Review on Density based Automatic Traffic Light Control System

Prof. Ms. N.C.Band[1], M.V. Virulkar[2], R.S.Chopade[3], R.A.Chikte[4]

[1]Asst. Professor, Electronics and telecommunication Engineering Dept., PRMIT&R, Badnera
[2,3,4] Student, Electronics and telecommunication Engineering Dept., PRMIT&R, Badnera, Amravati University, Maharashtra, India

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ABSTRACT: *In this project, we are designing a density based automatic traffic light control system where the timing of signal is changed by sensing the traffic density at any roads. Traffic congestion is a major problem in most cities across a world. It is caused by delay in signal, improper timing of traffic controlling because of this reason it is time to shift more manual mode to an automated system with decision making capabilities. In present condition, traffic controlling system is fixed time based which may become inefficient if one road is operational than the others. Therefore optimizing traffic control, we have made a prototype model for an intelligent traffic control system using IR sensors & Arduino. Sometimes higher traffic density at one side of road require high green time as compared to allotted time. The infrared sensors which are placed on either sides of the road at particular distance will detect the presence of the vehicles and send the information to the microcontroller where it will decide how long a flank will be open or when to change over the signal lights. In next sections, we have expand the procedure of this system.*

Keywords- IR Sensor, Arduino Nano, Traffic light system, LED's

1. INTRODUCTION

In today's high speed life, we have to face many problems one of which is traffic congestion, Traffic congestion becomes a serious issue in our day to day activities. Traffic congestion will be also much more widely increasing. The idea of controlling traffic light efficiently in real time has attracted many researchers. Productivity of individual and society goes down as lots of time is wasted in the traffic signal. High capacity of vehicles, the insufficient infrastructure and the implausible distribution of the signaling system are main reasons for this chaotic traffic congestions.

As engine remain on in most cases this will increase in pollution level. Petrol and diesel consumed in large volume, without any outcome. Therefore, to reduce this problem to significant level new schemes need to be implemented by making dynamic traffic control system using sensors.

2. LITERATURE SURVEY

In 2012, Shruti K R and Vinoda K Proposed Priority based traffic controller using wireless sensor network' In this paper, the author implements adaptive traffic control system based on Wireless Sensor Network(WSN). In this system time manipulation used for controlling traffic light. This system control traffic over multiple intersections. The author optimizes the traffic using wireless sensor network this system reduce traffic jams problem cause by traffic light to extent. In this system, they monitor traffic density, they will keep the Road Side Unit(RSU) beyond the road and depends upon the count from the Road Side Unit(RSU). Road Side Unit compares traffic density on all roads and give maximum green time to the road on the priority basis, the road with next priority level will follow the first priority level[2]. In 2011, Road Traffic congestion monitoring and measurement using Active RFID and GSM technology' In this paper, Author implement an intelligent traffic congestion monitoring & measurement system to monitor and measure the road traffic congestions using probe vehicle and provide an easy platform to analyze the traffic movement and congestion pattern. It uses one active RFID tag, one wireless router and one wireless coordinator to be installed at road side, around 200mt apart, for calculating average trip to cross two roads. These system will use wireless devices to collect signals from active RFID tags attached to the probe vehicle. Travel time of probe vehicle traces when it passes roadside devices[3].

3. WORKING

In this project, we are using IR sensors & Arduino to reduce traffic congestion problem and design an intelligent traffic control system. IR sensor consist of IR transmitter &IR receiver. These IR transmitters and IR receivers will mounted on the either sides of road at particular distance. When vehicle passes on road between IR transmitter & IR receiver sensor detect the vehicle & send the information to microcontroller. Based on different densities of vehicles, microcontroller will assign pro glowing time to LED's. If the traffic density is higher, LED will glow for higher time as compared to standard allotted time or vice-versa. Initially traffic light are running at fixed delay of 10second which in turn produces a delay of 40 second in the entire process. This entire embedded system is placed at that roads. Arduino(microcontroller) is interfaced with IR sensors & LED's. Total 8 IR sensors and 12 LED's are required. These are connected to ports of microcontroller. IR transmitter and receiver pairs, proximity sensor is used.

