

**MANUKAU INSTITUTE OF TECHNOLOGY
SCHOOL OF ELECTRICAL ENGINEERING AND TRADES
COMPUTING GROUP**



Embedded Systems 1 505.704

PROJECT – TRAFFIC LIGHTS

SEMESTER 1, 2011

You are to design a traffic light control system based on the PIC 18F4520. At a minimum you must provide control for a cross-roads intersection with a red/orange/green light set for each through road. For extra marks you can add in features such as right-turn arrows and pedestrian crossing lights.

To allow for expansion you are to drive the lights through a binary decoder of your choice. Using 4 output pins on the PIC for example, you could provide 16 output lines with an appropriate decoder.

Your design is to be based on a state machine.

Your design should “rest” on the main road and only change state when a vehicle arrives on the side road. Vehicle arrivals can be simulated with a push-button input. You should use a binary encoder of your choice so that you can monitor 16 inputs on 4 port pins. This will allow you to implement your design using only one port of the 18F4520.

The length of time the lights will stay green for the side road varies between 2 and 30 seconds depending on the traffic volume. Similarly the length of time the lights stay green for the main road after a vehicle has arrived on the side road varies between 2 and 30 seconds depending on the traffic volume. It is up to you to determine how to implement this.

Timing information is to be sourced from an external Real Time Clock chip of your choice.

After each change of state the system is to generate a “trace” message which it transmits out an RS232 port. This message could either be printed to a line printer or captured by a terminal program.

An LCD is to be provided which will display the current time and state.

You should decompose your project into modules and design, write and test each module independently before putting it all together.

Bonus mark ideas (each worth 2 marks up to max of 10)

- Ability to set clock time and date.
- Allow parameters such as cycle time to be configured via the LCD.
- Allow parameters such as cycle time to be configured remotely via the RS232 port.
- Ability to configure serial port parameters such as baud rate.
- Right-turn arrows (will require extra inputs and outputs).
- Pedestrian crossing lights (will require extra inputs and outputs).
- Any other idea approved by your tutor.

DELIVERABLES

Your design environment should be MPLAB SIM and PROTEUS VSM. You may be able to test part of your project on the target board but this is not a requirement.

Submit a written report detailing in clear form all the work carried out. Include flow charts and code.

Report weighting 30% comprising:

- Top Level description 2%
- Task decomposition and test 6%
- Top Level integration and success of the overall project 9%
- Structured presentation and documentation 3%
- Extra features 10%

Demonstrate your work to the supervisor – this will be done on or before the submission date for the project report at a time to suit and will take the form of an interview. Weighting 10%.

DUE DATE

Wednesday 8th June, 2011. You must demonstrate your project and submit your report using eMIT at 3pm and demonstrate your project at a time arranged with your tutor between 3 and 7 pm in P312.