Università degli Studi di Bergamo

Automazione Industriale

Laboratorio 2

Esercizio 1 SFC

Sistema che presenta un pulsante di **start**, una luce di colore **verde** ed esegue **un'operazione**.

Premuto il pulsante di start viene eseguita l'operazione per 20 secondi.
Una volta terminata viene accesa la luce verde.

Dopo 15 secondi di luce verde il sistema ritorna in attesa del prossimo start.

Esercizio 2 SFC

Sistema che simula il comportamento di un motore dotato di protezione e allarme.

Premo il tasto di **avvio**:

- Se non vi è la protezione scatta **l'allarme**
- Se vi è la **protezione** il motore si avvia

Se durante l'allarme inserisco la protezione, l'allarme si ferma.

Il **motore** una volta avviato rimane acceso per 30 secondi. Se durante questi secondi viene premuto il tasto di **stop**, il motore viene fermato.

Esercizio 3 SFC

Sistema che simula il comportamento di una fotocellula e un azionamento di lavorazione.

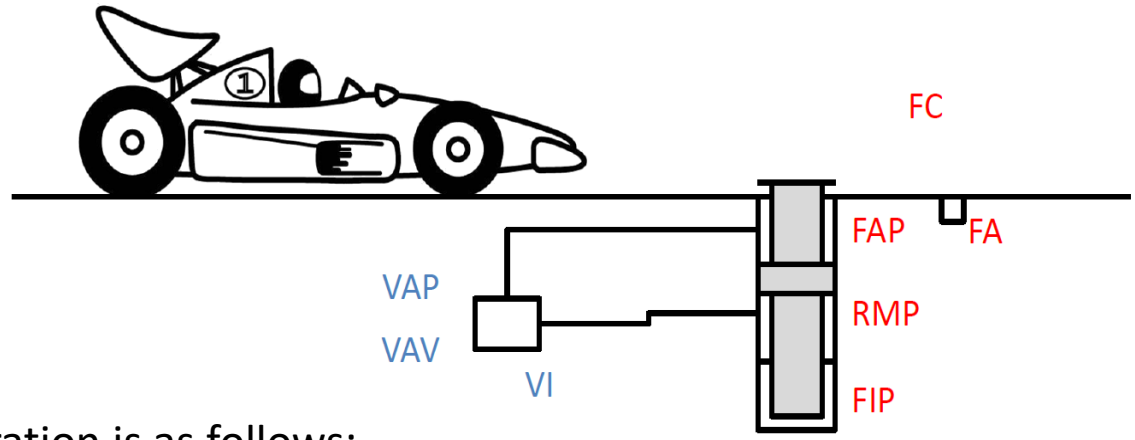
Dei pezzi passano davanti alla fotocellula automaticamente (non bisogna gestire nessun nastro o movimentazione)

- Incremento un contatore N sul fronte di salita della fotocellula F
- Se N>=3, alimento l'azionamento per 10 secondi e riporto il sistema in attesa

Durante l'azionamento, N dovrà essere resettato e la fotocellula deve smettere di contare.

Esercizio 4 SFC

The device, installed on the pit stop pad, aims to lift a racing car during the tire change (through a hydraulic cylinder controlled by a valve). The diagram is as follows:

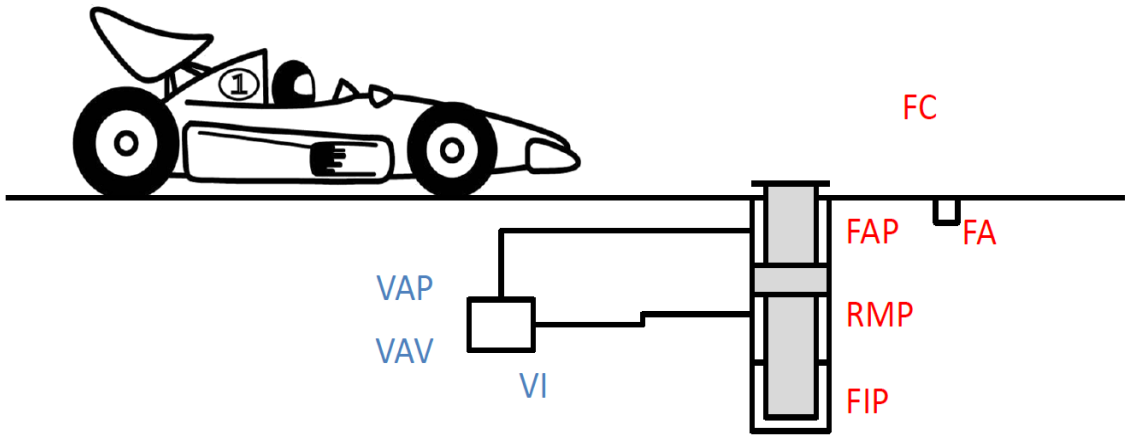


The basic operation is as follows:

- The car is placed in the pitch, so that the photocell detects it
- The piston starts lifting in flat forward mode (assuming it starts from the FIP condition) until RMP is reached.
- Piston moves up to FAP in fast forward mode
- The piston stays in place until the end stops the tire change.
- Piston returns to FIP with VI control

Set the program so as to force the piston to return in the case of FA = 0 (in any condition it is found).

