DENSITY BASED TRAFFIC CONTROL SYSTEM

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ABSTRACT

- The project is designed to develop a density based traffic signal system.
- Now a days traffic congestion has become a severe problem in many major cities across the world and it has become a nightmare for the people in these cities.
- The proposed model is mainly to overcome this problem.
- Here the signal timing changes automatically on sensing the traffic density at the junction.

- Present conventional traffic light system is based on fixed time concept allotted to each side of the junction which can't be varied as per varying traffic density,it means junction timings are fixed.
- Sometimes higher traffic density at one side of the junction demands longer green time as compared to standard allotted time.
- The proposed system using a microcontroller of 8051 family duly interfaced with sensors,changes the junction timing automatically to accomodate movement of vehicles smoothely,avoiding unnecessary waiting time at the junction.

- The sensors used in this project are IR and photodiodes are in light on sight(LOS) configuration across the roads to detect the density at the traffic signal.
- The density of vehicles is measured in three zones i.e., low,medium,high.
- Further, the project can be enhanced by synchronizing all the traffic junctions in the city by establishing a network(wired or wireless) among them.
- This synchronization will greatly help in reducing traffic congestion.

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Introduction

- In modern life we have to face with many problems one of which is traffic congestion becoming more day after day.
- The major cause leading to traffic congestion is the high number of vehicle which was caused by the population and the development of economy.
- It is said that the high volume of vehicles, the inadequate infrastructure and the irrational distribution of the development are main reasons for increasing traffic jam.

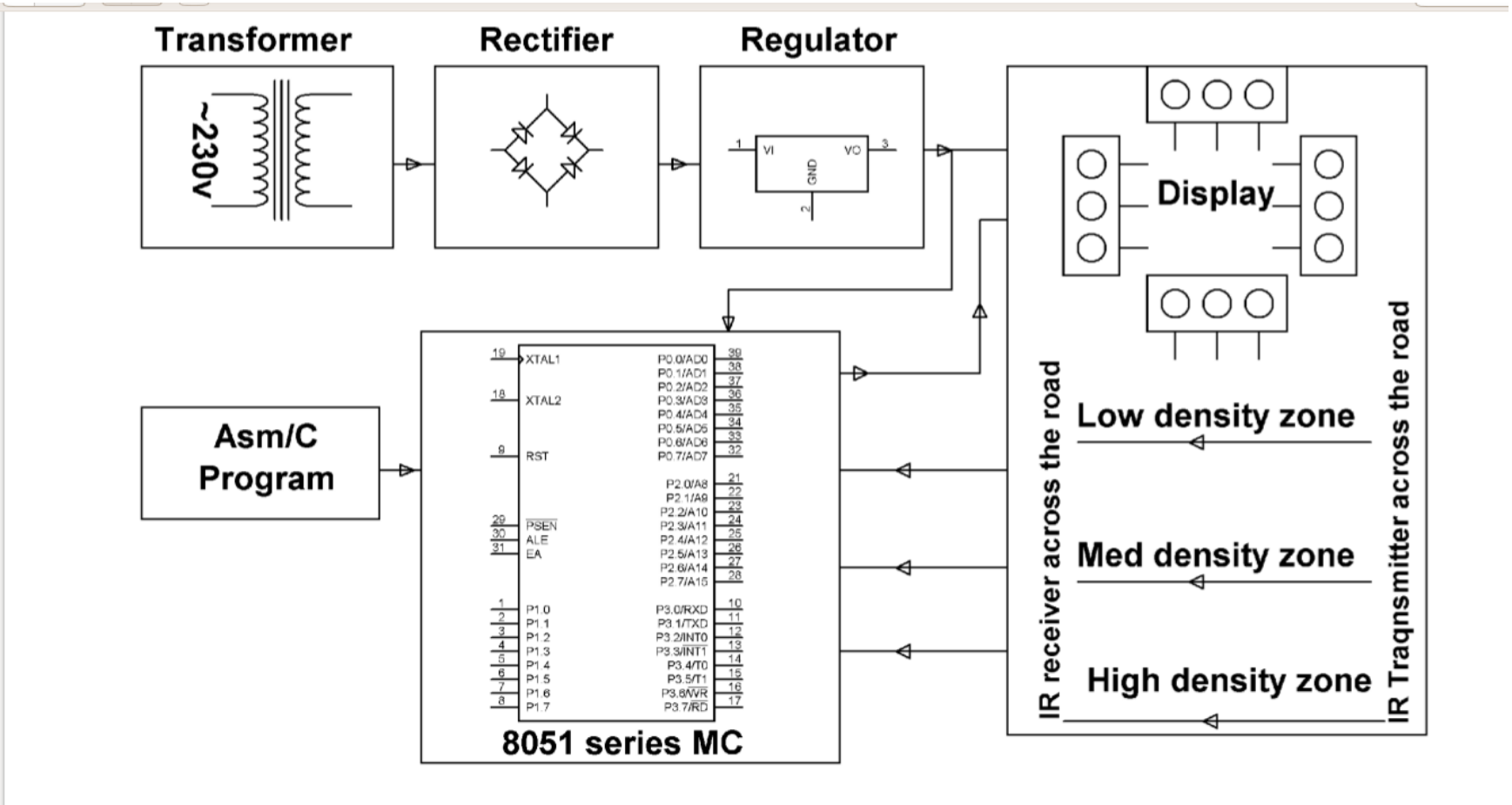
Motivation

- The traffic lights that are in widespread use today do not do much intricate reasoning when deciding when to change the lights for the various road users waiting in different lanes.
- How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed.
- Even though today’s methods are robust and work well when the traffic load is distributed evenly across the lanes in the intersection, the systems are very inefficient because they are unable to handle various simple situations that arise throughout the day.
- Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be large during the traffic.

Objectives&Scope of the study

- Our project aims at reducing traffic congestion and unwanted long time delay during the traffic light switch overs especially when the traffic is very low.
- It is designed to be implemented in places nearing the junctions when the traffic signals are placed in order to reduce the congestion in these junctions.
- The higher the no of vehicles on the road the longer will be the time delay allotted for that corresponding traffic light system.

