Lab 3 – Logbook

By submitting this log, I acknowledge that all work is my own and I have not received any assistance other than what is noted below.

Date	Acknowledgement
Wednesday 10th July, 2024	We acknowledge that all the work below is ours, and only ours.

List all group members:

Name 1: Shaan Banday

Student ID 1: 20993610

Name 2: Dharmik Ramlingam
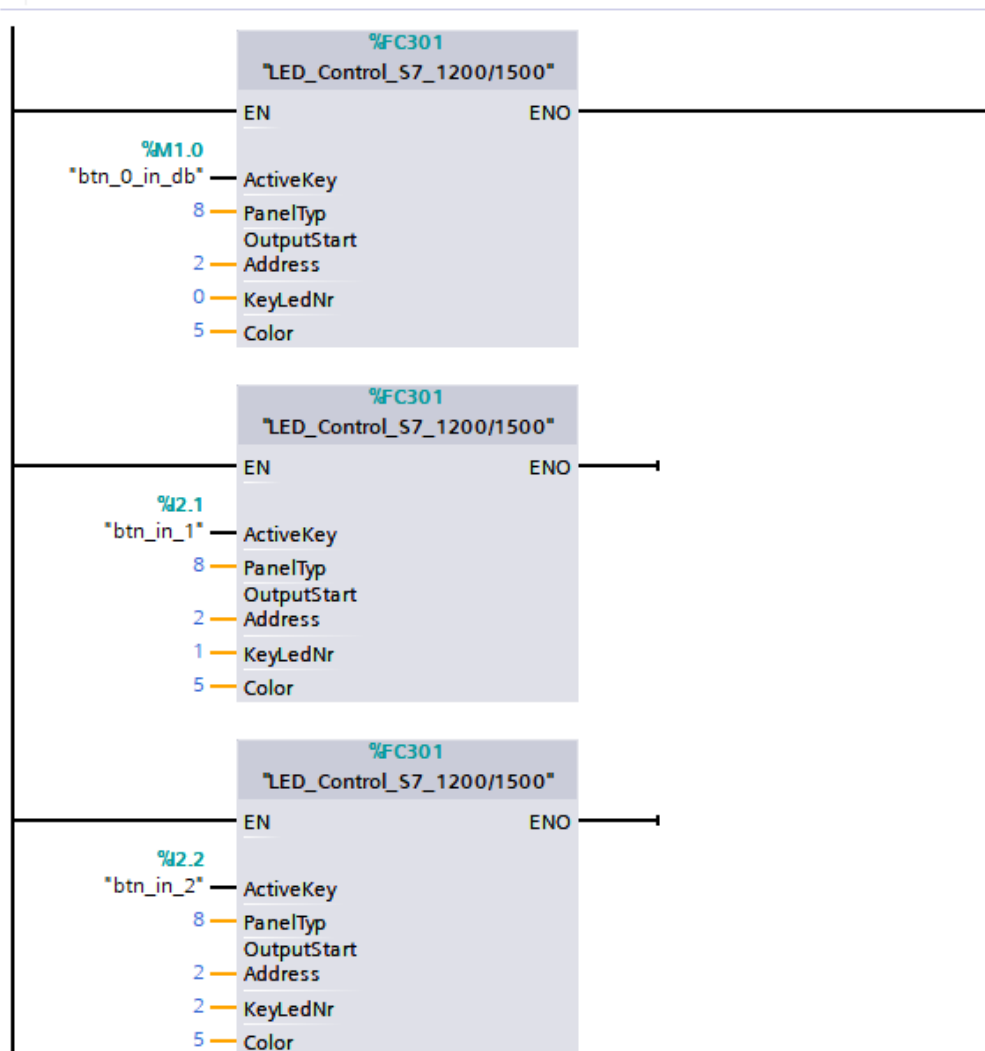
Student ID 2: 21011845
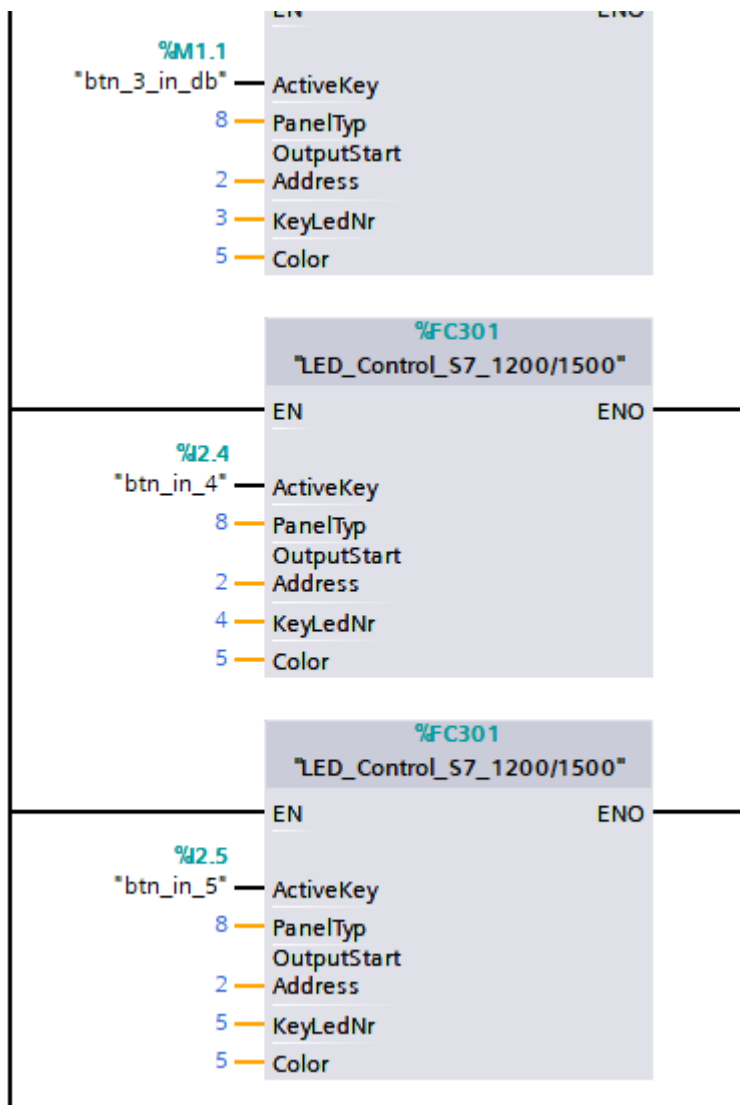
Name 3: Pranav Bommireddipalli
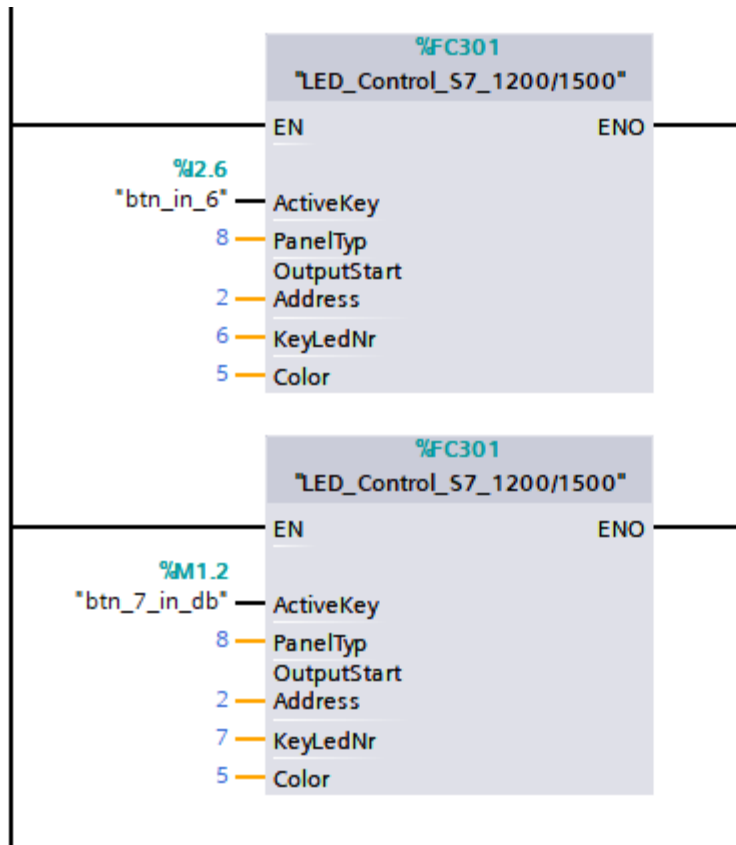
Student ID 3: 21016163

