ECE 321 Lab

Software Requirements Engineering

Department of Electrical and Computer Engineering

University of Alberta

404 Team Name Not Found

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Contents

1

1 Customer:

Client: Alberta Traffic Supply Ltd.
7798 16 th Street
Edmonton, Alberta, T6P 1L9
Western Canada largest traffic sign manufacture and traffic control company

2 Definitions

Labels **1,2,3,P1,P2,P3,B3,S2,G1,G3** *can be found in Figure 1.*

1. **TLMS** - **T**raffic **L**ight **M**onitoring **S**ystem

2. **RB** - **R**eset **Button**

3. **M** - Hardware malfunction: 1 indicates a malfunction, 0 for normal operation

4. **1** - Light on Road 1

5. **2** - Light on Road 2

6. **3** - Light on Road 3

7. **P1** - Pedestrian light on road 1

8. **P2** - Pedestrian light on road 2

9. **P3** - Pedestrian light on road 3

10. **t1** - Timer for **1**

11. **t2** - Secondary timer for everything else

12. **G1** - Left turn signal on road 1

13. **G3** - Left turn signal on road 3

14. **S2** - Magnetic sensor which detects if a car/motorcycle is waiting on **2**
    Outputs: 1 if vehicle waiting, 0 otherwise

15. **B3** - Button on road 3 which a pedestrian can hit to request to cross the intersection

16. **BG** - **B**linking **G**reen

17. **BR** **B**linking **R**ed

18. **D** - **D**ay (6:00-20:00)

19. **N** - **N**ight (20:00-6:00)

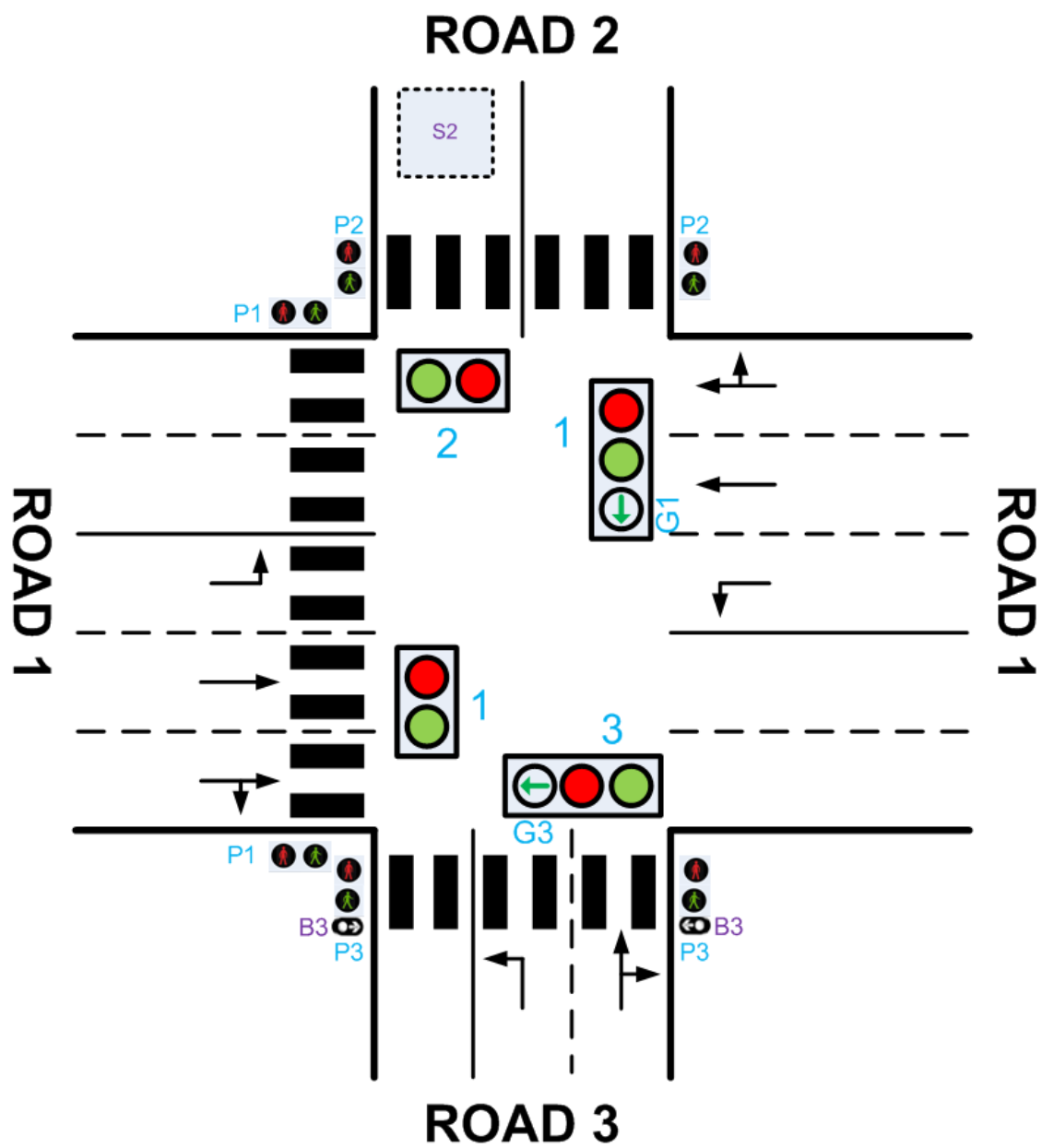20. **Clock** - Can have value **D** or **N**

21.

22.

Figure 1: INSERT CAPTION HERE

3 Description

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4 Requirements

1. The software will be running on imbedded system with 550KB hard drive, 50KB RAM.

2. The software desgin should obey regulations on traffic lights posted by Canadian Transportation Agency.

3. The software desgin should focus on safety, reliability and correctness. The system should be up as much as possible.

4. The software should use different timers. Timer 1 is used for road 1 only, and timer 2 is used for the rest.

5. Road 1 and 3 are main roads, and road 2 is secondary. Priority should be given in the sequence of road 1, road 3, road 2.

6. Pedestrian lights should turn green when it is safe to cross.

7. System should go to emergency state when there is a hardware malfunction, and go back to default mode when exiting emergency state.

8. The system should have a physical button for reset. During a reset, the system should go to emergency mode first, and then the default mode.

5 Nice-to-haves

1. Data logging system, but design should account for the limited storage.

2. Indication of which part of the system is malfunctioning.

3. Configurable timing for traffic flow optimization purpose.

4. Protection of the sensor S2.

6 State description

Note:

- *Labels* **1,2,3,P1,P2,P3,B3,S2,G1,G3** *are defined on page 2 and in Figure 1 on page 1.*

- Green and Red text indicate what colour the light should be in the respective state

1. **Default**
   - **1,P2**
   - **2,3,P1,P3,G1,G3**
   - **t1** activated
   - **M**: 0
   - **Clock**: **D**

2. **Green G1**
   - **G1,P1**
   - **1,2,3,P2,P3,G3**
   - **t2** activated
   - **M**: 0
   - **Clock**: **D**

   Note:

   (a) **Green G1 S2** *is this state, but when* **S2**=1

3. **Green 3**
   - **3,G3**
   - **1,2,P1,P2,P3,G1**
   - **t2** activated
   - **M**: 0
   - **Clock**: **D**

   Note:

   (a) **Green 3 S2** *is this state, but when* **S2**=1

4. **Green P3**
   - **1,P2,P3**
   - **2,3,P1,G1,G3**
   - **t2** activated
   - **M**: 0
   - **Clock**: **D**

   Note:

   (a) **Green P3 S2** *is this state, but when* **S2**=1

5. **Green 2&3**
    - **2,3**
    - **1,P1,P2,P3,G1,G3**
    - **t2** activated
    - **M**: 0
    - **Clock**: **D**

6. **Night**
    - **1** **BG**
    - **2,3** **BR**
    - **P1,P2,P3,G1,G3** are turned off
    - **M**: 0
    - **Clock**: **N**

7. **Emergency**
    - **1** **BG**
    - **2,3** **BR**
    - **P1,P2,P3,G1,G3** are turned off
    - **M**: 1
    - **Clock**: **D** or **N**

    Note:

    (a) When the system first starts up, it should briefly go into emergency mode with **M**=0 then immediately switch to default mode. (Because hardware malfunctions should be fixed before the system starts.)
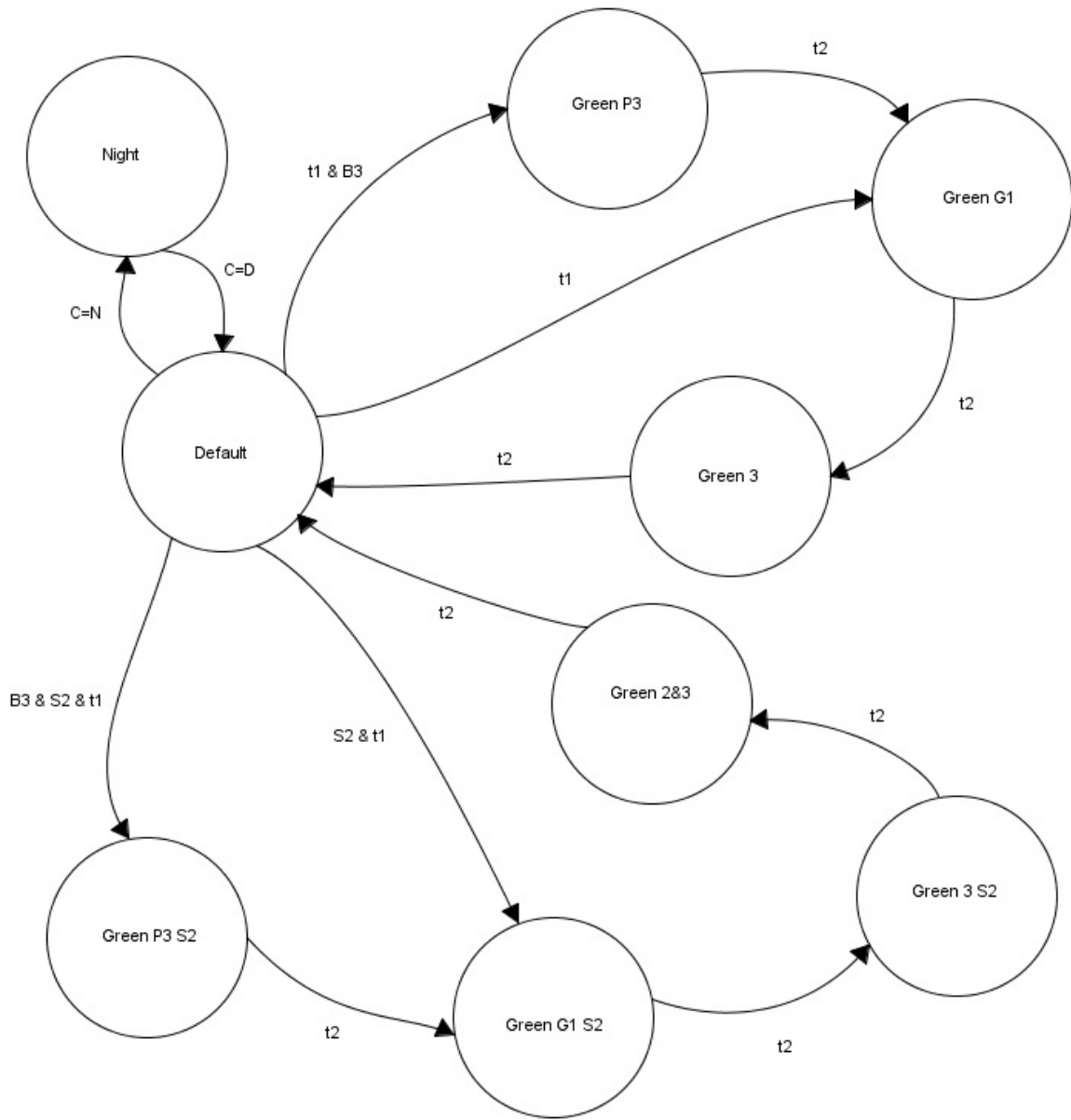
Figure 2: INSERT CAPTION HERE

7 Special considerations

1. Security
   Here's how we make the system more secure:

(a) step 1

(b) step 2

(c) step 3

2. Reliability

3. Synced timings