Esercizio 4 SFC



Inputs:

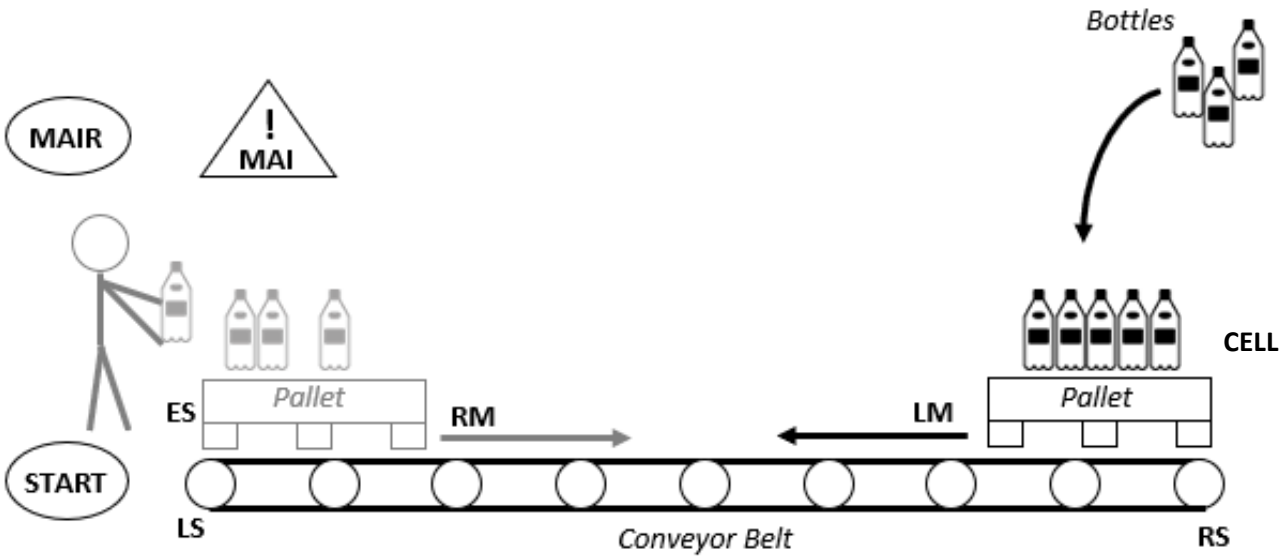
- FIP - Reverse piston limit switch (0 not activated - 1 activated)
- RMP - Half stroke piston achievement (0 piston extended by less than half stroke - 1 piston extended by more than half stroke)
- FAP - Forward piston limit switch (0 not activated - 1 activated)
- FA - Car photocell (0 car not present - 1 car present)
- FC - End of tire change (0 gearbox in progress - 1 gearbox not in progress

Outputs:

- VAP – flat forward mode (slow)
- VAV – fast forward mode (fast)
- VI – reverse mode

Esercizio 5 SFC – (EXE BONUS)

Develop a control software for bottles transport system.



The plant is composed of a conveyor belt, which can move a pallet to the right and to the left thanks to, respectively, a right motor *RM* and a left motor *LM*.

Two sensors, *LS* and *RS*, are placed on the bottom out of the belt in order to indicate, respectively, the reaching of the pallet to the left (*LS* = 1) and to the right margin (*RS* = 1).

Of course, motors should be switched off when reaching the limits (LM and RM = 0).

Esercizio 5 SFC – (EXE BONUS)

When the pallet is on the right side of the belt, some bottles are loaded on the pallet itself by an external machine. The pallet can transport 10 bottles. A photocell *CELL* get the presence of the bottles. Once there are 10 bottles on the pallet, after waiting 5 seconds for safety reasons, the pallet needs to be moved to the left, activating the left motor *LM* (*LM* = 1).

An additional sensor *ES* weighs the pallet on the left side of the belt: it is located under the pallet to indicate whether the pallet is empty or not (if it is empty: *ES* = 1, otherwise *ES* = 0). When the pallet is on the left side of the conveyor belt, it is emptied by an operator. Then, it moves back to the right margin (*RM* = 1) only when it is empty, and the operator presses the button *START*.

The *START* button is disabled after 25 bottles, when the system requires maintenance. In this case, an alarm *MAI* is activated and resets only after the operator presses the maintenance reset button *MAIR*.