Block Diagram

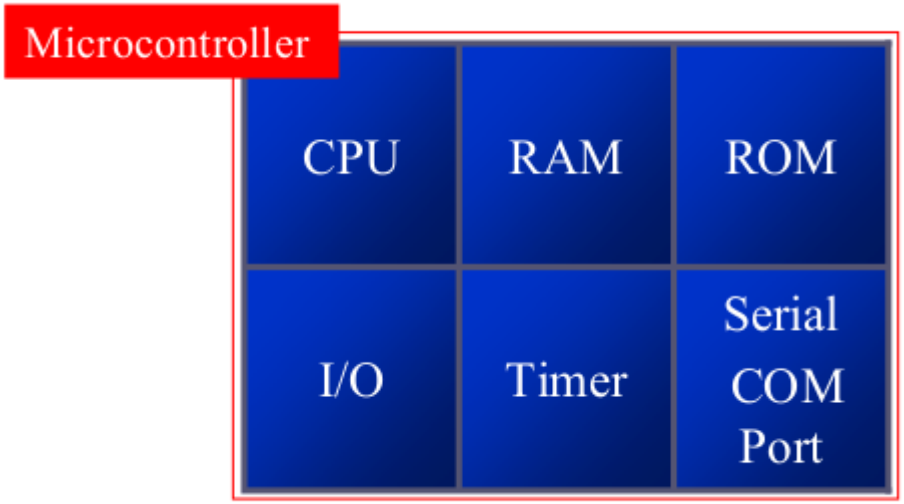


Required Components

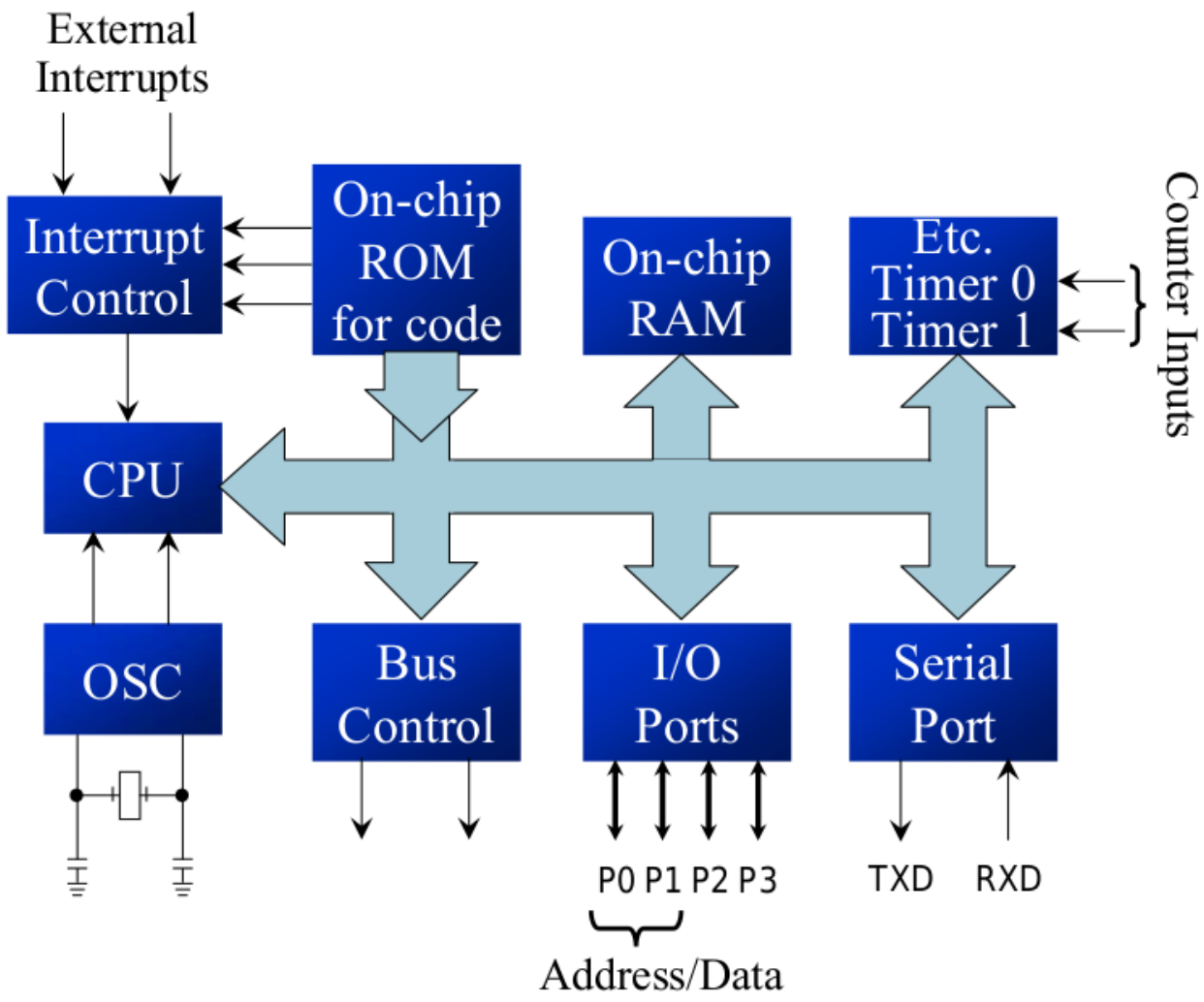
- Microcontroller(8051)
- IR Sensors
- LED's
- Photodiodes
- Diode(IN4007)
- Resistors
- Capacitors

Microcontroller
(Microcontroller is a computer on a chip)