The IR sensor is used to detect obstacles. It comprises an emitter (IR LED), detector IR photodiode and auxiliary circuitry. When the reception of IR radiation source is higher, output voltage will also high.
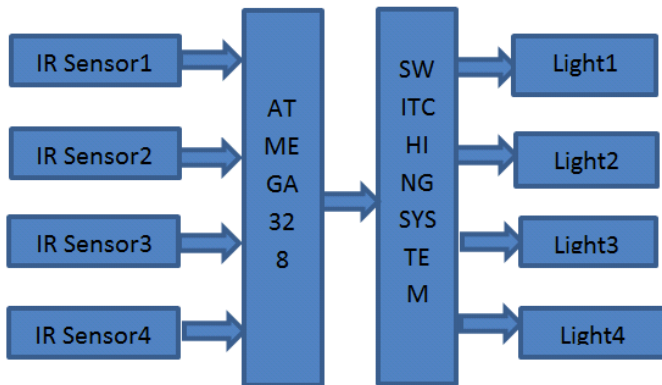

Fig.1: Block diagram of Density Based Automatic Traffic Light Control System

Above figure shows Block diagram of Density based automatic traffic light control system. It can be seen that the main heart of traffic system is Arduino. IR(sensors) receivers are connected to the analog pins of arduino(microcontroller) and digital pins are connected to the traffic lights. If there is large traffic on the road, then the particular sensor output becomes high. High output from the sensor will activate green signal on that particular road side & other road sides are made to be red and yellow depend on the density of the road. Switching system is used to connect two nodes that are not in direct proximity to each other. This ability to quickly & accurately distribute the right

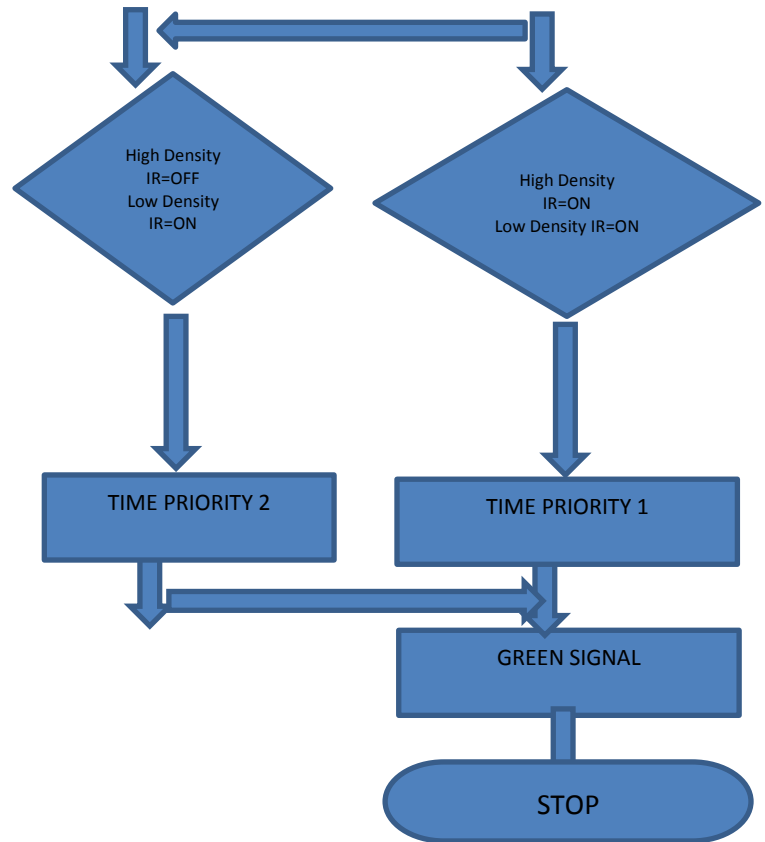information to the proper node so that is reaches the end user in sustaining way.

Input

Fig 2: flow diagram of Density Based Automatic Traffic Light Control System

Figure shows Flow Chart of Density based automatic traffic light control system. At the beginning of flowchart, the system starts. Arduino nano will compare density of each size of road. Whoever road is highly dense, system give green light to holding time more So that it can be clear. The system then goes further to assign operation serial number to each road based on their densities and the road with the most density is assigned road one.

4. DESIGN METHODOLOGY

4.1 Arduino Nano

Arduino Nano is a Microcontroller board designed by Arduino. It uses ATmega 328 microcontroller. It has a wide range of applications and is a major microcontroller board because of its small size and flexibility also it is friendly board based on ATmega 328. It lacks only a DC power jack The Arduino nano can be powered by via the MINI-B USB

connection. The ATMEGA328 is a single chip microcontroller created by ATMEL in the mega AVR family.
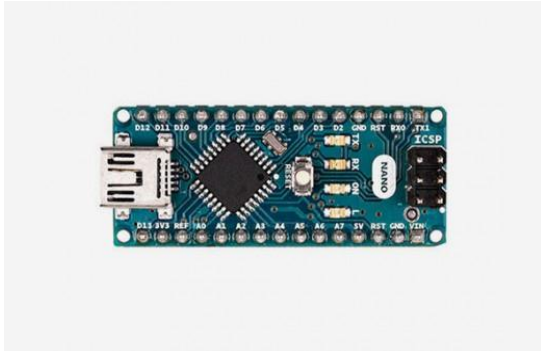

