Alexandria University
Faculty of Engineering
Computer and Systems Engineering Dept.
Fourth Year

CS441: Modern Control
Fall 2018
Assigned: 3ʳᵈ October 2018
Due: 10ᵗʰ October 2018

Lab 1

Problem Statement

Design ladder diagram to control the operation of the SCT conveyor trainer (see Appendix for detailed specifications of the SCT Conveyor trainer) which is connected to Toshiba Ex20 PLC. The operation of the belt should be as follows:

- The conveyor system starts with a switch.
- The belt should begin motion when an infrared sensor (at the beginning of the belt conveyor) detects an item.
- The belt stops when the item is detected in the Reject area of the belt (by another sensor at the reject area). The reject solenoid is then activated to reject the item.
- The belt restarts moving only when a new item is detected by the infrared sensor across the belt conveyor.
- The conveyor system should not respond to any of its inputs if the start switch is off.

Repeat the problem using a pushbutton to start the system and another one to turn it off instead of the switch.

- **Notes**

  - ✓ You should deliver a report showing the Ladder Logic and description of the system inputs and outputs in addition to other used flags if any.
  - ✓ You have to work in groups of five students.

Appendix
The Single Conveyor Trainer

The Bytronic Single Conveyor Trainer (SCT) has been designed to provide a full range of control applications. Its interface allows the unit to be easily interfaced to virtually any PLC or microcomputer.

The SCT in its basic form is provided with 2 sensors and 2 actuators, namely:

Sensors:

- ✓ Infrared thru beam mounted across the belt conveyor with adjustable heights.
- ✓ Infrared reflective sensor attached to the reject solenoid bracket, which may be used to detect the presence of an item near the reject solenoid.

Actuators:

- ✓ DC motor driving the belt conveyor.
- ✓ Reject solenoid which is used to reject components from the belt conveyor.

SCT Universal interface Input / Output (I/O) allocations:

Output	Function
0	Belt Conveyor Motor
1	Reject Solenoid

Input	Function
0	IR thru beam mounted across the belt conveyor
1	IR reflective at the reject area

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