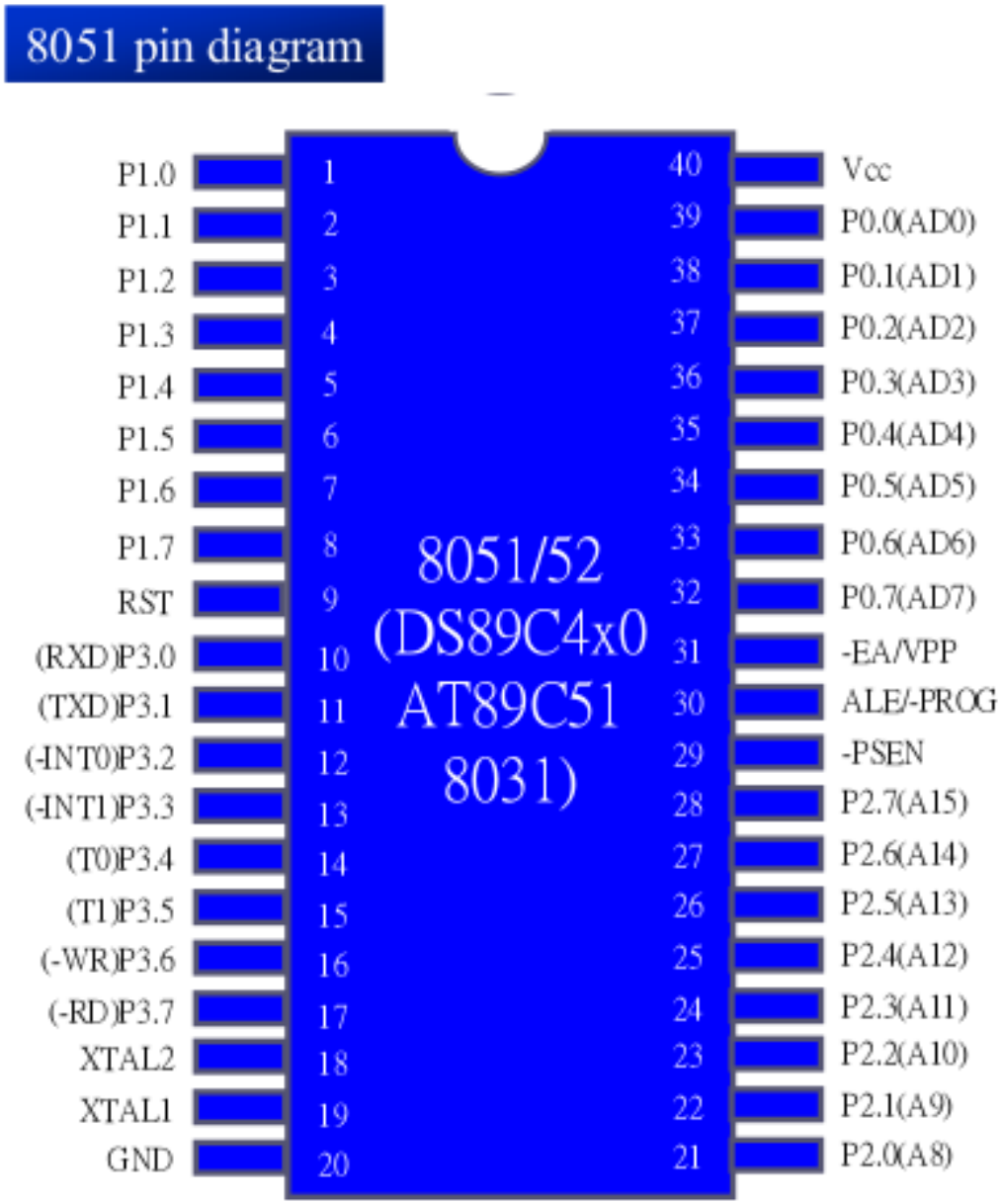
- CPU
- RAM
- ROM
- I/O Ports
- Timer
- ADC and other pheripherals



