Temporary Traffic Sign System (TTSS)

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ABSTRACT

We developed TTSS provide control off jam and deadlock happen on Amman cycle this system contain several steps to find final schedule that contain fair timer for each entry cross cycle.
The first step of our system, is to get cycle traffic speed and compare it with limit speed storage in DB depend in this operation system will active or deactivate the traffic sign schedule and this operation done in frequentation order (specific procedure).
The second step in our system, is mathematical method that using to get average speed (five speed read) for cycle entries and calculate final output (fair times for each entry in traffic schedule depend on traffic load).

1. Introduction

The problems of transportation and traffic are as old as man's history of transportation. The type of vehicles changed over the centuries and so did traffic problems and the ways one tried to solve them. The evolution of traffic in this century can be characterized by a vast increase in the number of cars. This process was followed by an expanding network of roads and streets trying to keep up with the increasing demand. At the same time new methods to control the traffic were advanced. They include simple and intelligent traffic lights as well as sufficient information and rerouting services.

Essential for the development of such a controlling mechanism is a detailed understanding of the traffic flow. A large number of models have been applied. Most of them are concerned with the one-dimensional vehicle flow on a road without intersections. [1]

Our system aims to control the traffic in a circle and across the road by avoiding traffic jams.
This system depends on the scheduling algorithm priorities and this algorithm is organizing the movement of vehicles by not spend a long time in transit circles or roads intermittent and depends on the priorities of crossing (pressure of traffic,

the flow of cars) and the system depends also on the speed of traffic on the roads to get to the Circle.
The system contains a custom method to calculate the time which should give himto organize the priorities in each of the entrances to Circle.
The system works to reduce traffic jams and increase the efficiency of control in the traffic jams by Specific rules

1. This system does not start work in only when there is traffic jams in each of the circles and the crossroads.
2. There are not specific distribution, or arrange for the opening of traffic signals.
3. Giving time for the light signal based on the pressure of cars on the entrances.
4. Can freeze in the preliminary risk situations such as: (processions, ambulances etc ...).

1.1 WHAT IS SIMULATION

A simulation of a system is the operation of a model of the system. The model can be reconfigured and experimented with; usually, this is impossible, too expensive or impractical to do in the system it represents. The operation of the model can be studied, and hence, properties concerning the behavior of the actual system or its subsystem can be inferred. In its broadest sense, simulation is a tool to evaluate the performance of a system, existing or proposed, under different configurations of interest and over long periods of real time. Simulation is used before an existing system is altered or a new system built, to reduce the chances of failure to meet specifications, to eliminate unforeseen bottlenecks, to prevent under or over-utilization of resources, and to optimize system performance. For instance, simulation can be used to answer questions like: What is the best design for a new telecommunications network? What are the associated resource requirements? How will a telecommunication network perform when the traffic load increases by 50%? How will a new routing algorithm affect its performance? Which network protocol optimizes network performance? What will be the impact of a link failure? The subject of this tutorial is discrete event simulation in which the central assumption is that the system changes instantaneously in response to certain discrete events. For instance, in an M/M/1 queue – a single server queuing process in which time between arrivals and service time are exponential - an arrival causes the system to change instantaneously. On the other hand, continuous simulators, like flight simulators and weather simulators, attempt to quantify the changes in a system continuously over time in response to controls. Discrete event simulation is less detailed (coarser in its smallest time unit) than continuous simulation but it is much simpler to implement, and hence, is used in a wide variety of situations [2].

2. Planning phase

2.1 Business Model

2.1.1 Problem Definition

Temporary traffic sign system Aims to reduce traffic jam resulting from the pressure the cars inside circles and the crossroads and works at the organization of traffic that lead to accidents.

2.1.2 Project Scope

1. This system has the ability to distribute priorities based on readings taken from the entrance Circle.
2. This system is constant to take real data and performs operations and the proper analysis to obtain a higher efficiency for the duration of his work.
3. Control the process of converting to an automated process by using this system.
4. This system will prevent traffic jams, especially in cases of emergency.
5. Provisions of the control automatic and the prevention of accidents and cases of intractable crises.

2.1.3 Project Purpose (Objectives)

1. This system works to regulate the movement of traffic in each of the intersections and circles.
2. Helps save fuel by reducing the time taken for the vehicle to stand up.
3. Reduces the time it takes to regulate traffic.
4. Reduces stress and traffic jams at rush hour.
5. This system works to reduce accidents caused by traffic jams.

2.1.4 System Capability

1. Responsive and able to give priority and to take it quickly
2. Has an algorithm able to give results as top priority
3. Capable of interacting with its environment and change the information based on current situation
4. Able to work in any period during the day and at any time
5. able to control the traffic signals through the readings that are taken from each entrance

2.1.5 Environment

2.1.5.1 Simulator environment

Windows Application using Microsoft Visual Studio 2010.

2.1.5.2 Tools Needed (Used)

Using specific software for temporary traffic sign system and this software are:

1. Microsoft Visual Studio 2010 language VB.net.
2. Microsoft SQL Server 2008 R2.
3. Smart Draw 2010.
4. Rational rose 2007.
5. Icon Lover

2.1.6 Project Risks and Feasibility Study

2.1.6.1 Feasibility Study

Technical:

From technical side this system will be improved by specific tools and wizards:

a- Software:

- Visual studio. 2010
- SQL server 2008 R2
- Rational rose 2007
- Smart draw 2010
- Project management 2010

Economic:

The cost of designing and maintaining the application is really reasonable and compatible with the budget. As the new application is expected to improve the work efficiency and increase the work speed.

Operational:

From operational side this system requires plan to convert virtual system (visual reading and sensor to actual system required sensor connect with main server also traffic sign reading data from main server using special network and special technical).

2.1.6.2 Project Risks

- 1-uncorrect reading for cycle port
- (infinity case)(X =0) (Sort by validate minimum value for port speed (1)).

2.1.7 Stakeholder analysis

No	Stakeholder Name	Role in Project
1	Supervisor car traffic officer	• Manage cycle and port (speed, timer details) • Create any port • Return report for traffic statistic
2	Car	Taking priority for traffic schedule (traffic side)
3	Traffic officer	• Control of system operation • Insure that all stakeholder(vehicle , commitment traffic schedule)

3. analysis Phase

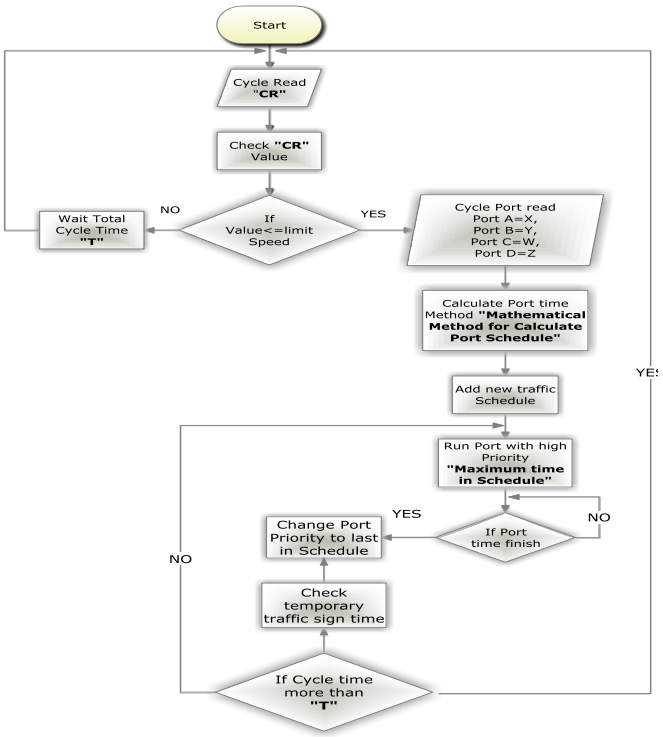
3.1 functional requirement

1. Manage cycle and cross road.
2. View statistic cycle traffic state.
3. Create emergency path on cycle or cross road.
4. Monitoring temporary traffic sign system.
5. Distribute cycle time in fair way.

3.2 Nonfunctional requirement

1. security: this system will ensure only authorize people (system sup) can access and modify data though windows application using valid user pass
2. simplify: this system will return simple output (traffic sign output) and this type of output are easy to deal with it
3. Usability: this system will enhance all requirements. without complex or Ambiguity steps

3.3 flow Chart for TTSS



3.4 Equations

Started in the equation for the TTSS from the equation of speed:

Speed = distance / time

And the our system based on speed, the speed proportional inverse proportion with time, meaning that whenever the higher the speed, whenever time a little vice versa

- Time Entry A = A, Speed Entry A= W
- Time Entry B = B, Speed Entry B= X
- Time Entry C = C, Speed Entry C= Y
- Time Entry D = D, Speed Entry D= Z

  Total Cycle Time= 15 minute (Constant value is added by the Supervisor and be changed).

Now we start derive this equation:

1. From the Speed equation we take (Time * Speed) as it inverse relationship between them.

As follows:

A*W, B*X, C*Y, D*Z

2. As we mentioned earlier that our system fair and that all entries on the cycle, terms of the Time and speed must be equal (whenever the higher the speed, whenever time a little vice versa), so the entries must be equal.

As follows:

A*W=B*X=C*Y=D*Z

3. Now, we derive this equation we take A with B to extract A :

A*W=B*X

A*(W/W) =B*(X/W)

A=B*(X/W)……..1

4. Now, we derive this equation we take B with C to extract B :

B*X=C*Y

B*(X/X) =C*(Y/X)

B=C*(Y/X)……..2

5. Now, we derive this equation we take C with D to extract C

C*Y=D*Z

C*(Y/Y) =D*(Z/Y)

C=D*(Z/Y)……..3

6. Now, we derive this equation we take D with D to extract D :

D*Z=D*Z

D*(Z/Z) =D*(Z/Z)

D=D……..4

7. Now, extract the total of variable D because it is constant in all equations

As follows:

∑D= (result of A + result of B + result of C + result of D)

8. The time for entry D:

Time of entry D= (Total Cycle Time / ∑ D)

9. Now, compensation to know the time of other entries (Result):

A=D*((Z/Y)*(Y/X)*(X/W))

B=D*(Z/Y)*(Y/X)

C=D*(Z/Y)

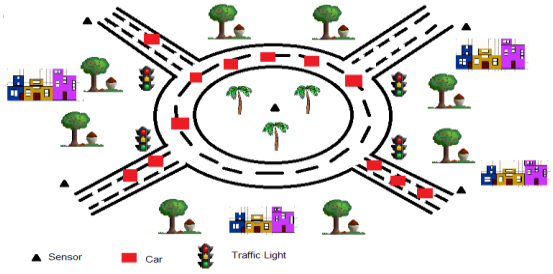
D=D

10. All result of entries must be equal with Total Cycle Time:

As follows:

Total Cycle Time= A+B+C+D

3.5 Prototyping



The first step of our prototyping, is to get cycle traffic speed from sensor and compare it with limit speed storage in DB then get entries speed from sensor depend in this operation system

will active or deactivate the traffic sign schedule and this operation done in frequentation order (specific procedure)

The second step in our system, is mathematical method that using to get average speed (five speed read) for cycle entries and calculate final output (fair times for each entry in traffic schedule depend on traffic load)

4. Design phase

4.1 Event Tables

NO	Event	Trigger	Source	Activity	Response	Use case	Destination
1	Login	Username, password	Admin	Login for inter system	Show first page, reject	Login	System Database
2	Chang Password	Username, password	Admin	Change Password	Change Password to another Password	Change Password	System Database
3	Add Admin	Username, Password	Admin	Add Admin in system	Go to add Admin Page	Add Admin	System Database
4	Update Admin	Username, Password	Admin	Change information Admin	Go to Update Admin Page	Update Admin	System Database
5	Delete Admin	Username, Password	Admin	Delete Admin From System	Go to Delete Admin	Delete Admin	System Database
6	Add Cycle	Username, Password	Admin	Add Cycle	Go to Add	Add Cycle	System Database
7	Update Cycle	Username, Password	Admin	Change Cycle information	Go to Update Cycle Page	Update Cycle	System Database
8	Delete Cycle	Username, Password	Admin	Delete cycle from system	Go to page Delete Cycle	Delete Cycle	System Database
9	View report about cycle state	Username, Password	Admin	View report about Cycle State	Report Page	View report about cycle state	System Database
10	Edit Traffic Sign	Limited Speed Cycle	System	Edit The Traffic Time Schedule	Go to Simulation Page	Edit Traffic Sign	System Database
11	Edit Speed Reading	System	System	Edit Speed Reading for Cycle or entries	Go to Simulation Page	Edit Speed Reading	System Database
12	Edit Emergency Path	Username, password	Admin	Add Path For Emergency State	Go to Page emergency	Edit Emergency Path	System Database

4.2 Use Case

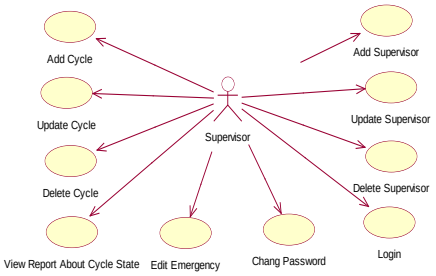
Our system has three actors:

First actor Supervisor this actor can manage his account and can add another supervisor, update, and delete also can manage cycle and entries and get reports about cycle state also can edit emergency path.

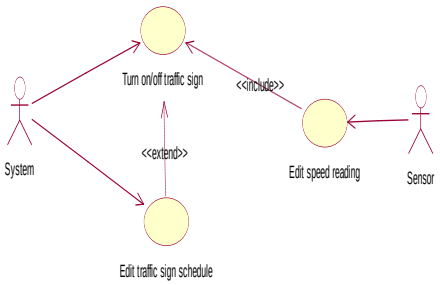
Second actor sensor this actor can edit speed reads for cycle and entries.

Third actor system can edit schedule depend on sensor reeds then turn on/off traffic sign depend on schedule.

4.2.1 Supervisor Use Case

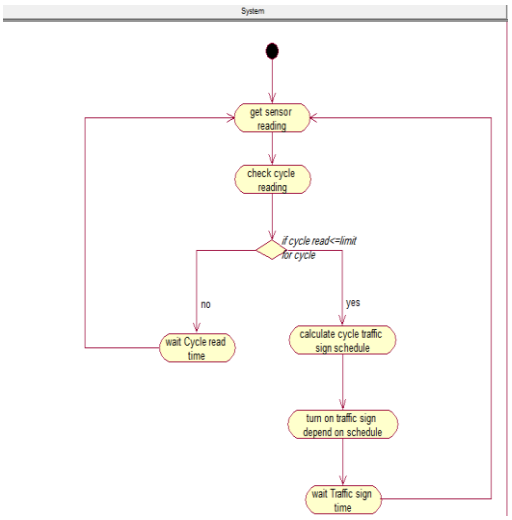


4.2.2 System and sensor Use Case

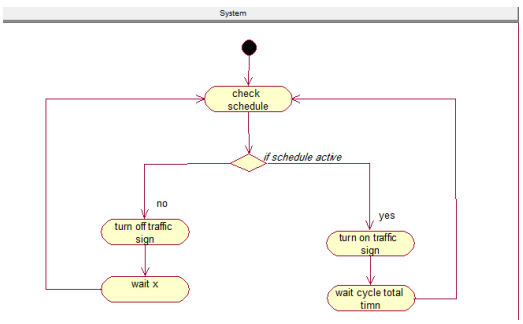


4.3 Activity Diagram

4.3.1 Edit traffic sign schedule

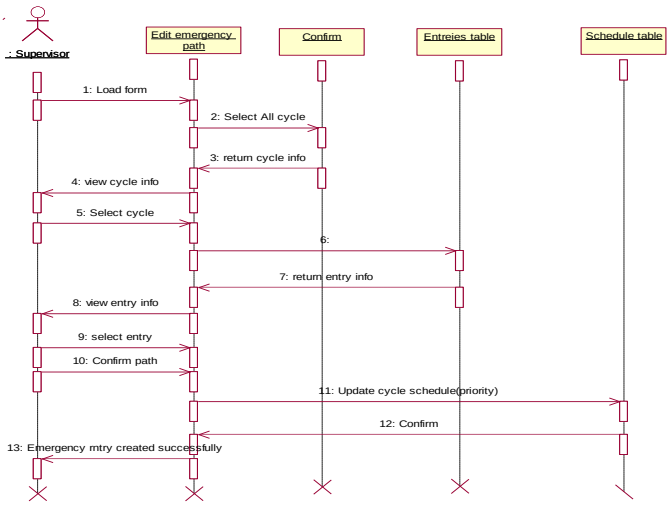


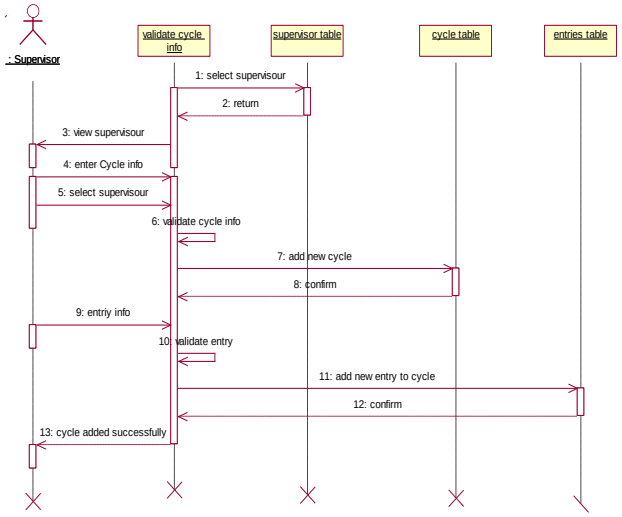
4.3.2 Turn on/off traffic sign



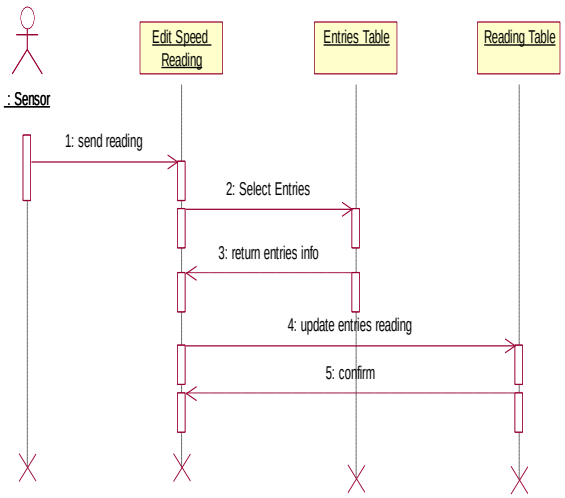
4.4 Sequence Diagram

4.4.1 EDIT EMERGENCY





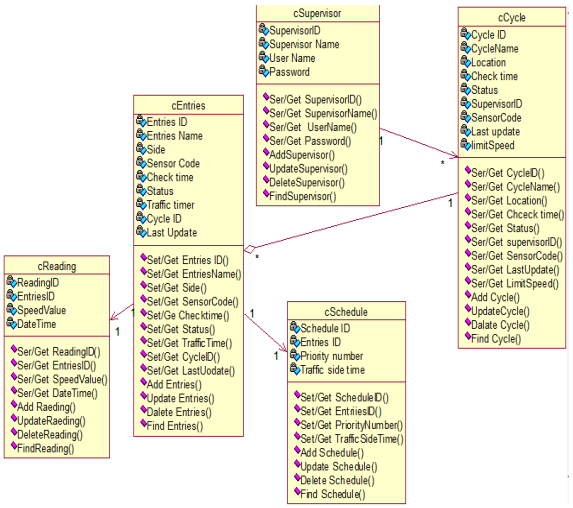
4.4.2 EDIT SPEED READING



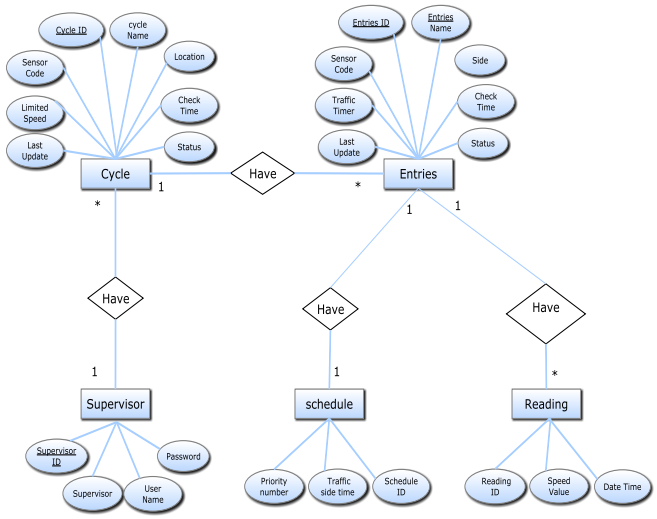
4.4.3 TURN ON/OFF TRAFFIC SIGN

4.5 Class Diagram

4.5.1 Software Class Diagram



4.6 ER-Diagram

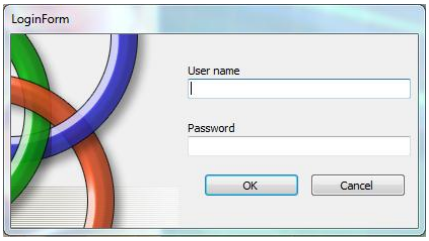


5. Implementation Phase

5.1 Screen

5.1.1 Login Form

Using this page system user can access to his page by using valid user name and password as show as **Figure** below:



