Density Based Traffic System

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Traffic congestion is a major issue innumerous location worldwide; it is past time to convert from a fixed timer mode to an automated approach, particularly in urban areas. If one lane is more useful than the others, the current fixed-time traffic signaling system is inefficient. To solve this problem, a framework for an intelligent traffic control system is being created. The signal's green time is extended compared to the standard time when traffic congestion is higher on one side of a junction. This paper describes a technique where the amount of traffic at the moment affects the length of the signal. Infrared sensors can be used to do this.

Keywords: Infrared sensors, Micro-controllers, LEDs, Oscillators.

1. Introduction

At the moment, traffic is expanding on a daily basis all over the world, primarily in metropolitan areas. Because resources and infrastructures are becoming insufficient as the number of road users grows fast, smart traffic control will have to deal with severe difficulties in the future, such as congestion.

One of the key factors contributing to traffic congestion is the amount of time drivers wait for a red light to turn green.The traffic signal is programmed to change. The current system's application is limited, with unbroken flow conditions and traffic lines with a lower percentage of heavy trucks.

Congestion and noise pollution caused by traffic are increasingly considered to be India's most serious issues. The idea of efficiently directing traffic in real-time has enticed many researchers to develop an intelligent traffic system that can assess traffic congestion and pollution and adjust traffic signals based on this variable.

2. DENSITY BASED TRAFFIC SYSTEM (DBTS)

[1] Currently, traffic is controlled by traffic police hand gestures and traffic signals. To educate people about the traffic system, a curriculum is required.

Vehicles will be able to swiftly notice the sign on the road thanks to the standards. Usage People will be able to detect and take appropriate action if the colors on the sign board are consistent.

In the current situation, traffic lights are fixed in various directions with a defined time delay, causing traffic to switch from one to the other, causing undesired congestion.

The study advocated controlling the timing of the lights by identifying the density of traffic on a single lane. [1]IR Tran receivers count vehicles and provide information about traffic density on a specific lane.

The following elements must be included in this paper:

1. Microcontroller (16F877A).
2. Reset button.
3. Crystal oscillator.
4. Regulated Power Supply (RPS).
5. LED indicator.
6. INFRARED SENSORS Sensor module.
7. High Powered LED

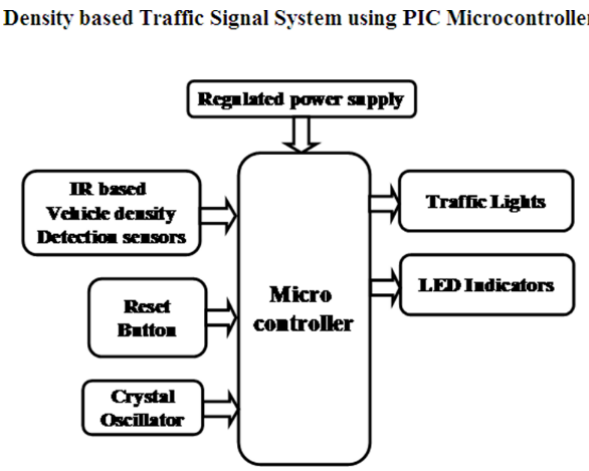

Figure 1. Block diagram

Microcontroller (16F877A):[1] The PIC16F877A microcontroller is utilized in this suggested study. Microchip Technology Inc. created the PIC microcontroller family. These are some of the most well-known microcontrollers, with 120 million units sold per year. PIC microcontrollers are divided into four categories.

Reset button: The reset button is a button used to restart a device. It clears the device's memory and reboots it.

Crystal oscillator: The speed of the crystal oscillator, which is connected to the PIC microcontroller. The oscillator with a frequency of 20 MHz is simple to operate and

inexpensive. A 22pF capacitor is linked to the 20 MHz crystal oscillator.

Regulated power supply: The RPS is a built-in circuit that transforms fluctuating AC to consistent DC. It is both dependable and transportable.

Led indicator: A semiconductor called a light-emitting diode (LED) emits light when power is given to it. They can be found in lamps, vehicles, and other items.

3. SYSTEM IMPLEMENTATION OF DBTS.

In order to develop an intelligent density-based traffic system, infrared sensors are replaced with the system in this study. Infrared sensors have both an infrared transmitter and a receiver. [1] These will be positioned at a specific distance apart on the opposing sides of the street. The sensors will detect the car as it passes by them and communicate the information to the microcontroller.

Depending on the density of cars, the microcontroller will calculate the number of vehicles and increase the LED's illuminating time. If the traffic density is higher, the LED glowing time will be longer than average, but if the traffic density is lower, the LED glowing duration will be shorter than usual. The first fixed time delay is 6 seconds, resulting in a total process delay of 12 seconds. The entire embedded system is situated at a crossroads. [2] The led and infrared sensors are connected to the microcontroller. Four infrared sensors are need in total and the number of LEDs required is twelve. As a result, these are connected to one of the microcontroller's two ports.