Internal Diagram



PIN Diagram

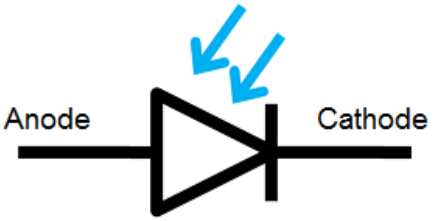

8051 pin diagram
P1.0 1
P1.1 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
P1.6 7
P1.7 8
RST 9
(RXD)P3.0 10
(TXD)P3.1 11
(-INT0)P3.2 12
(-INT1)P3.3 13
(T0)P3.4 14
(T1)P3.5 15
(-WR)P3.6 16
(-RD)P3.7 17
XTAL2 18
XTAL1 19
GND 20
8051/52
(DS89C4x0
AT89C51
8031)
40 Vcc
39 P0.0(AD0)
38 P0.1(AD1)
37 P0.2(AD2)
36 P0.3(AD3)
35 P0.4(AD4)
34 P0.5(AD5)
33 P0.6(AD6)
32 P0.7(AD7)
31 -EA/VPP
30 ALE/-PROG
29 -PSEN
28 P2.7(A15)
27 P2.6(A14)
26 P2.5(A13)
25 P2.4(A12)
24 P2.3(A11)
23 P2.2(A10)
22 P2.1(A9)
21 P2.0(A8)

IR LED

- An IR LED, also known as IR transmitter, is a special purpose LED that transmits infrared rays in the range of 760 nm wavelength.
- Such LEDs are usually made of gallium arsenide or aluminum gallium arsenide. They, along with IR receivers, are commonly used as sensors.
- The appearance is same as a common LED. Since the human eye cannot see the infrared radiations, it is not possible for a person to identify whether the IR LED is working or not, unlike a common LED.
- To overcome this problem, the camera on a cell phone can be used. The camera can show us the IR rays being emanated from the IR LED in a circuit.

Photodiode

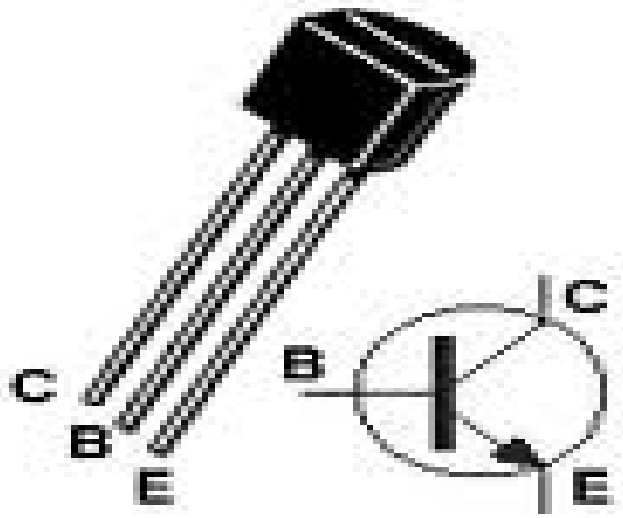
- A photodiode is a type of photo detector capable of converting light into either current or voltage, depending upon the mode of operation.
- Photodiodes are similar to regular semiconductor diodes except that they may be either exposed (to detect vacuum UV or X-rays) or packaged with a window or optical fibred connection to allow light to reach the sensitive part of the device.