5.1.2 Main Form

This page contain main menu for supervisor that allow supervisor to control all process in system as show as **Figure** bellow

6. testing phase

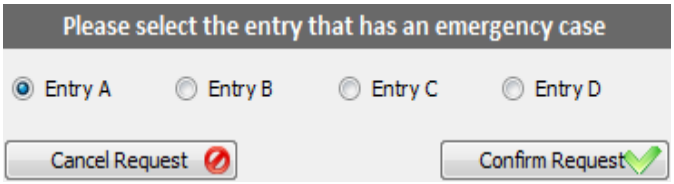
6.1 Software test

6.1.1 In random simulation form

- Our system starts in low case and OFF traffic sign then when clicks on button (High traffic) still the system in low case as show as **Figure** below

- Then the system start and calculate the schedule of traffic sign depend on random reads and with the first priority in schedule Entry Name (B) with traffic sign ON and another entries traffic sign is OFF as show as **Figure**below

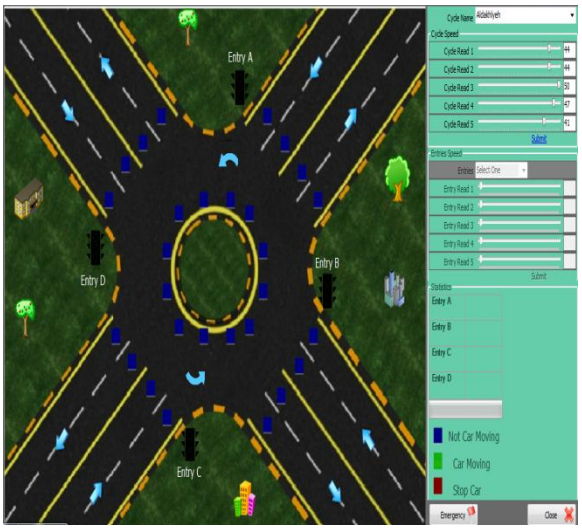
- In emergency case the supervisor select any entry then the system frees all schedules without the entry is a supervisor selected for example Entry Name (A) as show as **Figure** below



- This emergency case with Entry Name (A) with traffic sign ON and another entries traffic sign is OFF as show as **Figure** below

6.1.2 manual simulation form

First step, the supervisor select Cycle Name and enter cycle reads as show as **Figure** below



- When the average of five read for cycle more than Limit Speed (20) the system does not allow the supervisor enter the Entry reads with still OFF temporary traffic sign as show as **Figure** below

- But when the average of five read for cycle less than Limit Speed (20) the system allow supervisor enter all Entry reads,When enter all reads for all Entries then the system calculate the schedule of traffic sign depend on Cycle and Entry reads and with the first priority in schedule Entry Name (B) with traffic sign ON and another entries traffic sign is OFF as show as **Figure** below

7. Conclusion and Future Work

7.1 Conclusion

We butt between your hand our graduation project with subject TTSS that gave us salutation for traffic jam and cycle block because over load on traffic this system will read of load for each cycle entry and return optional schedule for solve traffic jam in fair way.

Our system depends on actual read and correct statistic about each cycle and entries.

This system contain procedure to deal with emergency case and make sure that any of it will find best path to cross it with minimum time.

7.2 Future Work

1. We will in the future by adding a camera to image processing and status of the state to give readings in a clear schedule mathematical.
2. Auto pest path for emergency case depend on wireless signal that send from emergency vehicle to specific sensor that we put it in each entry.
3. We also hope to develop the system clear than that .
4. We will develop the system so that the readings and give realistic to be connected with the system located in the traffic operations

8. References

[1]http://militzer.berkeley.edu/traffic_jams/node1.html#SECTION00010000000000000000

[2]http://www.google.jo/url?sa=t&rct=j&q=introduction+about+simulator+pdf&source=web&cd=5&ved=0CEgQFjAE&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.81.8350%26rep%3Drep1%26type%3Dpdf&ei=kfoCT4DZKcWy8gOqsZnAAQ&usg=AFQjCNHIbZG_8vfWyS9PbLMPJMNXIAPvYg