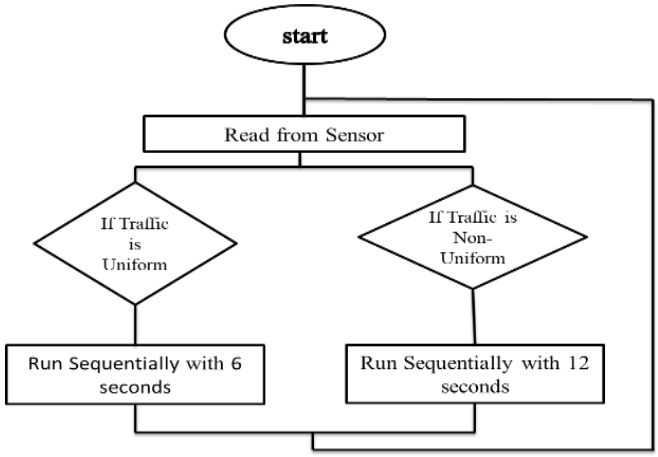

Figure 2. Flow chart

This paper's operation is broken into three levels.

1. The system will go on to the next signal if there is no traffic and no horn sound at a signal.If there are no vehicles at signals 1 and 2, for example, the system will verify the vehicles at signal. When there are vehicles at signal 4, run for 12 seconds and then skip 1 and 3 to signal 2.

2. The system will function normally if there is traffic at all of the signals and no horn

sound.

3. If there is traffic and the vehicle's horn sounds, the system will continue to function normally but the countdown minute for waiting will be increased. If there is traffic and the vehicle's horn sounds, the system will function normally with an increase in the countdown timer for waiting. When the system records the sound of a horn, for example, the typical countdown (say 30 seconds) increases.

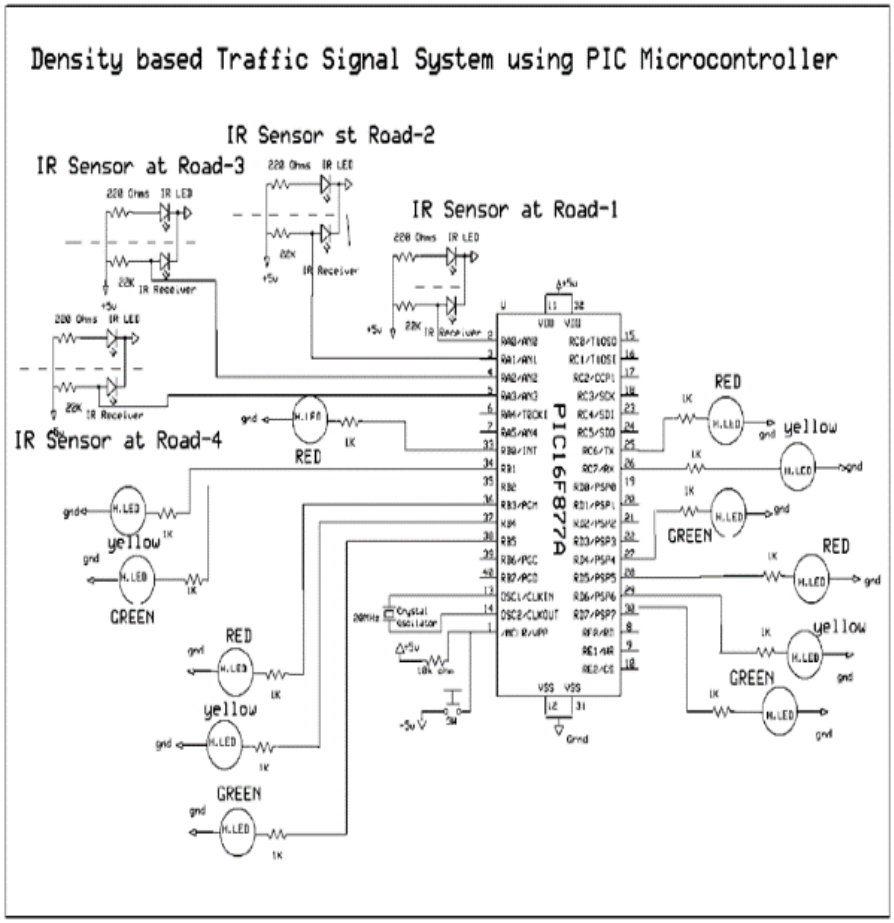

Figure 3. Schematic diagram of PIC16F877A

The interfacing of the PIC16F877A microcontroller with each module is depicted in Figure 3. Figure 3 (Density-based Traffic Signal System) shows how each component is linked to a microcontroller and infrared sensors to detect traffic density. [2] The crystal oscillator is attached to the microcontroller's 13th and 14th pins, as well as the RPS. The RPS is linked to the microcontroller. Through resistors, LEDs are connected to the microcontroller.

