

Traffic Lights Control System

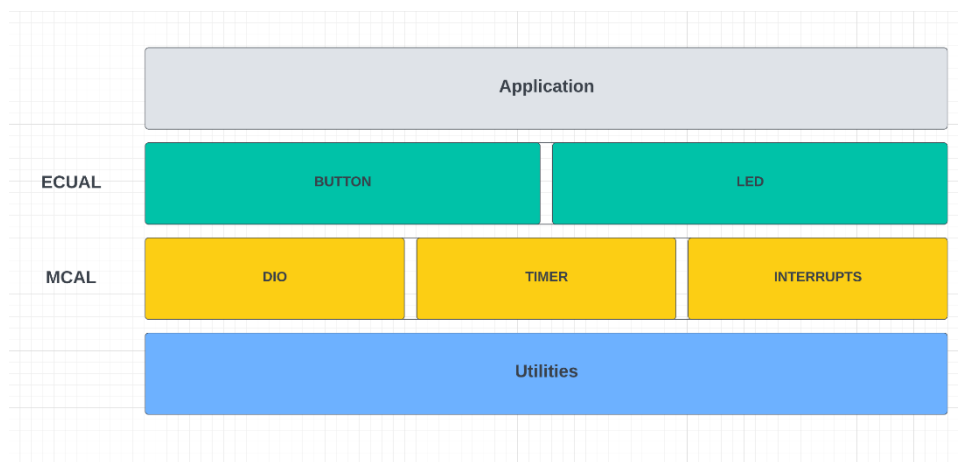
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System Description

A traffic light control system that provides “Pedestrian Mode” feature. By default, the traffic lights periodically change its’ light color between green, yellow, and red with 5 seconds’ period which is defined as “Normal Mode”. Pedestrian Mode is presented by a button that gives the ability to interrupt the normal mode based on the state of the car traffic lights:

1. Red State (Cars to stop): Pedestrian Mode gives you some more seconds to walk.
2. Yellow or Green: Yellow lights will work for both cars and pedestrians, then the pedestrian traffic lights will be green and cars traffic lights will be red for 5 seconds, then the system will return to work on normal mode

System Design



The system is designed based on the layered architecture model, Application, ECUAL, MCAL, and Utilities Layer.

Microcontroller: ATmega32

Utilities: Folder contains 3 Header files:

1. Common Macros: Macros to set, clear, toggle, or check on the state of certain bit.
2. Registers: file that contain memory mapped definitions of the registers
3. Standard Types: Macros of variable data types and default values like HIGH, LOW, etc.

MCAL: Layer contains:

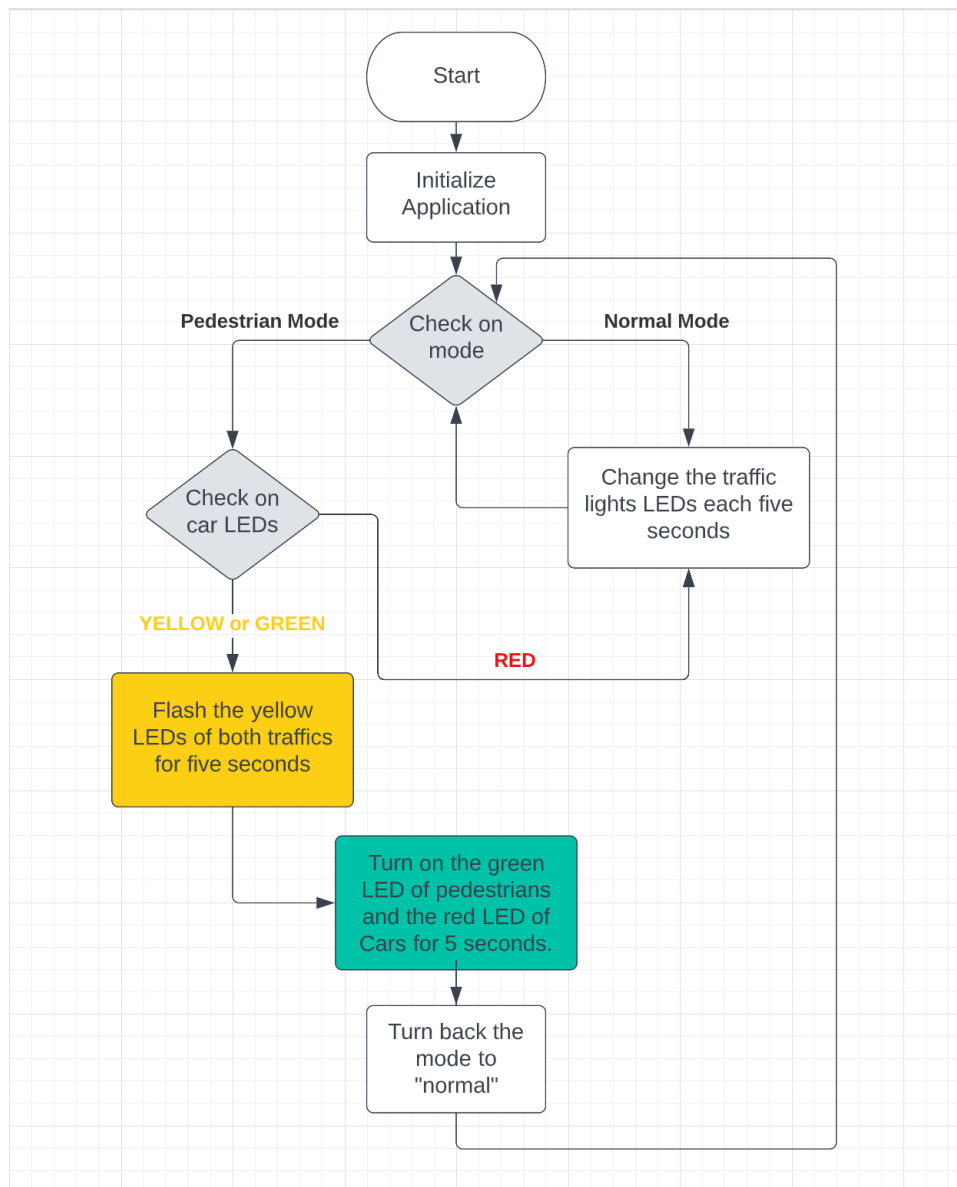
1. DIO Driver: based on ATmega32, DIO Driver supports 4 Ports.
2. TIMER Driver: Driver of Timer1 (16-bit timer) in ATmega32
3. INTERRUPTS Driver: Driver that initialize external interrupt 0 and define the assembly instructions of interrupts like ISR and INTO_vect.

ECUAL: Layer contains:

1. BUTTON Driver: Driver to initialize and check whether the button is pressed or not.
2. LED Driver: Driver to initialize, turn on, turn off, toggle, and check on the LED state.

The system contains 6 LEDs (Outputs of the system) and 1 Push Button (Input of the system).

System Flow Chart



System Constrains

1. If a pedestrian pressed on the button for long time, no action will be taken.
2. If a pedestrian pressed on the button for more than one time, action will be taken only once based on the first press, and the action must be done before starting again.