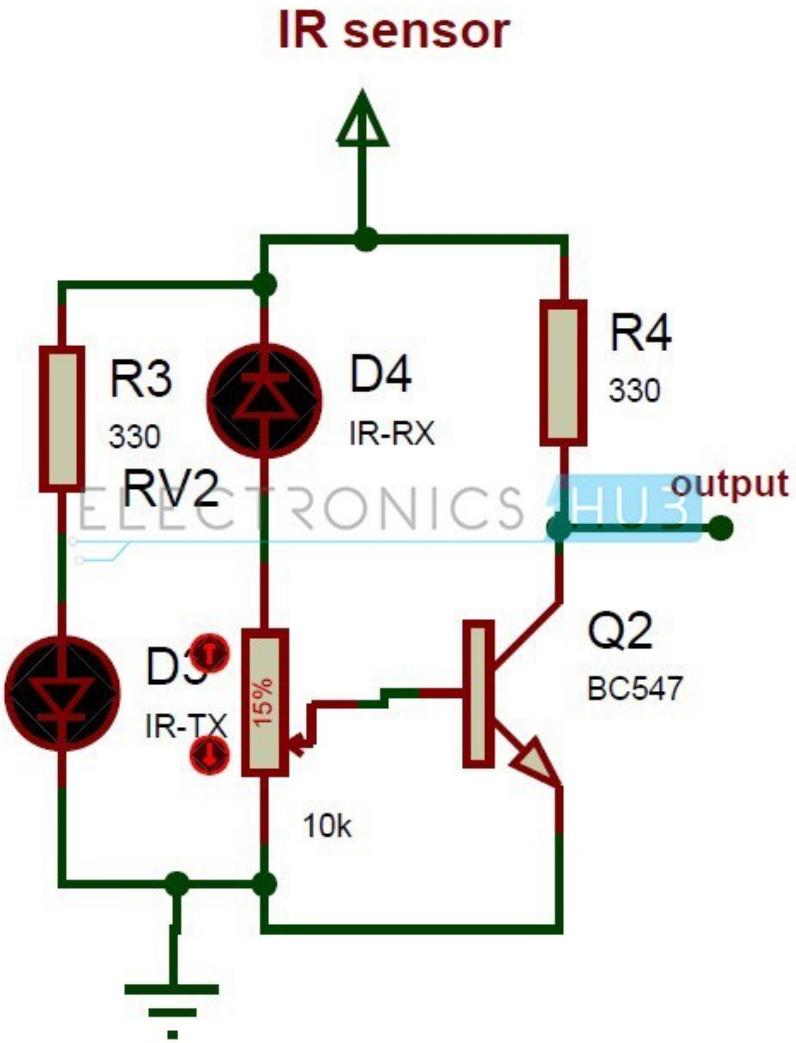
Photodiode symbol

Transistor

- The BC547 transistor is an NPN Epitaxial Silicon Transistor.
- The BC547 transistor is a general-purpose transistor in small plastic packages.
- It is used in general-purpose switching and amplification BC847/BC547 series 45 V, 100 mA NPN general-purpose transistors.
- Whenever base is high, then current starts flowing through base and emitter and after that only



IR Sensor


IR sensor
R3
330
D4
IR-RX
R4
330
RV2
output
ELECTRONICS HUB
D3
IR-TX
15%
Q2
BC547
10k

Working of project

- The project uses the IR interruption concept for generating logic states to the input of the MC. To achieve the same a number of IR diodes are used facings photodiodes.
- While the IR light falls on the photodiode the resistance of the photodiode falls increasing the bias voltage
- Logic high sensed by the MC input changes the green ON time to a higher value for allowing more vehicles to pass through. After sometime in case any other way gets more logic high, the sequential timing gets automatically increased for that way.
- Based on the IR interruption the green ON time increases, thus more the vehicle longer will be the green signal time. Thus dynamic time control is achieved based on the traffic

