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Auto Traffic Smart Signals with green corridor

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ABSTRACT: Traffic congestion is a major problem in all major cities all over the world. Conventional system has many limitations. In our project, we worked with three major goals, that is to a) provide variable time slot as per traffic density b)provide green corridor for emergency vehicles c)provide zero waiting time to a car at a junction if all other roads are empty. Through this paper we have attempted to revamp these standards. In our system we used IR sensors and photodiode to sense status of traffic. The system is controlled by Microcontroller 8051. Green corridor can be established by using a Bluetooth device from Android application device. All the sensors and the Bluetooth module is interfaced to the microcontroller. The microcontroller chip supervise every sensor and the Bluetooth module and either change the time slot or turn the signal green.

KEYWORDS: IR & Photodiode sensing switch, 8051 Microcontroller, Bluetooth

I) INTRODUCTION:

Conventional traffic light system is based on fixed time concept allotted to each side of the junction. The time slots, once fixed, cannot be changed as per the traffic density. Drawbacks of existing system:

- Time slots once fixed cannot be changed as per traffic density.
- Signal override feature is not provided
- Smooth movement of emergency vehicle without avoiding unnecessary waiting is not possible.

We tried to overcome these drawbacks in our system. Sometimes there is high traffic density at one side of the junction. It requires longer green time as compared with normally allotted time. The proposed system using Microcontroller 8051 family changes the junction timing automatically. This avoids unnecessary waiting time at the junction. The microcontroller is interfaced with sensors which sense the density of traffic. IR sensors and photodiodes are used in our system. The density is measured in three zones A) LOW, B) MEDIUM &C) HIGH. Three different timings are allotted to these three zones. We can synchronise all the traffic junctions by establishing a network among all the signals in the city. One can also establish a 'Green' corridor for an emergency vehicle like ambulance by using a Bluetooth device from Android application device mounted in that vehicle. Similarly if there is only one car at any signal and all other connected roads are empty, then that particular signal will turn green.

II) LITERATURE SURVEY

The project uses IR interruption concept for providing change in the logic state to input of Microcontroller. Number of IR diodes facing photodiodes are used in the system. The photodiodes are connected to transistors Q1, Q2, Q3, Q4,Q5. These transistors are in the conducting state. The collectors of these transistors are connected to corresponding port pins. This act as input for the program to be executed based on change of logic state.A single junction has four sides. In our system, 12 LEDs representing signal lights are connected to the output of microcontroller in sink mode to port 0, port 1 & port2.When all the inputs coming from Q1 to Q5 are in logic low state, the output LEDs (Three per junction) follow fixed timing intervals in sequential clockwise direction. During low traffic density, such fixed timing can be provided. When any one way is blocked with more number of vehicles, the IR blocking happens. There are three zones with three sets of IR sensing arrangement.The transistors Q1 to Q5 goes high because of IR interruption while the vehicle comes in between the photodiode and IR diode.This logic high sensed at the microcontroller input changes the fixed ON time to a higher value for allowing more vehicles to pass through. After some time if any other way gets more traffic, the sequential timing get automatically increased for that way. Each way is divided into three active zones, each zone representing some specific length. Based on IR interruption, the ON time increases. Thus more the vehicles,

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longer will be the green signal time. Thus dynamic traffic control is achieved based on the traffic density. One Bluetooth module is used in the system which is powered from a zener diode D1 for 3V. The transmitter and receiver of this Bluetooth are interfaced to the microcontroller for bidirectional dataflow. The android application from any smart phone communicates through the inbuilt Bluetooth module of the phone to the above Bluetooth module for signal override application as required. Any smart phone with Bluetooth software is used for signal override, i.e. if an emergency vehicle is approaching the street junction, the user from the vehicle can override the signal by interacting with the traffic light wirelessly by means of Bluetooth. When signal override is needed for any direction, then use of GUI is made for keys Upward, Downward, Right or left for corresponding North, South, East and West sides. If no override is required, then simply click the centre button. Then the timing will follow according to the traffic density programmed.

III) PROGRAMMING, HARDWARE & SOFTWARE TOOLS:

A) IR LED:

It is also known as IR transmitter. It is a special purpose LED that transmits infra red light in the range of 760 nm wavelength. Such LEDs are normally made up of Gallium Arsenide or Aluminium Gallium Arsenide. Along with IR receivers, they are used as IR sensors. The appearance of these LEDs is same as common LEDs. Since human eye cannot see infra red radiations, it is not possible for a person to recognise whether an IR LED is working or not. To overcome this problem a camera on cell phone can be used. The camera can show us that IR rays are being emanated from IR LED in the circuit.

Features:

Very high radiant power

Low forward voltage

Suitable for high pulse current operation intensity.

High reliability

B) Photodiode:

It is a type of photo detector capable of converting light into either current or voltage depending upon mode of operation. They are similar to regular semiconductor diode except that they may be either exposed or packed with a window or optical fibre connection to allow light to reach the sensitive part of the device.

Principle of operation:

A photodiode is a PN junction or PIN structure. When a photon of sufficient energy strikes the diode, it excites an electron, thereby creating a mobile electron and a positively charged hole. If the absorption occurs in the junction's depletion region, these carriers are swept away from the junction by built in field of the depletion region. Thus hole moves towards anode, electrons towards cathode and a photocurrent is produced. When the diode is reverse biased, width of depletion region increases. Therefore junction capacitance decreases. This results in fast response time. The photocurrent is linearly proportional to luminance.

C) IR interruption concept:

IR diode is connected through a resistance to the DC supply. A photo diode is connected in reverse biased condition through a potential divider of a 10k variable resistance and 1k in series to the base of the transistor. While the IR rays fall on the reverse biased photodiode, it conducts that causes voltage at the base of the transistor. The transistor acts as a switch producing low voltage at its collector. Once the IR rays are obstructed, the driving voltage is not available to the transistor. Thus its collector goes high. This low to high logic is used for the microcontroller input for any action as per the program.

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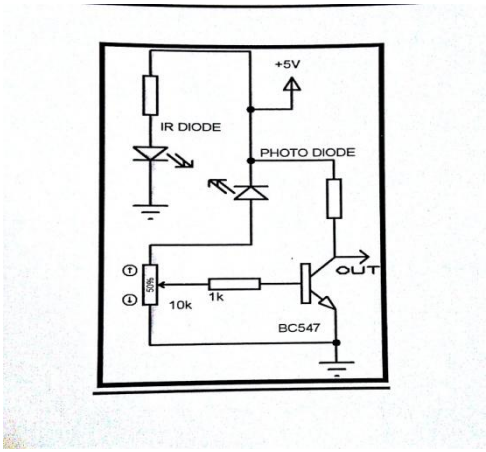
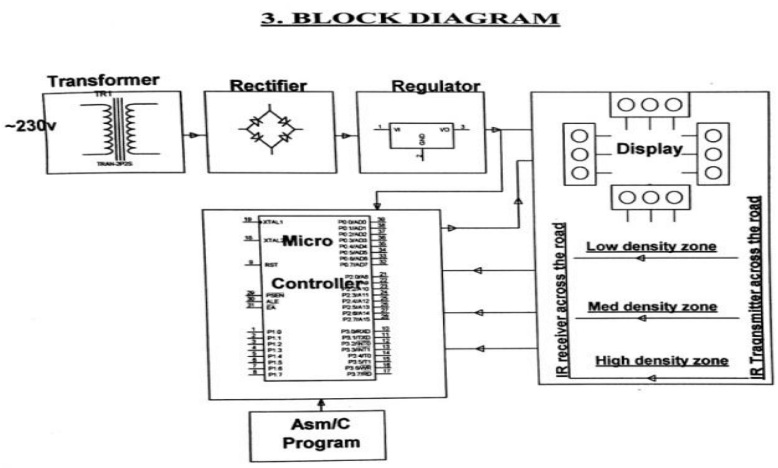


Power Supply: The circuit uses standard power supply comprising of a step down transformer from 230V to 12V, which is rectified, filtered and regulated to give constant 5V DC at its output.

D) Connections:

The output of power supply is connected to pin no. 40 of Microcontroller & ground is connected to pin no. 20. The input is given to port 2 of Microcontroller and output of Microcontroller i.e. port 0 and port1 are connected to LEDs.
Pin 0.0 of port 0 of Microcontroller is connected to D4 i.e. Red LED
Pin 0.1 of port 0 of Microcontroller is connected to D5 i.e. Yellow LED
Pin 0.2 of port 0 of Microcontroller is connected to D6 i.e. Green LED
Pin 0.3 of port 0 of Microcontroller is connected to D3 i.e. Green LED
Pin 0.4 of port 0 of Microcontroller is connected to D2 i.e. Yellow LED
Pin 0.5 of port 0 of Microcontroller is connected to D1 i.e. Red LED
Similarly Pins 1.0, 1.1, 1.2, 1.3, 1.4 and 1.5 of port 1 of Microcontroller are connected to Diodes D10 (Red LED), D11(Yellow LED), D12(Green LED), D9(Green LED), D8(Yellow LED), D7(Red LED)
Pin 2.0 of port 2 of Microcontroller is connected to Q3 photodiode
Pin 2.1 of port 2 of Microcontroller is connected to Q2 photodiode
Pin 2.2 of port 2 of Microcontroller is connected to Q1 photodiode
Pin 2.3 of port 2 of Microcontroller is connected to Q4 photodiode
Pin 2.4 of port 2 of Microcontroller is connected to Q5 photodiode

IV) BLOCK DIAGRAM:



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V) CONCLUSION:

The proposed Smart signal system is more advanced than conventional system due to many reasons. Some of them are-

- Variable time slots as per traffic density.
- Green corridor can be established for emergency vehicles.
- No waiting for a vehicle in case of very less or no traffic.

REFERENCES:

[1]Muhammad Ali Mazidi, Janice Gillispie,"The 8051 Microcontroller and Embedded Systems", Pearson Publication
[2]ATMEL 89S52 data sheets
[3]www.atmel.com
[4]www.beyondlogic.org
[5]www.alldatasheets.com
[6]www.wikipedia.org
[7]www.howstuffworks.com