Station number: 9

Exercises

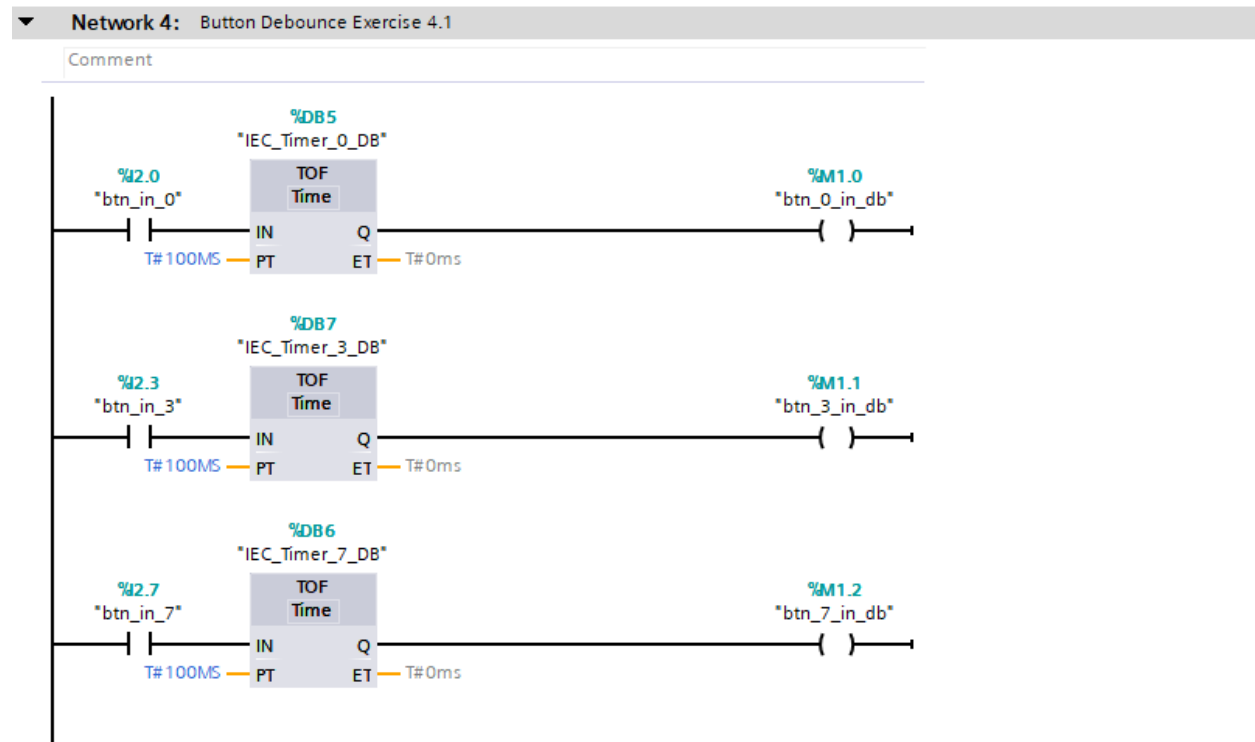**1. Paste here the screenshot of your ladder program from the TIA Portal for exercise 4.1.**

Exercise 1 – LED KP8 Configuration and Remapping:

EN   ENO

%M1.1
"btn_3_in_db" —— ActiveKey
        8 —— PanelTyp
              OutputStart
        2 —— Address
        3 —— KeyLedNr
        5 —— Color

%FC301
"LED_Control_S7_1200/1500"
EN   ENO

%I2.4
"btn_in_4" —— ActiveKey
        8 —— PanelTyp
              OutputStart
        2 —— Address
        4 —— KeyLedNr
        5 —— Color

%FC301
"LED_Control_S7_1200/1500"
EN   ENO

%I2.5
"btn_in_5" —— ActiveKey
        8 —— PanelTyp
              OutputStart
        2 —— Address
        5 —— KeyLedNr
        5 —— Color

```
                              %FC301
                      "LED_Control_S7_1200/1500"
              ┌─────────────────────────────────────┐
         ─────┤ EN                              ENO ├─────
    %I2.6     │                                     │
  "btn_in_6" ─┤ ActiveKey                           │
          8 ─┤ PanelTyp                             │
             │ OutputStart                          │
          2 ─┤ Address                              │
          6 ─┤ KeyLedNr                             │
          5 ─┤ Color                                │
              └─────────────────────────────────────┘


                              %FC301
                      "LED_Control_S7_1200/1500"
              ┌─────────────────────────────────────┐
         ─────┤ EN                              ENO ├─────
     %M1.2    │                                     │
"btn_7_in_db"─┤ ActiveKey                           │
          8 ─┤ PanelTyp                             │
             │ OutputStart                          │
          2 ─┤ Address                              │
          7 ─┤ KeyLedNr                             │
          5 ─┤ Color                                │
              └─────────────────────────────────────┘
```