Proteus is a programme that allows you to access hex files. Hex code is transferred from machine code to the microcontroller after translation. and the Proteus handles the rest of the process.

Steps for compilation and simulation:

- For compilation, we use the PIC C compiler. The steps in the compilation process are as follows: PIC C compiler is now open.
- Make a new project and save it under a different name.
- Click the 'Text1' button in the newly formed project.
- Click 'File, Save as,' and save the file with the extension '.c'.
- Start compilation by writing the source code in the 'project.c' window.
- On clicking compile option .hex file will be generated automatically.
- After compilation, the simulation process begins. The first circuit is created in Express PCB using Proteus 7 software, and then simulation is performed. The following step will be dumping after the simulation is completed.

The following are the steps in the simulation:

- Click on 'IS1S6' in the Proteus 7 software. Then it shows a PCB with a circuit depicted using a microcontroller. To design the circuit, you'll need components.

Dumping steps:

The stages involved in dumping a programme that has been edited in proteus 7 are as follows:

- To begin, go to the Tools menu and select Check Communication. Before attaching the programme dumper to the microcontroller kit, you must first create a connection.
- After connecting the dumper to the microcontroller kit, go back to the Tools menu and select Check Communication and the dumper will recognize the microcontroller.
- Select the File option and then 'Import Hex' to import the '.hex' file.
- To dump the program into the Microcontroller, double-click 'prog.hex' and then 'open.'

4. RESULTS AND DISCUSSION

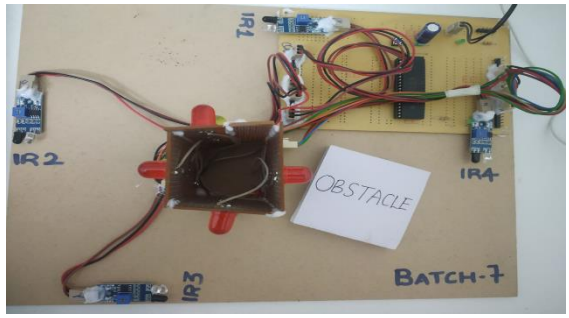

Figure 4. Connection of components to PIC micro controller.

The purpose of this work, "Density-based Traffic Signal System Using Microcontroller," is to

change the signal delay based on traffic using a microcontroller. With the help of infrared sensors, this microcontroller measures traffic density.

Infrared sensors transform a traditional traffic system with a set delay into an intelligent traffic system with a variable delay based on vehicle density. The infrared sensors are positioned on the same side of the road as the infrared transmitter and receiver. The presence of the vehicle is counted as a signal and sent to the microcontroller whenever the vehicle passes by these sensors.

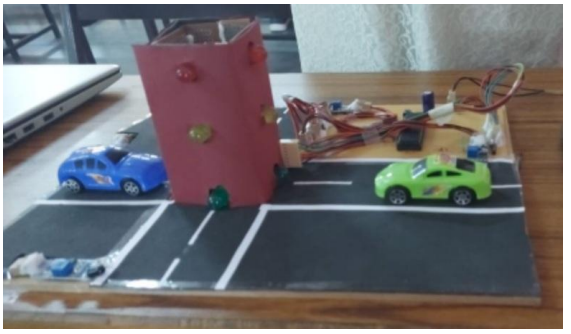

Figure 5. Arrangement of DBTS.

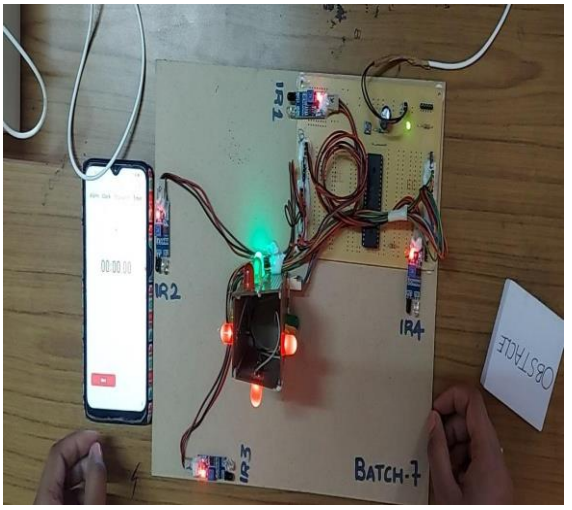

Figure 6. Signaling sensors and response.

5. CONCLUSION

Our country has a pressing need for a systematic traffic control system, as India has an average of 300 accidents every day. In order to decrease traffic congestion, traffic signals have been changed. Wherever traffic density is low, the adoption of this intelligent traffic system will help to alleviate congestion and minimise the glowing duration of signals. The objective of the proposed study is to create a real-time traffic system based on density. As a result, this research proposes intelligent traffic.

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