Fig 3: Arduino Nano chip

4.2 IR Sensor

IR stands for Infrared sensor. It is a passive device that measures infrared light from objects in its field of view. It is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure heat of an object as well as detect the motion. The IR sensor consists of IR transmitter and IR receiver. IR transmitter sends the infrared light and IR receiver sees the reflection of that infrared light and measures the distance which is then sent to the Arduino through analog input.
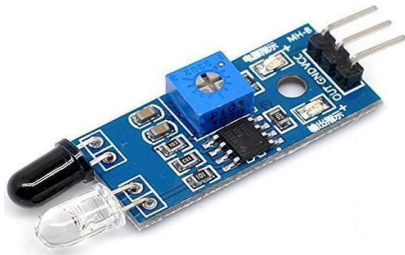

Fig.4: IR Sensor

4.3 LED'S

It is stands for Light emitting diode. It is a semiconductor light source, when current flows it emits light. It works on the principle of Electroluminescence. In above project, the light emitting diodes are used for indication purpose.

Fig.5: LED's used for traffic control

4.4 Resistor

A resistor is a passive two-terminal electrical device that controls the flow of electric current. It works on the principle of ohm's law and the law states that the voltage across the terminals of resistor is directly proportional to the current flowing through it.

Fig.6: Resistors

5. RESULT

The result has observed that, to reduce the wastage of time and traffic congestion we can implement the system that controls the traffic based on heavy flow of vehicles at any particular side the time delay in the traffic signal is set based on the densities of vehicles on the road.

6. CONCLUSION

There is existent need of efficient traffic management system in our country, as India meets with 384 road accidents every day. To optimize this congestion and unfavorable time delay in traffic an advanced system is designed here in this project. With field application of this technology, the irritating chaos of traffic system can be effectively channelized by distributing the time slots based on the densities of the vehicle load in certain lanes of multi junction crossing. We have successfully implemented the prototype. The next step forward is to implement this scheme is real life scenario for first hand results, before implementing it on the largest scale. We believe that this may bring a exhausted change in traffic management system.

REFERENCES

1. Intelligent Traffic Signal Control System Using Embedded System by Dinesh Rotake and Prof.SwapniliKarmore, Innovative Systems Design And Engineering, ISSN 2222-1727 (paper) ISSN 2222-2871 (online), Vol. 3, No. 5, 2012.

2. Priority Based Traffic Lights Controller Using Wireless Sensor Networks by Shruthi K R and Vinodha K, International Journal Of Electronics Signals And Systems (IJESS) ISSN: 2231- 5969, Vol-1 Iss-4, 2012.

3. Road Traffic Congestion Monitoring and Measurement using Active RFID and GSM Technology by Koushik Mandal, Arindam Sen, Abhijnan Chakraborty and Siuli Roy, IEEE | Annual Conference on Intelligent Transportation Systems, 2011.

4. Image Processing Based Intelligent Traffic Controller by VikramadityaDangi, AmolParab, KshitijPawar and S.S Rathod. Undergraduate Academic Research Journal (UARJ), ISSN: 2278 – 1129, Vol-1, Iss-1, 2012.

5. International Journal of Innovative Research in Science, Engineering and Technology Volume 3, Issue 3, March 2014 Density Based Traffic Signal System by K.Vidhya, A.BazilaBanu.

6. Er. Faruk Bin Poyen, Imran Ali, ArghyaSantra, AwanishPratap Rao International Journal of Advanced Enginnering, Management and Science(IJAEMS) Vol-2, Issue-8, 2016.

7. An Intelligent Real Time Traffic Light Control System by Mouleeshu WarapprabhuR., Niviya Dharshini S., Pearlstone Emmanuel G., Yashar Arafath M. International Journal of Engineering and Advanced Technology(IJEAT), ISSN 2249-8958, Vol-9, Iss-2, 2019.

8. M. Mazidi, R. Mckinlay "PIC microcontroller and embedded systems", Prentice Hall 1st ed, 2007.

9. M. Verle, "PIC microcontroller - Programming in C" 1st ed, MikroElectronika, 2009.

10. Design Traffic Light Control System based on Location Information and Vehicle Density in VANET by Balasubramani S., D. John Aravindhar International Jornal of Recent Technology and Engineering(IJRTE), ISSN 2277-3878, Vol-7, Issue-5S4, 2019.