Exercise 1 – Logic:

Network 4: Button Debounce Exercise 4.1

Comment

2. Paste here the screenshot of your ladder program from the TIA Portal for exercise 4.2.
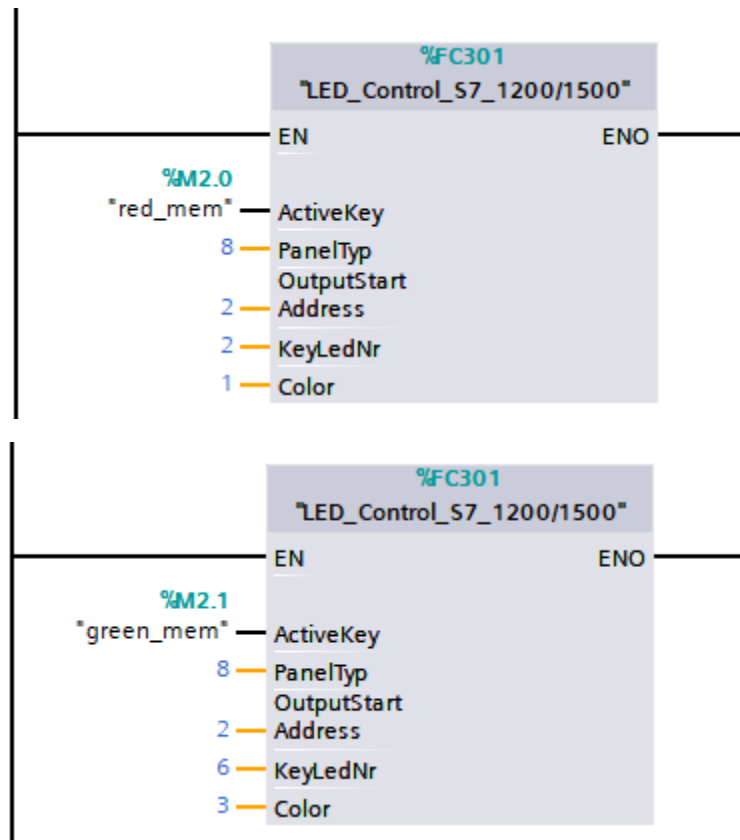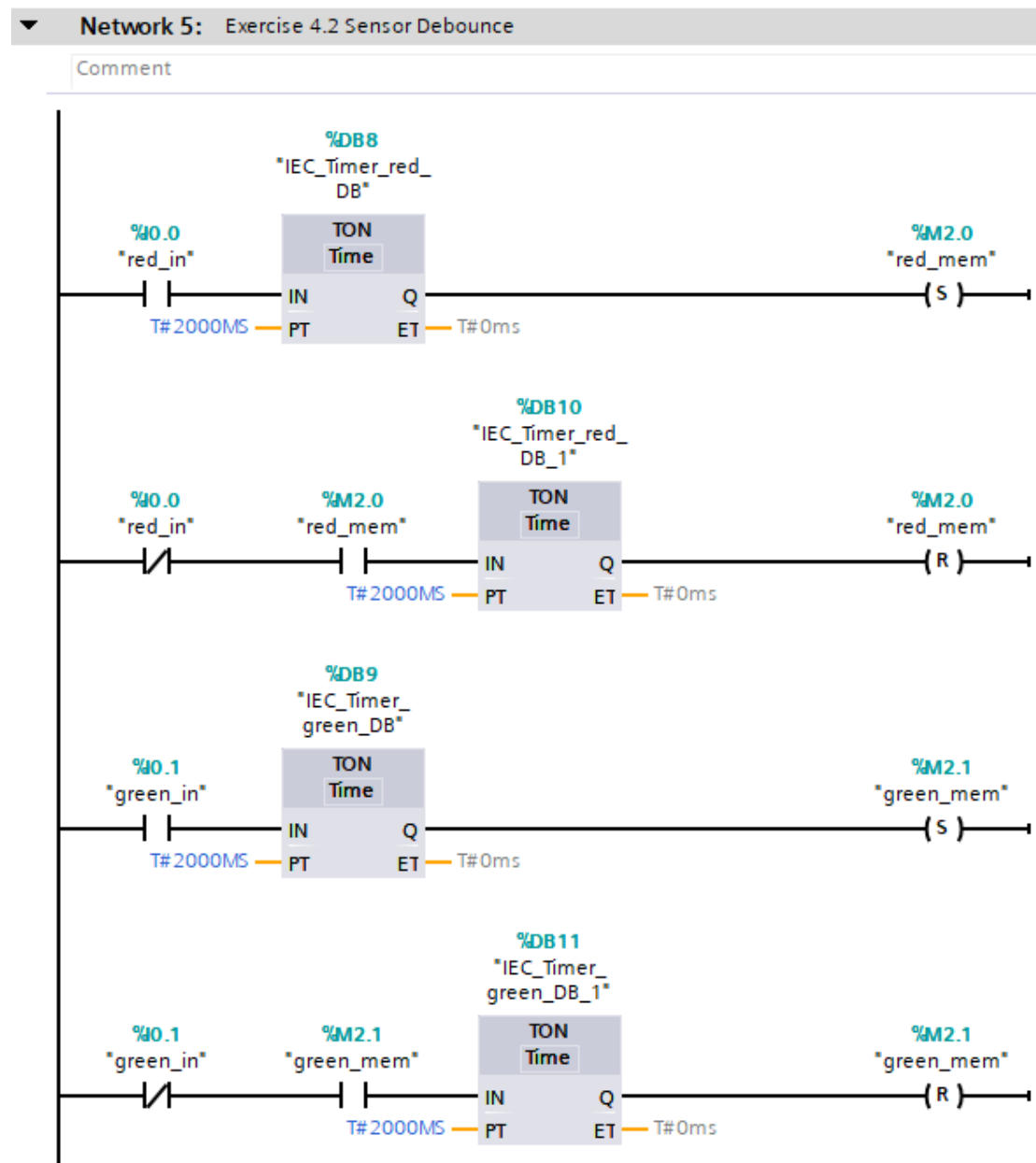
Exercise 2 – LED KP8 Configuration and Remapping:

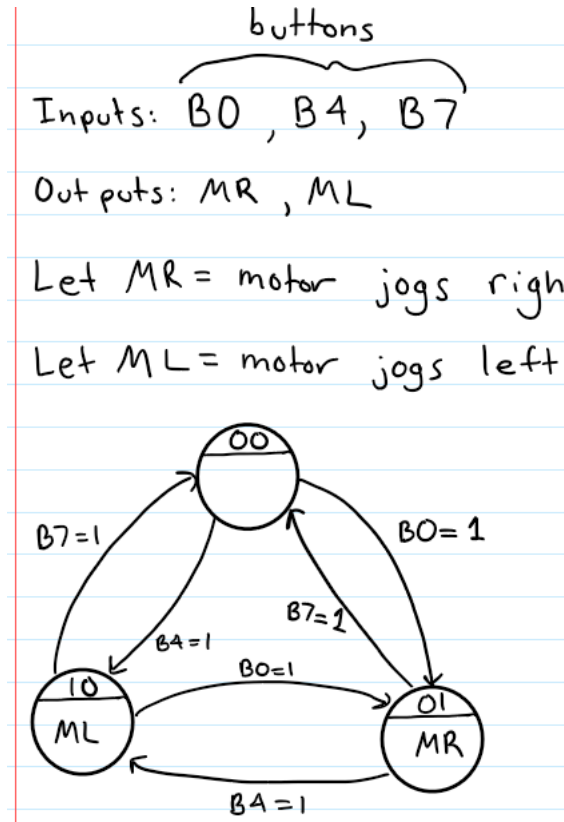***NOTE: Only LED #2 and #3 are changed from the previous question.**

Exercise 2 – Logic:

Network 5: Exercise 4.2 Sensor Debounce

Comment

3. **For exercise 4.3 – 4.5, provide:**
a. **A screenshot/picture of the state diagram, indicate which are the parts (states and transitions) added for 4.4 and 4.5.**

4.3:

buttons

Inputs: B0 , B4, B7

Outputs: MR , ML

Let MR = motor jogs right

Let ML = motor jogs left

State diagram:

- State 00 (top)
- State 10 / ML (bottom left)
- State 01 / MR (bottom right)

