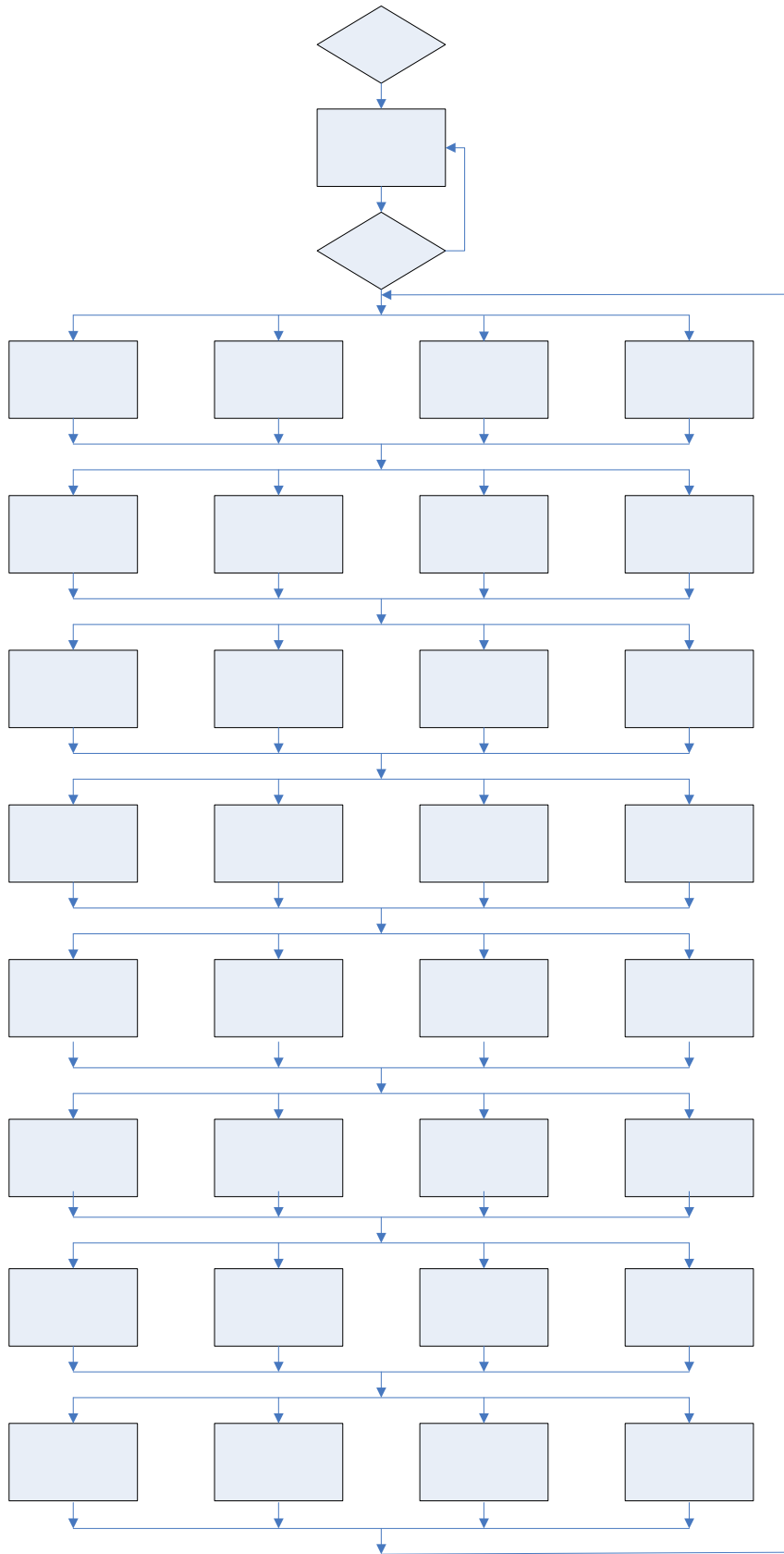


## CHAPTER 4

### RESULT AND DISCUSSION

#### 4.1 The Cycle Flow for the Normal Mode Traffic Light Control

As soon as power supply is restored, the 4 junctions give red light as a standard procedure. Explanation refers to the Figure 4.0 shows the cycle flow of Normal Mode operation. When the start button is pressed, first junction gives the green light and after a few delay it turns to yellow. After the short delay, it turns to red. Then 2<sup>nd</sup> junction gives the green light and continues the same step. Complete until 4<sup>th</sup> junction, then come back to 1<sup>st</sup> junction and continue the same sequence. When the stop button is pressed, all phase give the flashing amber light. In case the power supply cut and restored, this project will give the red light at all junction.

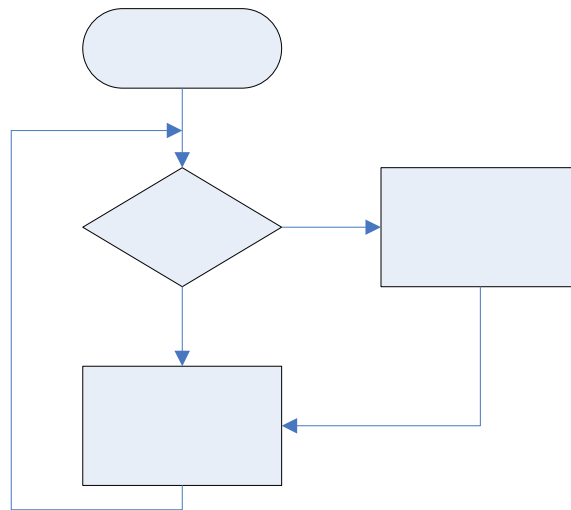


Green 1  
Yellow 1

**Figure 4.0:** Cycle Flow for Normal Mode operation

## 4.2 Night Mode Traffic Light Operation

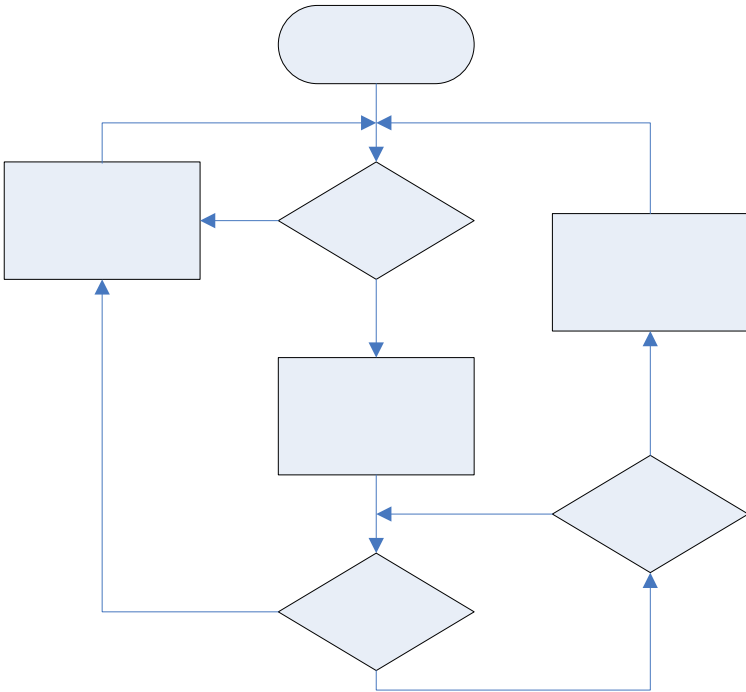
When the traffic volume becomes low, this Intelligent Traffic Light automatically changes the mode to Night Mode. This situation always happened at the night usually begin 1.00 a.m. In this mode, the sensors are the important thing to detect the incoming vehicle. The sensor that has been used in his project is IR Transceiver. When the sensor detects a car, the program automatically changes the red to green. The green period is short so that the sequence becomes fast. However, when another sensor senses a vehicle on any junction, the green light will be prolonged to allow that vehicle to pass by that junction. The fast sequence will then continue. Figure 4.1 below shows the flow operation of the sensor as input program.



**Figure 4.1:** Sensor as input program for Night Mode

The input sensors actually have been program to identify a low traffic light volume period. In this period the system will test for incoming traffics whether the traffic is low or not base on both situations above the system control will switch between Normal Mode and Night Mode. If the traffic volume less than 2 cars within 5 seconds (delay have been set in program), the system would give instant pass green light to any vehicle approaching the junction. However, if the traffic volume is higher than setting parameters, the system will return to Normal Mode. Figure 4.2 shows the

flow operation how the traffic light system switches automatically between Normal Mode and Night Mode.



**Figure 4.2:** Process flow of the system change between Normal Mode and Night Mode

### 4.3 Emergency Mode Operation

The Intelligent Traffic Light system has been programmed which set to Emergency Mode automatically whether the system currently in Normal or Night Mode. The system will response to emergency vehicle such as fire brigade, ambulance and police vehicle to pass as soon as it senses their present at the junction. The system will back to the present Normal Mode after the certain delay. In the event of two emergency vehicle approaching from different direction, the system will give green light to the one that comes first (first come first serve basis)

In order to implement this feature, a transmitter must be installed on emergency vehicles, which will be activated as the emergency siren system is switch on. The transmitter output in the form of RF or IR must be coded so that the receiver sensor

which has been installed beside the rode could response correctly to avoid stray interference signal from other systems. Probably, the stray signal could give the error input to the control system. However, in this project, the switches have been placed as sensors at all junctions.

#### **4.4 Using LED External Circuit better then Expansion I/O**

The PLC that have been used for this project is CPM2A 20CDR which have only 20 I/O; 12 for input and 8 for output. Actually, this project required the 10 input and 12 outputs. Base on this statement, there have a problem of limited I/O. There have 2 solutions to solve this problem:

- Using I/O Expansion Unit
- Using the LED External Circuit

For this project, the second solution has been taken to solve the problem of limitation I/O. There are a few reason of why this method has been chosen. The main factor is LED External Circuit was more economic because the total price of the components that have been used in this circuit is cheaper but the price of the I/O Expansion Unit is quite expensive. By using the I/O Expansion Unit, not need to design the addition circuit, but by using the LED External Circuit, this circuit needs to design and construct. However it was simple and easy to create because the circuit was not complicated. By using I/O expansion unit, the ladder program was longer so it's quite difficult to design, edit and troubleshoot. (Refer to Appendix : The PLC program that using the Expansion I/O unit) But, the ladder program can be reducing by using the LED External Circuit. So it's easy to design, edit and troubleshoot the program.( Refer to the Appendix :the PLC program that use the LED External circuit).