ECE 321

D-51 (Friday Section)

Lab Report #1

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Problem Statement

The client requires a traffic light system at a 4-way intersection with the functionality, constraints, and details mentioned in this report.

Stakeholders:

End users, Company work for, supervisor, lab instructor, TA, Software engineer, maintenance engineer, management, government (traffic control regulations)

Requirements

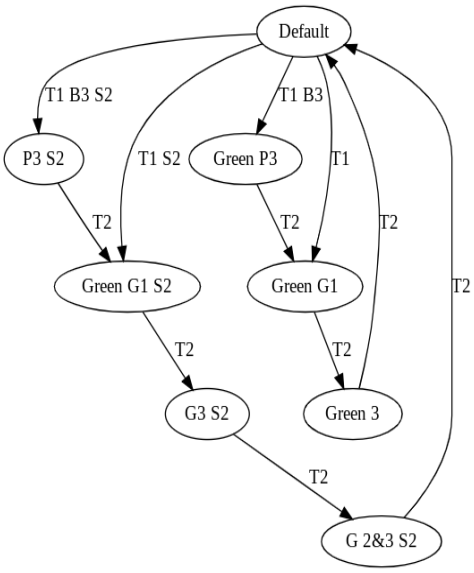
The system will have the following Elements:

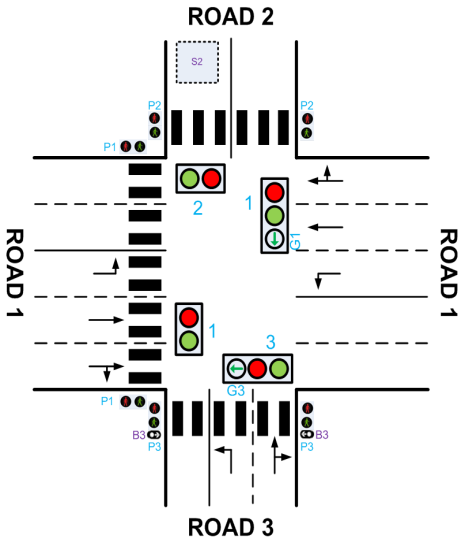
- Lights L1, L2, L3, turn signals G1, G3, and pedestrian signals P1, P2, P3 are either red or green
- 1 Sensor (S2) on road 2 heading south
- 1 pedestrian button (B3) on road 3
- 1 day night switch
- 1 malfunction switch

The system will loop through light cycles according to diagram below

State Matrix and Diagram

State \ Elements	L1	L2	L3	p1	p2	p3	g1	g3	t1	t2	Malf	Clock
Default	G	R	R	R	G	R	R	R	On	Off	Off	D
Green G1	R	R	R	G	R	R	G	R	Off	On	Off	D
Green 3	R	R	G	R	R	R	R	G	Off	On	Off	D
Green P3	G	R	R	R	G	G	R	R	Off	On	Off	D
Green 2&3	R	G	G	R	R	R	R	R	Off	On	Off	D
Night	BG	BR	BR	Off	Off	Off	Off	Off	Off	Off	Off	N
Emergency	BG	BR	BR	Off	Off	Off	Off	Off	Off	Off	On	D/N





Functional Description

- The system will cycle through a default cycle, unless given other inputs.
- Inputs triggering after the default cycle include the pedestrian button, the road sensor, and the night switch
- The malfunction switches have the same effect but the night switch goes immediately to a the emergency state without waiting for a cycle to complete.
- Any system resets allow for an initialization period

Constraints

- System: 450KB of storage and 54KB Ram embedded system using ANSI C.
- Sensors have simple interfaces and automated notifications.

Delivery and Follow up

- We will provide maintenance, updates, as well as user and installation guides.
- Reset the machine on software malfunction.
- Since the hardware is dealt with, we can ignore all hardware malfunctions.