Project2

On Demand Traffic Light

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System description:

This system is a traffic light system made for both cars and pedestrians, so it had to be there 2 mode one for the cars and supposed to work all the time (Normal Mode), and the other is the mode made for the people who wants to pass the street (pedestrian Mode), and this mode is supposed to be triggered when a push button is pressed by the pedestrians.

Pedestrian Mode had conditions in it when it pressed as when the button pressed when the cars green on or yellow is blinking is different from what happen when the cars red light is on.

The used board in this system is ATmega 32 board.

System Design:

This system contains 3 modules (MCAL, ECUAL, APP).

1. MCAL Layer:

This layer contains all the functions that talk directly to the microprocessor through registers.

In this system this layer contains:

- The EXTI driver for the interrupt needed to call the pedestrian mode.
- The DIO needed to deal with the input output pins in the microcontroller.
- The Timer driver to create a delayed also needed for the upper layer.

2. ECUAL Layer:

This layer contains functions that deal with the external hardware and use the MCAL layer to manage the communication between those hardware devices and the microcontroller.

In this system this layer contains:

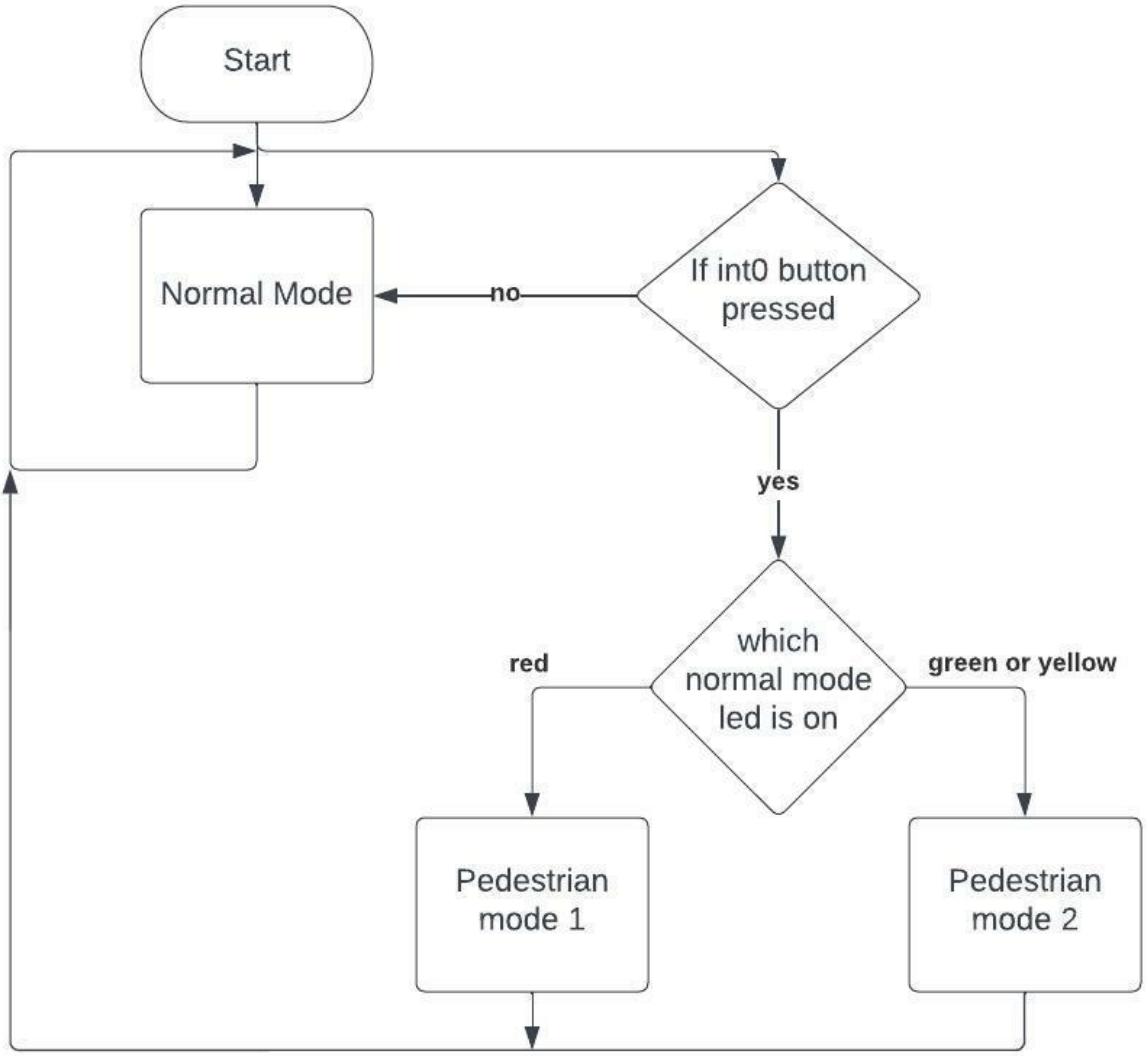
- LED driver to control the led used in normal and pedestrian modes
- BUTTON driver to initialize and control the button used to interrupt the system.

3. APP Layer:

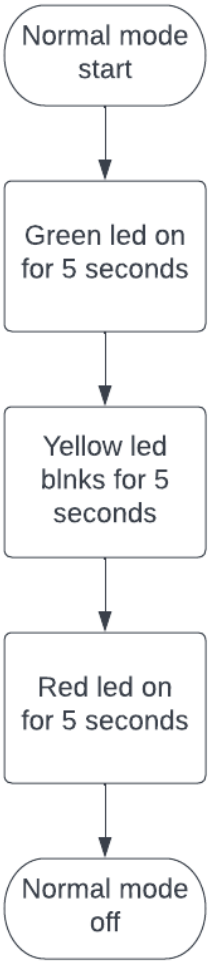
This layer contains all the logic in this system which uses all layers below it to make the application happen as needed, the needed logic is to make 2 modes one for the cars and the other is for the pedestrian.

- **Normal mode:** this mode is made for cars. The main logic in it is that when the system starts the green led on for 5 seconds then yellow led blinks for 5 seconds and at last the red led on for 5 seconds, this mode supposed to be the default mode.
- **Pedestrian mode:** this mode is made for pedestrians, and it starts when the pedestrian presses the button, this interrupts the normal mode and has 2 conditions.
    - Mode1: this mode starts when the button is pressed when the red led of the normal mode is on, the green led is directly on while the red led for the cars are also on and this lasts for 5 seconds till the 2 yellow led (normal, pedestrian) starts to blink while the green pedestrian led is on, then the green led for cars is on and the red led for pedestrian is on and continue from we stopped in the normal mode.
    - Mode2: this mode starts when the button is pressed when the green led is on or the yellow one is blinking during the normal mode, the 2 yellows led starts to blink for 5 seconds and then do all the things done in mode1.

System Flow chart:



Normal mode:



Pedestrian modes: