International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

Dynamic Density Controlled Traffic Light System

M.A. Khadar Baba[1]; P. Anvesh[2]; P.Prathiksha[3]& P. Vamshi Krishna[4]
[12,3,4] ECE Department, Guru Nanak Institutions Technical Campus, Hyderabad, Telangana, India.
Email: anveshpippiri@gmail.com, abdul2805@gmail.com

Abstract: *This paper describes the implementation of Density based traffic control system using IR technology and At mega328p microcontroller. It has very efficient architecture which can be used for low end security systems and IR is widely adapted technology for communication. The problem with the traffic system is that for every minute the vehicles at the 4-way road will be heavy and the traffic lights shall be changed to each side for some fixed time. Even though there are no vehicles at particular side, the traffic signals will glow for given fixed time. Due to that there is time waste process. Due to this other side vehicles have to wait for the time to complete the process. So to reduce the wastage of time, we can implement the system that controls the traffic based on the heavy flow of vehicles at any particular side.*

.**Key Words:** IR Sensors, PID controllers.

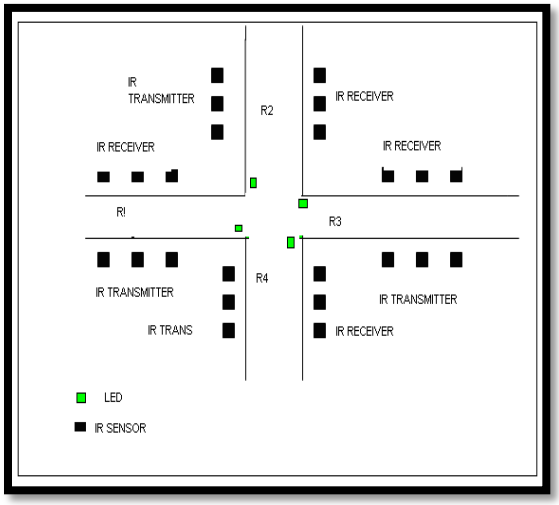
I. INTRODUCTION

In most cities across the world traffic congestion is severe problem faced by everyone. Now a days, controlling the traffic becomes major issue because of rapid increase in automobiles and also because of large time delays between traffic lights such as Sometimes higher traffic density at one side of the junction demands longer green time as compared to standard allotted time . By this lots of work hour is wasted in the signals. It indirectly also adds to the increase in pollution level as engines remain on in most cases, a huge volume of natural resources in forms of petrol and diesel is consumed without any fruitful outcome.

Therefore, in order to get rid of these problems or at least reduce them to significant level, newer schemes need to be implemented by bringing IR sensor based automation technique in this field of traffic signaling system. This is achieved by using this Dynamic density controlled traffic light system. Once the density is calculated, the glowing time of green light is assigned by the help of the microcontroller. The sensors which are present on sides of the road will detect the presence of the vehicles and sends the information to the microcontroller where it will decide to change over the signal lights. Hence by adopting this system time is saved, easily programmable and highly reliable so, this Density controlled traffic light system is better than the Time based controlled traffic light system.

II. SYSTEM DESCRIPTION

An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular function. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines and toys as well as the more obvious cellular phone and Personal Digital Assistant (PDA) are among the myriad possible hosts of an embedded system. Embedded systems that are programmable are provided with programming interfaces, and embedded systems programming is a specialized occupation.



p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

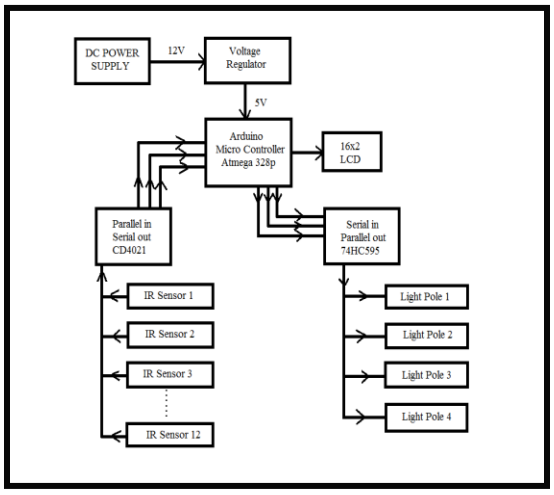


Fig.1Block diagram.

- Through DC adapter 12v dc power supply is given to the circuit board./
- Voltage regulator will converts 12voltage dc power supply to 5voltage dc power supply because our microcontroller will works under 5voltage dc power supply only.
- Arduino microcontroller At mega 328p senses the environment by receiving inputs from IR sensors and affects its surroundings by controlling light poles.
- CD4021 sends the input from IR sensors in parallel manner and sends the output to microcontroller in serial manner.
- 74HC595 sends the input from microcontroller in serial manner and sends the output to light poles in parallel manner.
- 16x2 LCD will displays the information on the screen.

III. IMPLEMENTATION

Hardware:

This digital output can be connected to microcontroller directly to from the IR sensors measured. It works on the principle of light modulation by sensing the crowd at each of the lane. The Arduino Uno used is ATmega328P operates at 16 MHz at 5V D.C. Arduino Uno controls all the operation. The Arduino Uno obtains the input from the IR sensors and monitors the Traffic control[8].

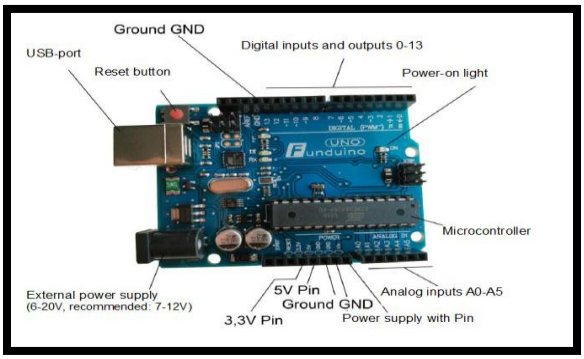


Fig.2 Arduino Uno Board.

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. Infrared (IR) radiation is part of the electromagnetic spectrum which includes radio waves, microwaves, visible light, and ultraviolet light, as well as gamma rays and X-rays.

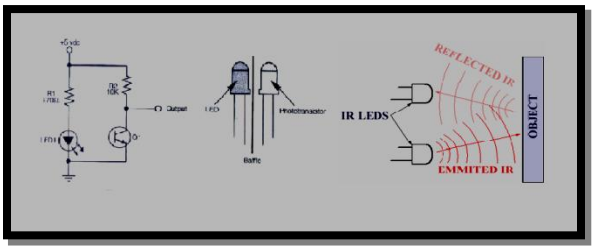


Fig.3 IR Sensor.

The MC14014B and MC14021B 8–bit static shift registers are constructed with MOS P–channel and N–channel enhancement mode devices in a single monolithic structure. These shift registers find primary use in parallel–to–serial data conversion, synchronous and asynchronous parallel input, serial output data queuing, and other general purpose register applications requiring low power and/or high noise immunity.

International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

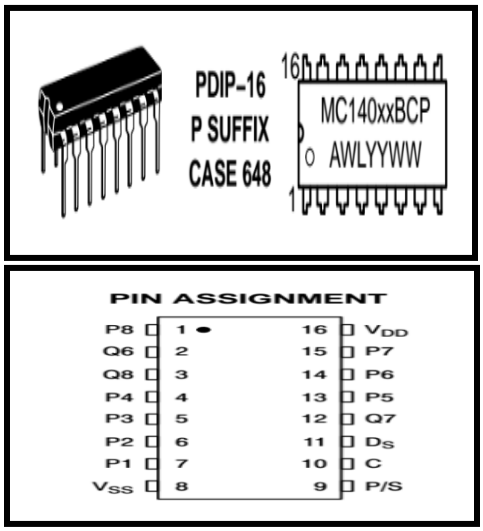


Fig.4 MC14021BCP IC Pin Configuration.

The SNx4HC595 devices contain an 8-bit, serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. The storage register has parallel 3-state outputs. Separate clocks are provided for both the shift and storage register. The shift register has a direct overriding clear (SRCLR) input, serial (SER) input, and serial outputs for cascading. When the output-enable (OE) input is high, the outputs are in the high-impedance state.

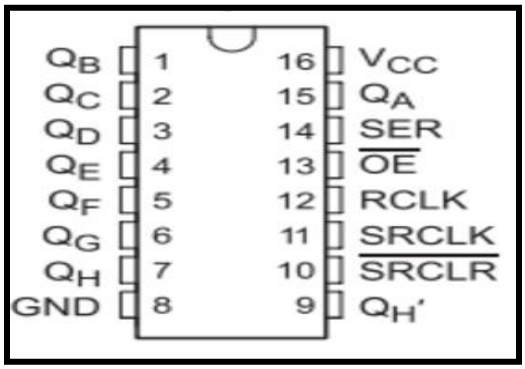


Fig.5 Pin Configuration of SN74HC595 IC.

Software:

Arduino Software:

The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions. An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run. This means that you connect the board to the host PC to develop and debug your program, but once that is done, you no longer need the PC to run the program.

Fig.6 Arduino Uno IDE.

Integrated Development Environment (IDE):
We can use the Arduino IDE on our computer (picture following) to create, open, and change sketches (Arduino calls programs "sketches". We will use the two words interchangeably in this book.). Sketches define what the board will do. You can either use the buttons along the top of the IDE or the menu items [2].

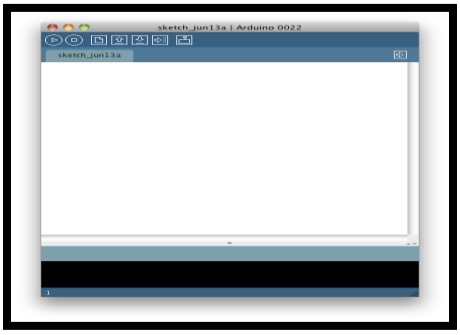


Fig.7 Arduino IDE on our computer screen.

Connect your Arduino to the computer with the USB cable. You do not need the battery for now. The green PWR LED will light. In the editing window that comes up, enter the following program, paying attention to where semi-colons appear at the end of command lines.

International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

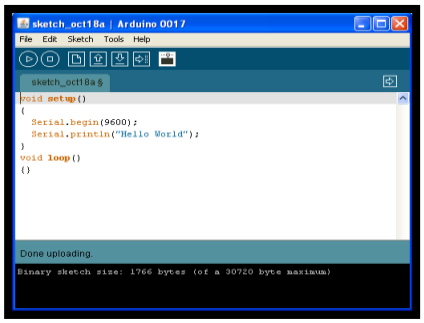


Fig.8 Program on Arduino IDE**.**

Click the Upload button  or Ctrl-U to compile the program and load on the Arduino board.

Click the Serial Monitor button  .

IV.STEPS OF EXECUTION

Algorithm:

- As per our process diagram, initially the signals are started by giving the power supply. The first step is to make sure that the signals are all in ON condition. During this all the traffic signals will blink in yellow light.
- This indicates that they are all in the working condition. The next step is to check for the density of traffic in these roads. By density what we are trying to mean in that the number of vehicles available in a particular at a certain period of time.
- The density is calculated over here by means of using an IR circuit. Depending on the number of vehicles that cut the light travelling from the receiver to transmitter of the IR circuit the count of the vehicles is registered in the microcontroller.
- This is followed by the next step in which the microcontroller decides as to which road should be given the highest priority.
- This is based on the density of traffic on each road and also it depends on the speed at which an IR circuit registers the count. The very next step is to assign time delays for each road.
- The time delays have already been set for certain specific counts in the microcontroller. As soon as the microcontroller receives the counts from the IR circuit it will immediately detect the density of each road and accordingly allot the time delays for which each signal will show the green light. The higher the traffic density, the longer will be the time delay allotted.
- In the final step, the microcontroller makes sure that the lowest density road is also opened and that the delay of the green light for that particular signal also comes to an end.

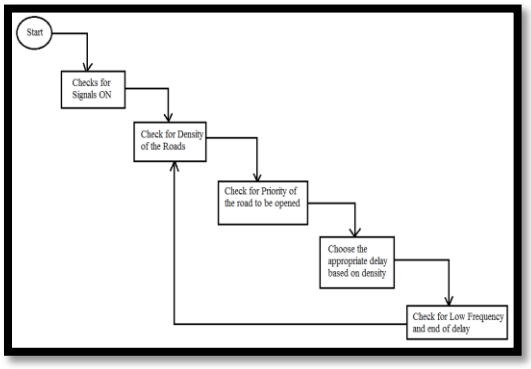


Fig.9 Process Description.

- Once all the roads are opened in a sequence, then the microcontroller again goes back to the second step where it checks for the density of traffic in each road. The whole process is repeated like a cycle.
- The main point that is to be noted regarding this process is that, whenever a particular road has no traffic, correspondingly, the yellow light in the traffic signal will glow.

V. RESULTS &ANALYSIS

Experimental Kit:

The experimental kit of "Dynamic Density Controlled Traffic Light System" is depicted below. LCD to display predefined messages that were written the program. Moreover, it contains IR Sensor , MC14014B etc.

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

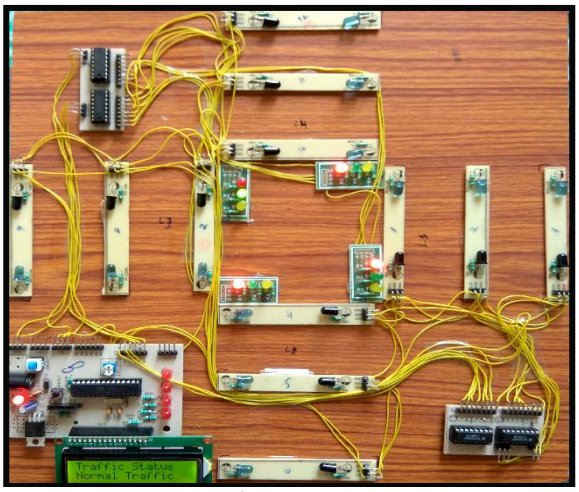


Fig.10 Project Kit

Results:

Results include the successful operation of the intelligent traffic light control and monitoring system. The IR sensor with IR transmitter is placed at a gap. Gap acting as a proto- type ind road. The system is placed near road as a standalone device. Whenever any obstacle like vehicle passes between IR transmitter and IR sensor, microcontroller detects and increase number of vehicle count in a recording interval for traffic light. Traffic light is placed ahead of IR sensor at a distance so that decision taken by microcontroller to control traffic light can help in reducing the congestion at traffic light. On the basis vehicle count microcontroller decide the traffic light delays for next recording interval. Traffic light delays are classified as LOW,MEDIUM, HIGH range. Thee ranges are predefined by varying vehicle count.

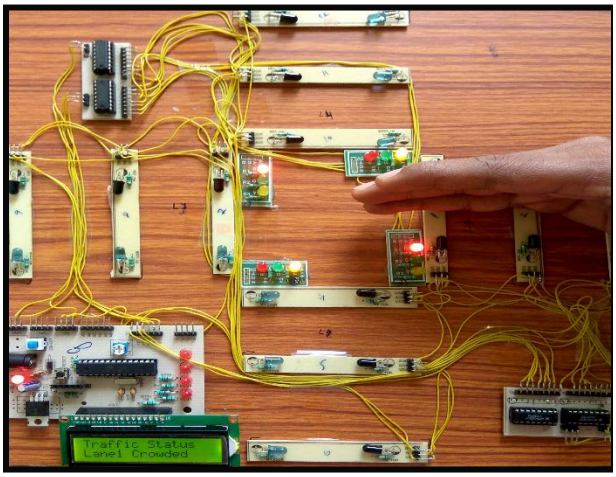


Fig.11 Output when Lane 1 is crowded.

VI. CONCLUSION

Finally, by this We conclude that To reduce the congestion and unwanted time delay in traffic, an advanced system is required. One such advanced technology is automatic signaling using IR sensors. The sensors help in keeping Count of vehicles entering roads and subsequently allot time delay thereby giving accurate priority to each road for the time being. With this technique we have entered a new era of automatic traffic signal control. By using this system configuration we can reduce the possibilities of traffic jams caused by traffic lights to an extent.

REFERENCES

[1] Ramón Martínez "Smart control system for LEDs traffic-lights based on PLC". Dpt. de Senates, Sistemas y Radio communications. Universidad Polytechnic de Madrid ETSI deTelecommunication. Ciudad Universities sn.28040 Madrid SPAIN.

[2] Bechrakis D. A., Sparis P. D." A flexible data logging device for wind potential measurements and statistical magnitudes". Democritus university of Thrace, department of electrical and engine mechanical computer engineering laboratory.

[3] Muhammad Ridwan. Development of a Low Cost Smart Traffic Controller System". Department of Mechanical and Materials Engineering Faculty of Engineering and Built Environment University Kebangsaan Malaysia, 43600 Bangi Selangor, Malaysia.

[4] Marco Wiering. "Intelligent Traffic Light Control". Institute of information and computing sciences, utrecht university.

[5] CihanKarakuzu "Fuzzy logic based smart traffic light simulator design and hardware. Implementation". Kocaeli University, Engineering Faculty, Electronics & Tell. Eng. Department, 41070 VezirogluYerleskesi, Izmit-Kocaeli, Turkey.

[6] Kok, Khiang Tan and Marzuki. "Intelligent Traffic Lights Control by Fuzzy Logic". Malaysian of Computer Science.

[7] 11. K.Thatsanavipas, N.Ponganunchoke ,et al., "Wireless Traffic Light Controller"2nd International Science, Social- Science, Engineering and Energy Conference 2010:Engineering Science and Management..

[8] Multiple Traffic Control Using Wireless Sensor and Density Measuring Camera Amrita Rai and Govind Singh Patel. Sensors & Transducers Journal Vol. 94, Issue 7, July 2008, pp. 126-132.