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Repo : https://github.com/zayn-stu/TrafficLightsASM

This project implements a simulated four-way traffic light controller using the DEEDS simulator and the DMC8 microcomputer. The system combines polling and interrupt techniques to control normal operation and handle emergency conditions.

The hardware interface consists of three input switches and two output ports. IA0 is used as a “Start Sequence” switch, polled by the program to begin operation. The Reset line remains asserted and is not handled in software. The Interrupt line is connected to the processor’s interrupt input and is used to force an emergency state. Inputs IA1–IA7 are tied to logic 0. Traffic lights are represented by colored LEDs connected to ports OA0–OA5 and OB0–OB5, with each set of three LEDs forming one traffic light (Green, Yellow, Red).

In normal operation, after reset, the controller waits in a polling loop until IA0 is set to 1. Once activated, it continuously cycles through a predefined sequence of green, yellow, and red states for four traffic lights, using software delays to model realistic timing. The outputs are driven by writing specific bit patterns to ports OA and OB, ensuring correct color activation for each direction.

An interrupt service routine is installed at address 0038h to handle emergency conditions. When the Interrupt switch is toggled to 0, an interrupt is triggered, immediately forcing all traffic lights into the red state by setting the appropriate output values. The system remains in this emergency state for a defined delay. When the Interrupt signal returns to 1, the handler exits and normal sequencing resumes from the main loop.

Behavior:

The microcomputer has 3 switches.
'Start sequence' at IA0
'Reset' at 'Reset'
'Interrupt' at 'Int'

IA1 through IA7 are connected to logic 0

Ports OB0 through OB5 have colored LEDs
Ports OA0 through OA5 have colored LEDs.

The sequence of the colors (from OA5 to OB0):
Green, yellow, red, green, yellow, red, and so on.

OA5 : Green
OA4 : Yellow
OA3 : Red
OA2 : Green
OA1 : Yellow
OA0 : Red
OB5 : Green
OB4 : Yellow
OB3 : Red
OB2 : Green
OB1 : Yellow
OB0 : Red

On animation start the switches are set to :
Start sequence : 0
Reset : 1
Interrupt : 1

Reset must stay 1, leave it untouched.
Toggling Start Sequence to 1 starts the sequence.
Toggling interrupt to 0, activates all red LEDs and deactivates the rest.
Toggling interrupt from 0 to 1 reactivates the sequence.