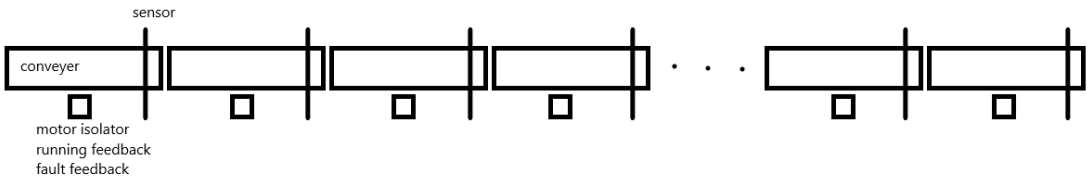
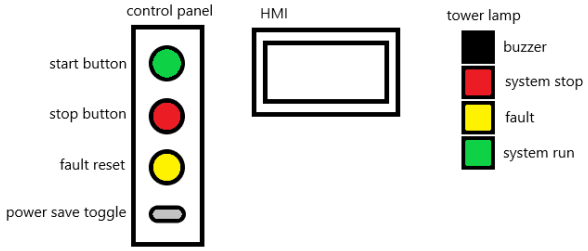
conveyor belt system with basic controls and conditions

design a conveyor belt system with the following specifications

consists of

- N conveyors of length L moving at speed S
  - object detector on each conveyor
  - motor isolator
  - motor running feedback
  - motor fault feedback
- control panel
  - start push button with illumination
  - stop push button with illumination
  - fault reset with illumination
  - power save toggle
  - lamp
    - system run
    - system stop
    - fault
    - buzzer
  - HMI with a diagram of the conveyors and each conveyor's status





working logic

start condition

- activates when the start push button is pressed
- the start button illuminates immediately
- system run lamp flashes for 10 seconds as a warning
- conveyors start in a cascading manner from upstream to downstream with a delay of `2*L/S` seconds between them
- once all conveyors are running:
  - system run lamp stops flashing and stays on
  - conveyors enter running condition

running condition

- all conveyors continue running unless another condition is triggered

power save condition

- activates when power save toggle is enabled
- if the sensor feedback of the `n-1-th` conveyor is 0 for `2*L/S` seconds:
  - the `n-th` conveyor stops to save power
  - running feedback = 0, fault feedback = 0 on the `n-th` conveyor
- if the sensor feedback on the `n-1-th` conveyor turns 1:
  - the `n-th` conveyor resumes running

dieback condition

- activates when the fault feedback of the `n-th` conveyor is 1
- the `n-1-th` conveyor stops when its sensor detects an object (sensor feedback = 1)
- actions:
  - fault lamp starts blinking
  - buzzer beeps once
  - fault feedback of the `n-1-th` conveyor turns 1
- the cycle continues upstream until conveyor 1
- once all conveyors downstream to the `n-th` conveyor have fault feedback = 1:
  - upstream conveyors enter power save mode (if not already)
  - system run lamp turns off
  - fault lamp stays on

    - buzzer beeps twice every 1 minute
    - fault reset button illuminates

after the fault at the `n-th` conveyor has been cleared:

- the system remains in fault condition
- operator must press the fault reset button
- upon pressing:
    - fault reset lamp starts blinking
    - buzzer beeps once
    - upstream conveyors of the `n-th` exit power save mode in a cascading manner with `2*L/S` second delay
    - after another `2*L/S` seconds, the `n-th` conveyor:
        - starts running
        - running feedback = 1
        - fault feedback = 0
    - after another `2*L/S` seconds, downstream conveyors return to their previous condition (running or power save)
    - fault reset button stops illuminating
    - fault reset lamp turns off
    - system run lamp turns on

stop condition

- activates when the stop push button is pressed
- stop button illuminates immediately
- system run lamp starts blinking
- conveyors stop in a cascading manner from downstream to upstream:
    - each conveyor stops when its sensor detects an object (sensor feedback = 1)
- once all conveyors have stopped:
    - system run lamp turns off
    - system stop lamp turns on
    - buzzer beeps once