Transitions:
- B7=1 (from 10 to 00)
- B0=1 (from 01 to 00)
- B4=1 (from 00 to 10)
- B7=1 (from 00 to 01)
- B0=1 (from 10 to 01)
- B4=1 (from 01 to 10)

4.4: Added RED and T_DN as inputs. Added T as an output. Added state 11 and associated state transitions (from 01 to 11 and 11 to 00).
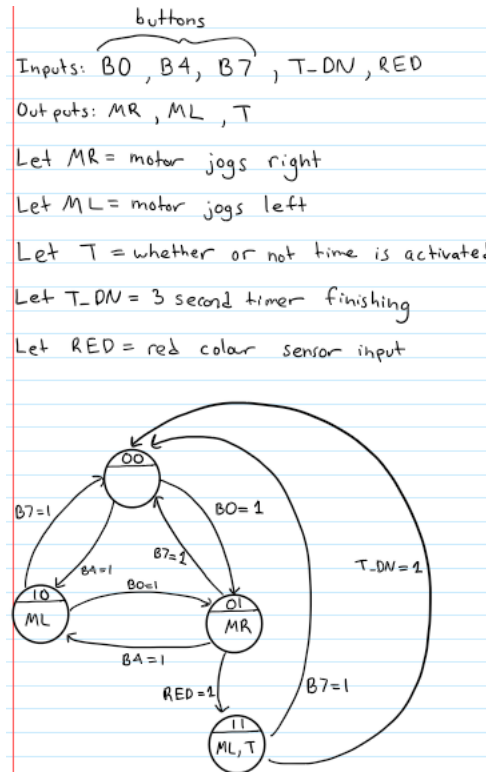
4.5: Added green as input. Added extra memory bit to account for extra state, added state 1XX, added transitions from 1XX to 00 and all states to 1XX.
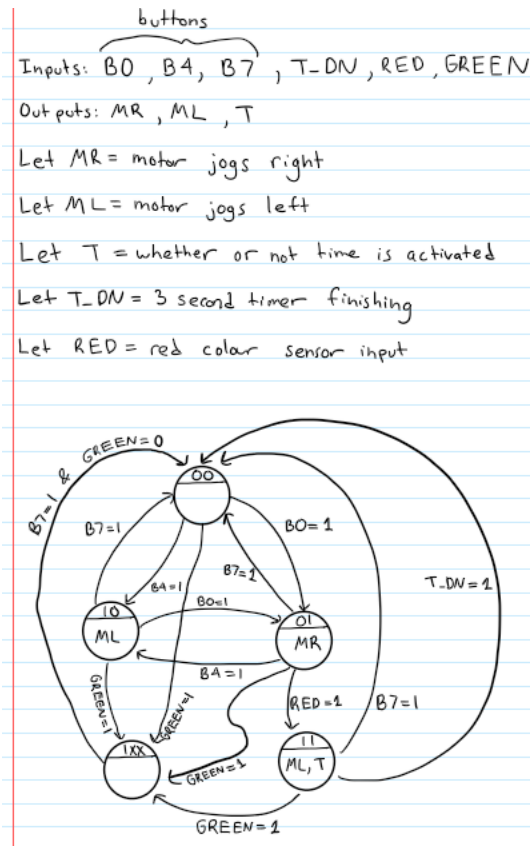
b. **Provide a short description of how the state diagram was conceived, and of its working principles.**

4.3: There are 3 states, and one condition that activates each state. When button 0 is pressed, the motor jogs right regardless of which state it is initially in. Same goes for button 4 being pressed to jog the motor left and button 7 to stop the motor.

4.4: Since the same conditions from 4.3 still need to be met, we can add to that state diagram. An additional state that jogs the motor left and starts a 3 second timer is added. This state is activated if the colour red is sensed while the motor is jogging right. While in this state, only button 7 and the input of the timer completing effect anything.