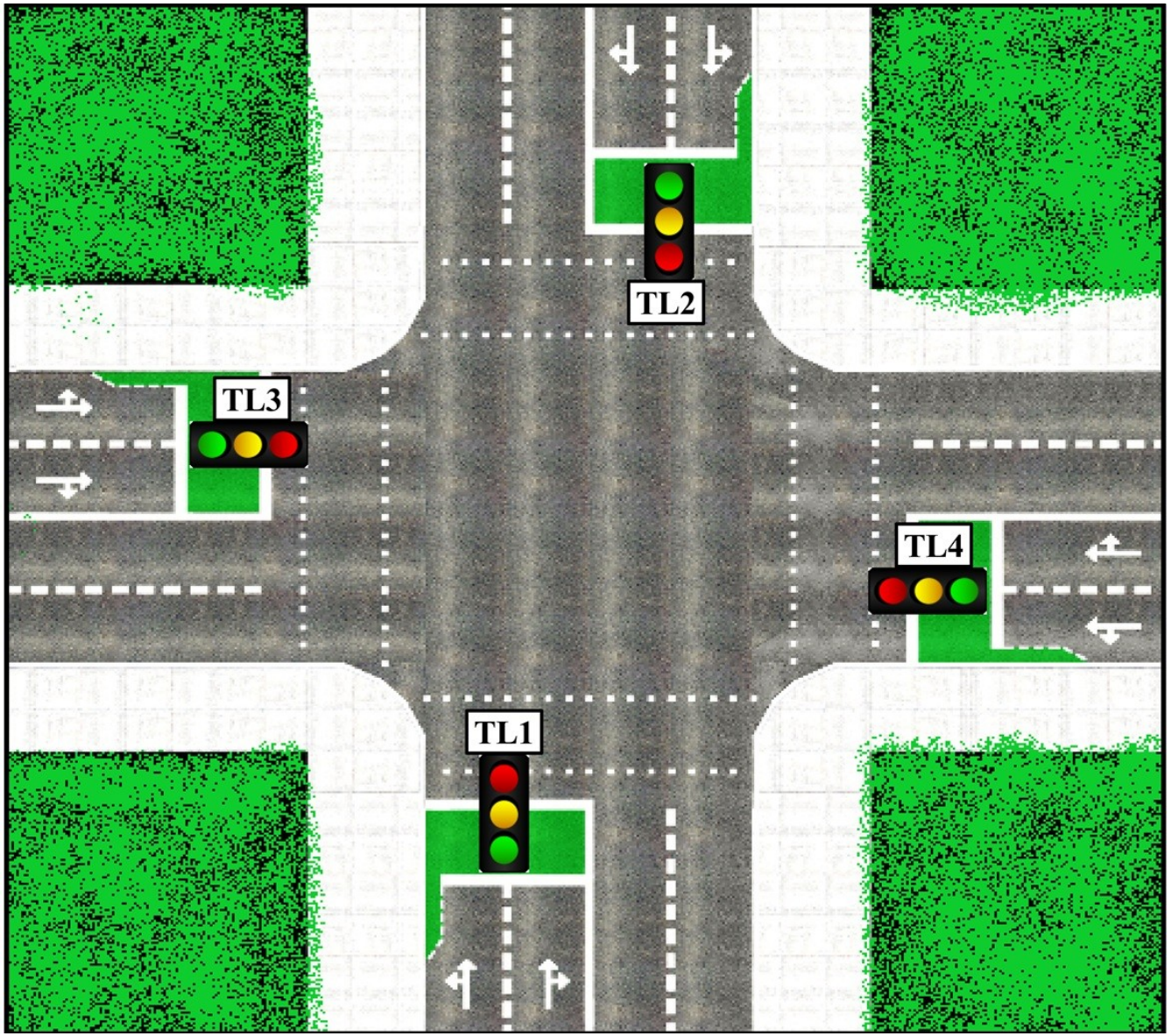
Software requirements

- Verilog HDL
- Simulator:-Model sim
- Personal computer(PC)

Verilog HDL

- It is a hardware description language emerged in 1983 @ Gateway design automation.
- Used to model electronic systems.
- It is most commonly used in the design and verification of digital circuits at the register-transfer level of abstraction.
- It is also used in the verification of analog circuits and mixed-signal circuits, as well as in the design of genetic circuits.

4-way junction road



Conclusions

- We conclude the traffic regulation based on density by using verilog HDL in model sim tool.
- For better working of the system image processing should be used.
- Thus,we can save our most precious thing i.e., time.

Acknowledgement

- We would like thank our department faculty Mr.S.Ashok and J.Chandra reddy for motivating us in doing such kind of real time project and thanks to my all web sources.

References

- IEEE International Workshop Advanced Computing on Intelligent Data Systems:Technology and Applications
- I.J..I.R.S.E.T(Inrernational journal of innovative research in science and environmental technology).