Modern Control

Elevator Controller Ladder Diagram Design

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Introduction

It is required to Design Ladder Diagram that will automatically control the operation of the Elevator through two levels (first and top) using the level push buttons.

The elevator is initially at the bottom level and waits until either the level 4 car pushbutton is pressed or the level 4 elevator call pushbutton is pressed.

The elevator travels to the top floor with 60% speed, reducing its speed to 30% when approaching its destination, and then fully stops by activating the brake when it reaches its destination.

The car door is opened (for 5 seconds) and then closed. The elevator then waits until either level 1 car pushbutton is pressed or the level 1 elevator call pushbutton is pressed, which makes the elevator travel to its new destination (Level 1) according to the same rules. The above sequence is repeated infinitely

Inputs

Floor 1 up	x0
Floor 4 down	x5
Car floor 1	x6
Car floor 4	x11
Floor 1-4 Sensors	x12-x15

Outputs

Open/Close door	y0
Release Car brake	y1
Motor 60% speed	y12
Motor 30% speed	y13
Motor direction up/down	y14

Truth Table

	M0	M1	M2	M3	M4	M5	M6	M7
Y0	Close (0)	Close (0)	Close (0)	Open (1)	Close (0)	Close (0)	Close (0)	Open (1)
Y1	0	1	1	0	0	1	1	0
Y12	0	1	0	0	0	1	0	0
Y13	0	0	1	0	0	0	1	0
Y14	Up (1)	Up (1)	Up (1)	Up (1)	Down (0)	Down (0)	Down (0)	Down (0)

Assumptions:

When the elevator is at floor 1, we are expecting 2 events; even if a request from floor 1 or floor can be achieved, we are here assuming that the further request will be served first (i.e. go to floor 4 first)

The same assumption is developed when the elevator is at floor 4