

# ECE 461 - Homework Set #3

PLC Programming - Due Monday, September 14th

Write a PLC program to implement one of the following...

1) PLC Controlled Car:

Input:

- DI\_00 Sensor to detect an object in front of the car

Output:

- DO\_00 - DO\_03 H-Bridge driving a motor
- 0000 Off
- 1010 Forward
- 0101 Reverse

Function: Go forward until you hit something (DI\_00 = 1). When that happens

- Stop for 1 second
- Go in reverse for 1 second (which turns the car through a mechanical design)
- Stop for one second
- Go forward again

2) Drive a conveyor belt which is connected to a motor.

Input:

- DI\_00 Optical Sensor (1 indicates object present)

Output:

- DO\_00 Motor. Closed turns on the conveyor belt.

A part on the conveyor is to be positioned underneath an optical sensor. The operation is

- Drive the conveyor
- When the sensor detects an object,
- Keep the conveyor on for 1.5 seconds
- Then stop the conveyor for 2.0 seconds
- Then restart the conveyor.

3) Accept / Reject Sorting. Repeat problem #2.

Input:

- DI\_00 Optical Sensor (1 indicates object present)
- DI\_01 Good / bad sensor (1 indicates part is bad - problem 3)

Output:

- DO\_00 Motor. Closed turns on the conveyor belt.
- DO\_01 Pneumatic Actuator: Closed pushes the object off the conveyor belt into the trash bin.

A part on the conveyor is to be positioned underneath an optical sensor. The operation is

- Drive the conveyor
- When the sensor detects an object,
- Keep the conveyor on for 1.5 seconds

- Then stop the conveyor for 2.0 seconds
- 0.5 second after the conveyor stops, the good/bad sensor is checked. If the part is bad, the pneumatic actuator turns on for 1.0 second and pushes the object off the conveyor belt into the trash can.
- Then restart the conveyor.

4) Power Line Fault Remover. To remove a fault on a power line (short to ground), the power lines turned off and then turned on three times to try to clear the fault (burn off the tree branch). If the fault isn't cleared after three tries, the transformer turns off and a fault is indicated.

Input:

- DI\_00 Fault detected (1)

Output:

- DO\_00 0 = line open, 1 = line powered
- DO\_01 0 = OK, 1 = fault

5) Counter: Count out 10 pills and fill a box

Input:

- DI\_00 Sensor. 1 = pill, 0 = no pill

Output:

- DO\_00: 1 = First conveyor belt (pills)
- DO\_01: 1 = Second conveyor belt (boxes)

Turn on the conveyor belt, counting the number of boxes that pass by.

- When 10 pills are counted
- Wait 1.0 second
- Stop the conveyor belt
- Wait 1.0 seconds
- Turn on the second conveyor belt for 2.0 seconds to bring forth the next box
- Turn off the second conveyor belt and wait another second (4 seconds total wait)
- Restart the main conveyor belt and repeat