 3 selectable by the user.
- T is a time value equal to an input voltage e.g., 4.5v = 4.5s

1. The sequence is to be initiated by pressing a soft switch programmed onto the HMI.
2. Cylinder V is a virtual cylinder and hence it should be displayed only on the HMI.
3. All the time delays are to be programmed within the PLC.
4. Both the physical cylinders are to be energised by the directional control valves provided by the 4-slice solenoid valve, which in turn are to be driven via relays, which are controlled through the PLC.
   (DO NOT POWER THE VALVES DIRECTLY FROM THE PLC)
5. Cylinder A is to be fitted with roller switches, Cylinder B is to be fitted with magnetic reed switches as proximity sensors,
6. The Analog input Box (or built-in voltage provider) should be used to provide analogue input.
7. The “INITIAL POSITIONS” of the cylinders , before sequence starts, is A-, B+, V-

HMI requirements:

1. The HMI should display the voltage input by the Analog input Box.
2. The display should also display ALL three cylinders in extended or retracted positions (the two Physical cylinders, A and B, as well as the virtual cylinder, V).
3. There should be 3 buttons to serve as following:
   a. START: (GREEN BUTTON) Starts the cycle
   b. PAUSE: (YELLOW BUTTON) pauses the cycle (mid-cycle, anywhere) for 5 seconds, then automatically resumes the sequence.
   c. STOP: (RED BUTTON) Stops, and then resets the program cycle.
4. A dropdown box for the value of n
   a. Default value of n is 2, if the selection is not made by the user.

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Submission requirements:

1. Provide the step 7 S7-1200 PLC and KP700 HMI programs.
2. A PDF listing of your PLC and HMI programme with annotations.
3. Provide link to a maximum of 3-minute video clip of your solution on YouTube.
4. At least one part of the video must show the sequence in full (Without CUTS) to prove function is not just an "edit"

Deadline: 28th November 11:59pm

Notes:

Sharing software files will be treated as plagiarism and will be reported to the Academic Registry for investigation.

Presentation:

Viva of approx. 10-15 minutes to showcase your submitted documents (and video) and answer potential queries. – schedule TBC at a later date, **Probably 13:00 – 17:00 30th November**

CHANGELOG:

V1.1

Addition of B+ in final brackets
Addition of Requirement 7 (Initial Positions)