Embedded Systems Professional Track

EgFWD - Udacity

On-demand Traffic Light control

Project Documentation

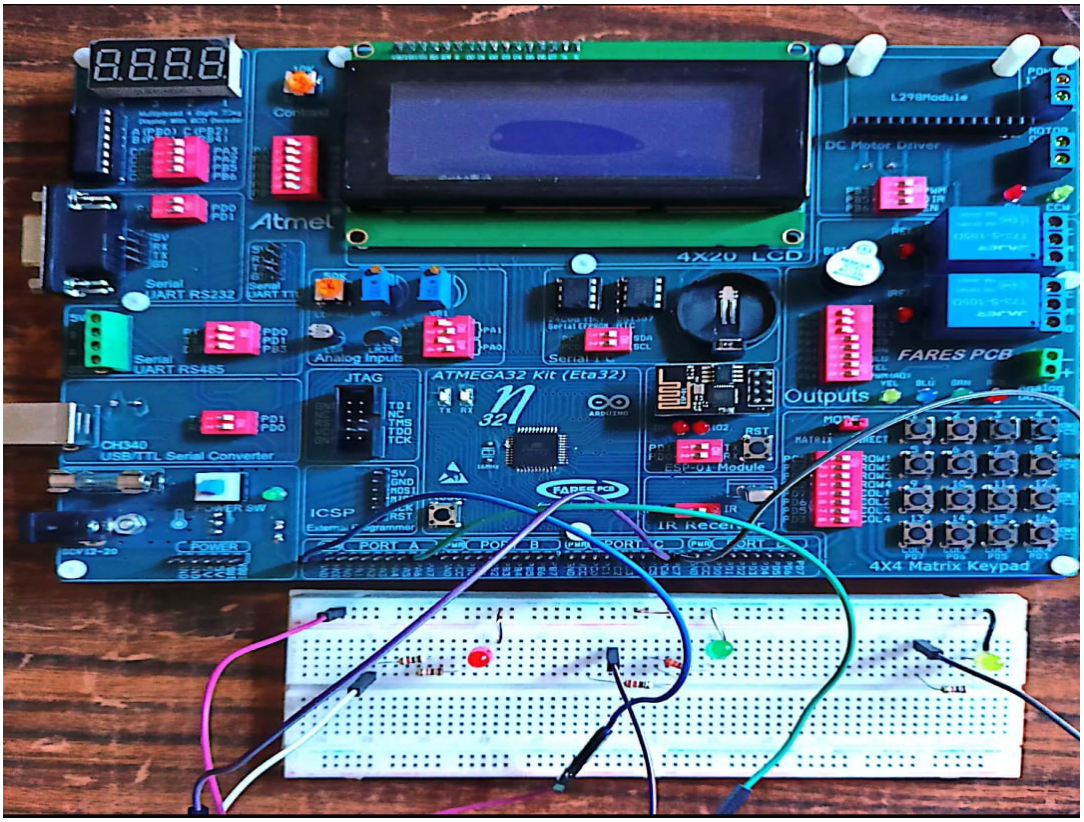
By:

Yosra Attaher

Table of Contents

1. System Description

1.1 System Overview



The system aims to provide an on-demand traffic control system. It includes a pedestrian button to allow for pedestrians to pass.

1.2 System Functionality

The system should satisfy the following requirements:

- Traffic light for cars.
- Traffic light for pedestrians which opposes the car's.
- Can detect when the button is pressed.
- Change state and give pedestrians priority.

2. System Design

2.1 Hardware components

The system consists of:

- AVR Atmega32 (1MHz) Privided from ETA32 board
- 2 Green LEDs
- 2 Yellow LEDs
- 2 Red LEDs
- 2 300 Ohm resistors
- 3 10k Ohm resistor
- 1 Push Button
- Breadboard
- Jumper wires

2.2 Operating Environment

The program is implemented using eclipse IDE and tested on the hardware directly (ETA32 board).

The project consists of 4 layers which are: MCAL, ECUAL, Utilities and App, each layer defines specific functionality.

2.3 Design

The system is designed as a state machine, the change of each state is based on the previous state, we have five states four of them just to make the traffic light work if there is no trigger, the last one is implemented only if the button is pressed.

Due to limitation of hardware resources specific ports and pins are used, they are showen in the following table.

Component	BTN	Red _L_Car	Red _L_Man	GRN_L_Car	GRN_L_Man	YLW_L_Car	YLW_L_Man
Port	D	B	A	A	C	A	C
Pin	3	7	7	4	6	6	7

In this system timer0 is used in CTC_MODE to make delays, the daufult delay is 10 sec and if the button is pressed the dellay of yellow ligth decreases to 5 sec only.

Interrupt1 is used when SW4 is pressed to activate the state which gives pedestrians priority.

3. State Machine