4.5: Since the same conditions from 4.4 still need to be met, we can add to that state diagram. Now, we need another state that prevents anything from happening when green is sensed at any point in time. Until green is stopped being sensed by the block, and button 7 is pressed, it remains in this state. This state is the fifth state and there aren't any more so we call it 1XX to simplify the ladder program so we only need to change 1 bit instead of 3.
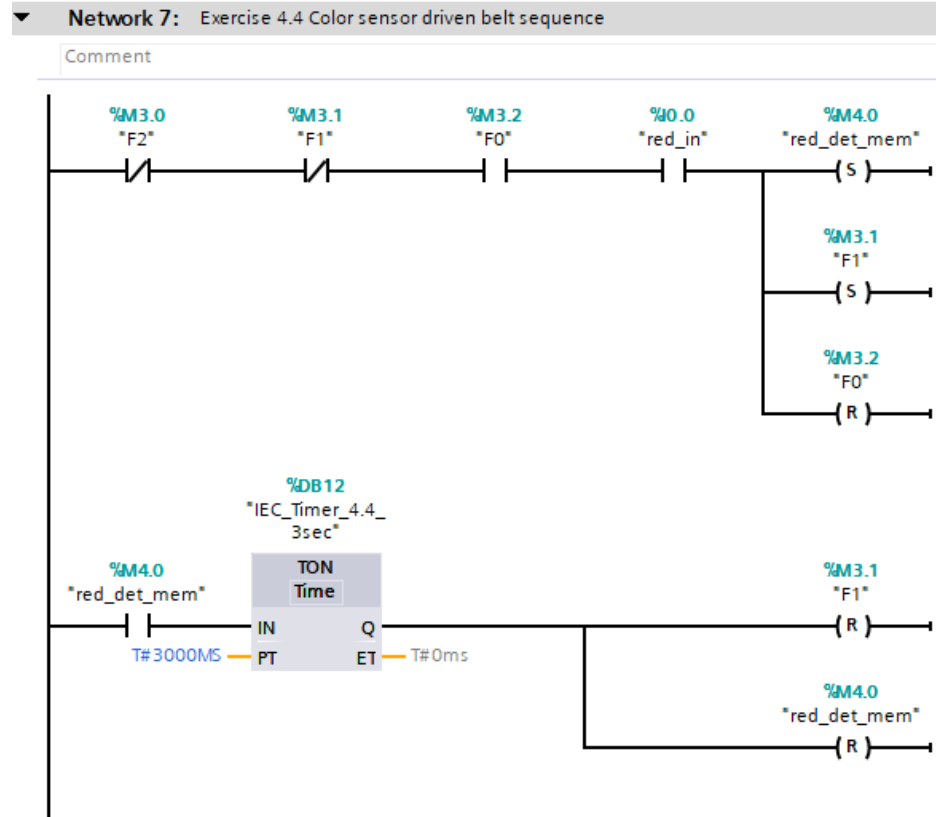
c. **Paste here the screenshot of your ladder program from the TIA Portal for exercise 4.3.**

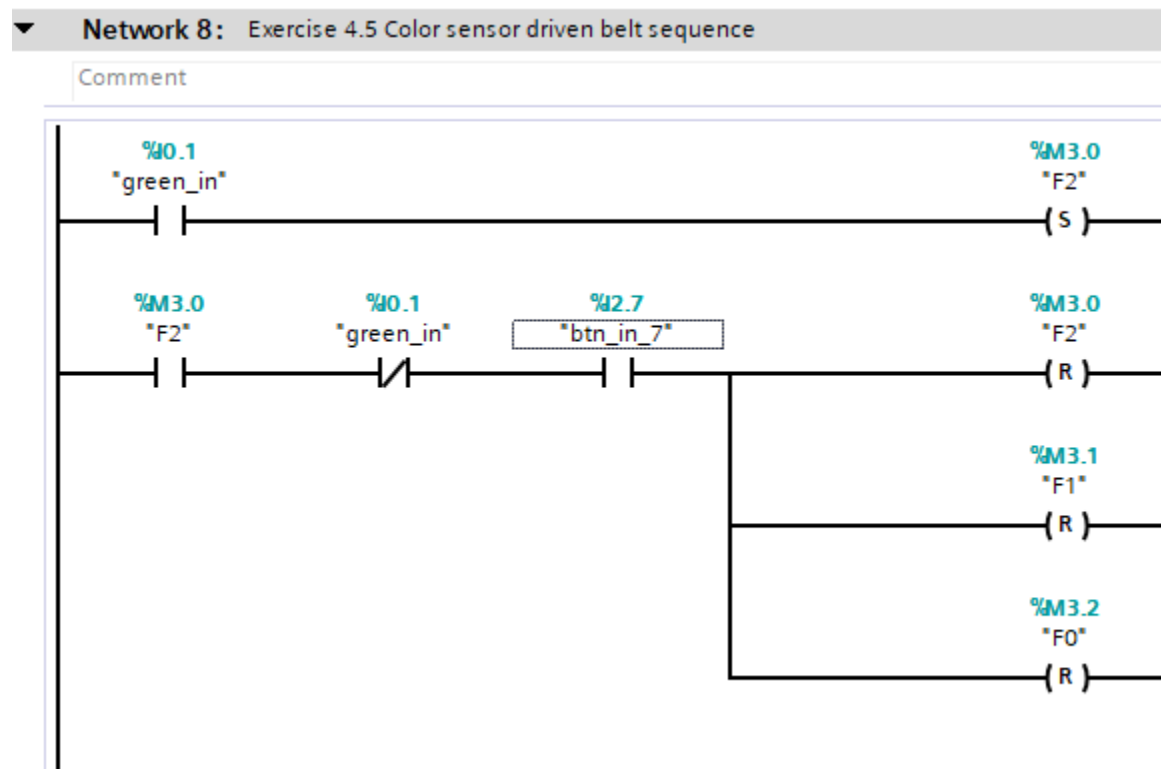**Network 6:** Exercise 4.3 Button controlled conveyor belt

Comment
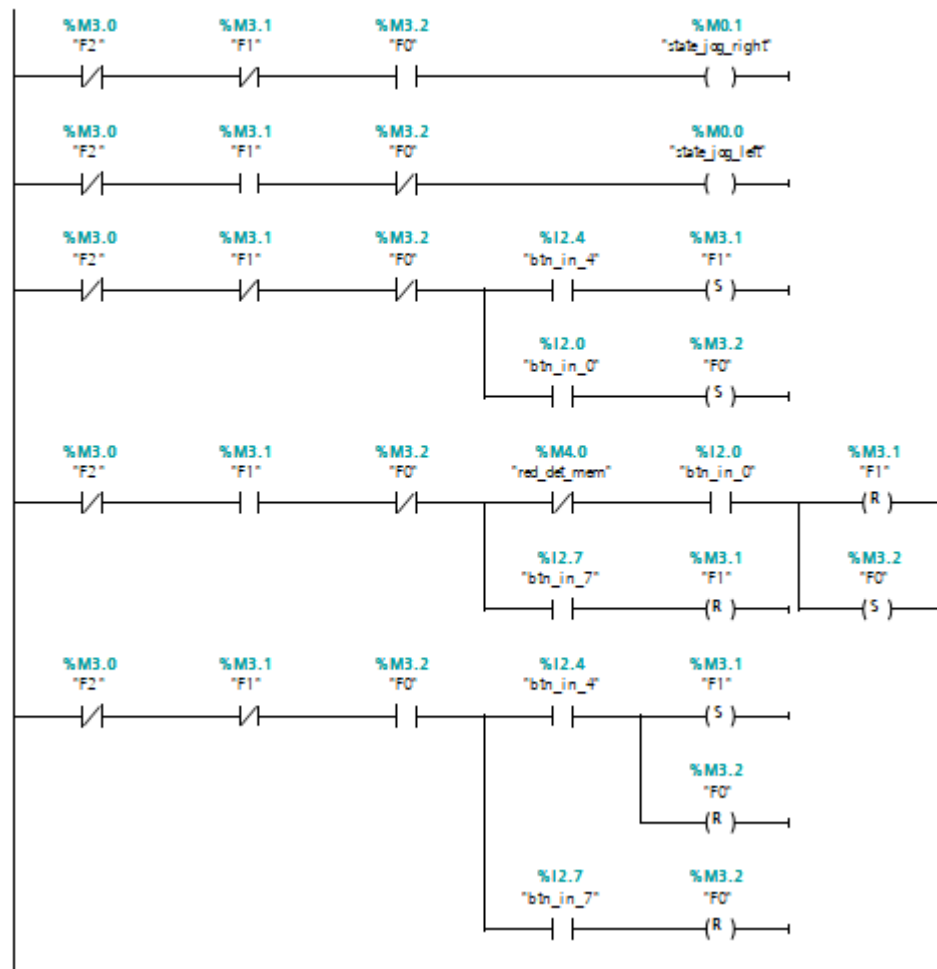
d. **Paste here the screenshot of your ladder program from the TIA Portal for exercise 4.4.**

Network 7: Exercise 4.4 Color sensor driven belt sequence

Comment

e. **Paste here the screenshot of your ladder program from the TIA Portal for exercise 4.5.**

Network 8: Exercise 4.5 Color sensor driven belt sequence

Comment

4. Bonus: Paste here the screenshot of your ladder program from the TIA Portal for exercise 4.6
Part 1 only: