

ECE 321 Lab  
Software Requirements Engineering  
Department of Electrical and Computer Engineering  
University of Alberta

404 Team Name Not Found

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## 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 **B**utton
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
19. **N** - **N**ight
20. **Clock** - Can have value **D** or **N**
- 21.
- 22.

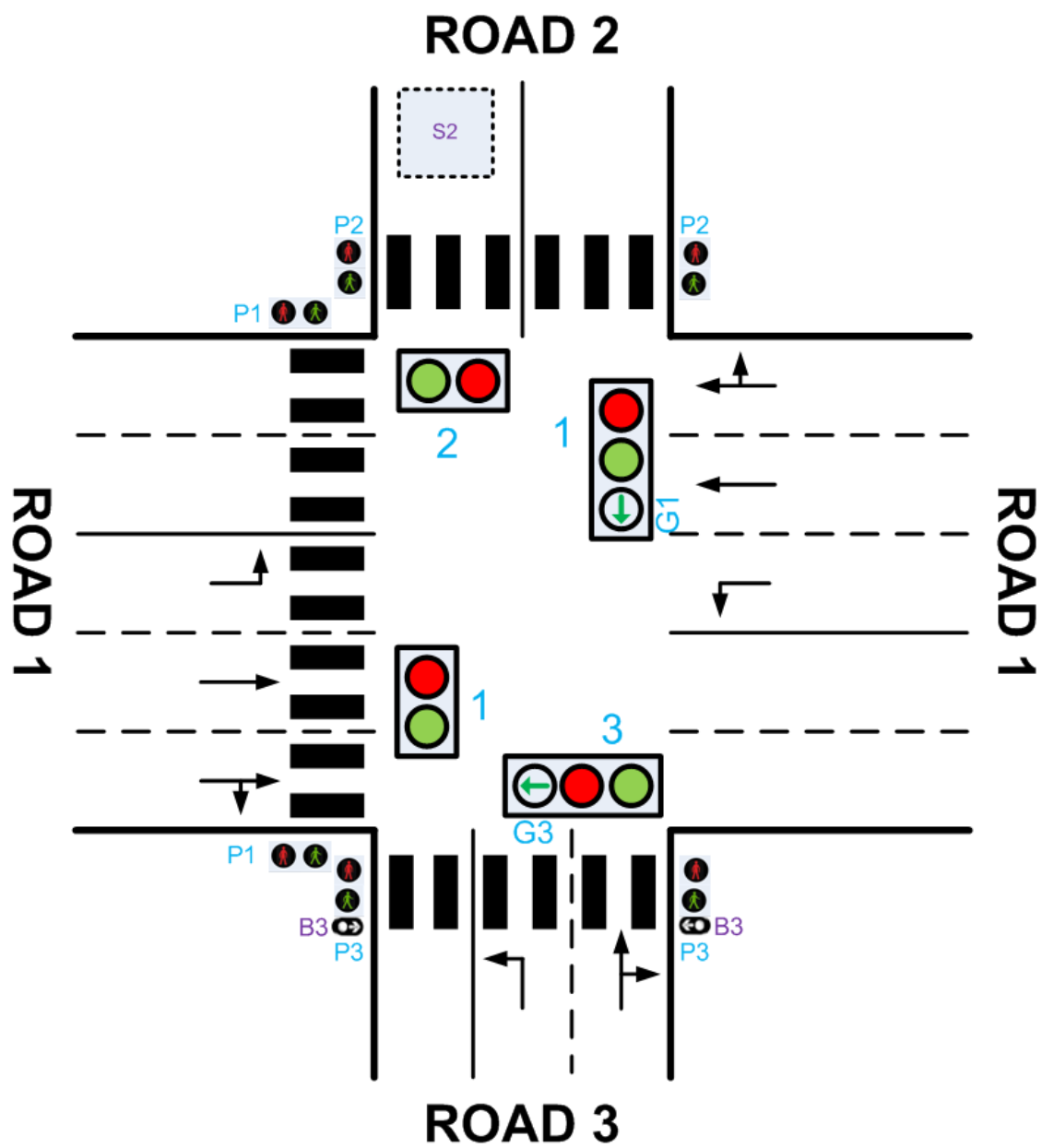


Figure 1: INSERT CAPTION HERE

### 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

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

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

Notes:

(a) **Green 3 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

Notes:

(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

Notes:

(a) **Green 3 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**

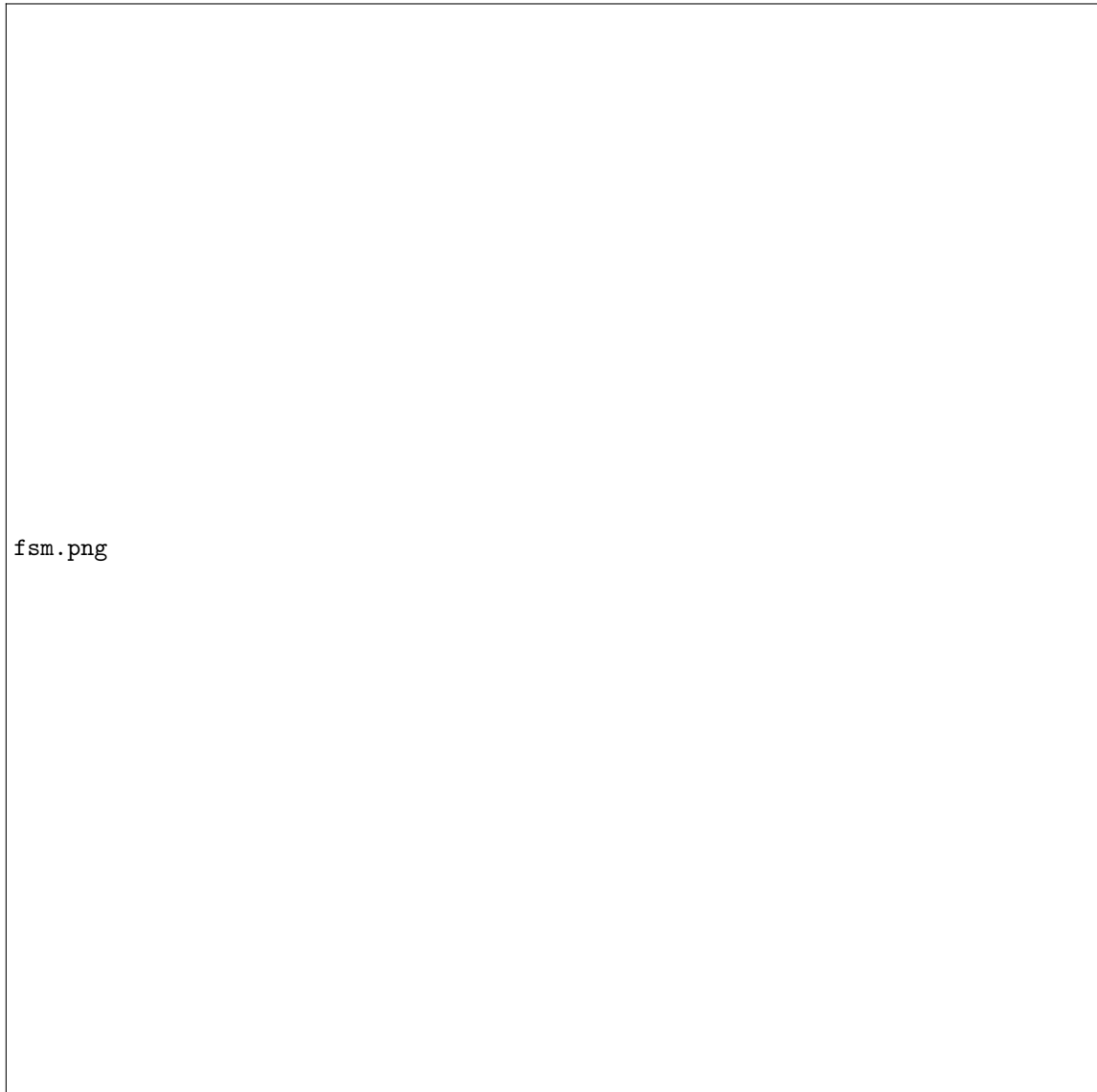


Figure 2: INSERT CAPTION HERE

## 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