

Unique Traffic Signal System for Road Traffic Designed with High Tech Devices

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Abstract: *The traffic signal system designed here is intended to stop infringers from violating the traffic rules by raising metal rods from the underground of road when red traffic signal is energized. This scheme is proposed to restrict the road traffic strictly. When the red light is turned to green, automatically the metal rods will be lowered below the road level allowing the safe passage of vehicles. In addition after stopping the traffic, pedestrians are allowed to cross the road, for which an automatic announcement will be made to alert them. Since it is a prototype module, basic theme is presented for single road, but for real time applications it can be implemented for all sides of the cross roads. The demo module is constructed with single signal post which contains red, green and yellow signals.*

Key words: Signal Post, Microcontroller, H Bridge IC.

I. INTRODUCTION

Traffic lights, also known as traffic signals are signaling devices positioned at road intersections, pedestrian crossings, and other locations to control the flow of traffic. The present traffic signaling system in use, functions as per the pre-determined set of ON-OFF timings for Red, Green and Yellow lights but doesn't have the capability of checking and controlling the traffic violators. Especially in outskirts of the city at many traffic signal junctions, due to the lack of traffic police presence, many people are violating signals and this leads to severe accidents. To avoid such critical situations, it is necessary to restrict those law breakers by providing an automatic mechanical obstacle by which they cannot move further due to the ejected metal rods raised from the underground of specific road area where signal post is deployed.

II. LITERATURE SURVEY

The existing traffic system in our country uses a few time delay equipment for the signal lights and time counters such as 555 counters are used for displaying the time duration of the signal. This however is not an effective way of implementing the traffic rules as we see many people violating them every now and then. In order to adhere to the traffic rules strictly by each and every individual, this unique traffic system is proposed and a prototype of which is implemented. A microcontroller is used to command the other components. A H bridge IC popularly known as the L293D IC is used to elevate the metal bars which are beneath the road level. These metal rods are elevated when the signal post turns red. After a time delay of 45 seconds the signal turns green after which the bars are lowered. This process is looped and can be manually operated if necessary.

III. PROPOSEDSYSTEM

The block diagram of our proposed system is as shown inFigure1:

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Block Diagram

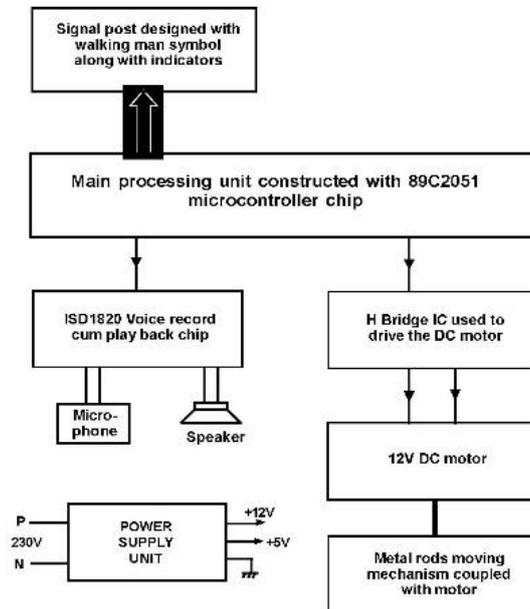


Fig1: Block diagram

Functionality of each block shown in Fig 1 is described below:

Power Supply: Connected to external power supply.

89C2051 Microcontroller: The embedded system constructed with Atmel 89C2051 microcontroller chip plays a key role. Microcontrollers are increasingly being used to implement control systems. It is therefore important to understand Microcontroller-controlled systems well. This 89C2051 Microcontroller is the heart of the project.

Signal Post Containing LEDs: Light emitting diode also known as LED is a semiconductor device which emits light. These LEDs produce light in Visible, infrared, UV regions. When current flows through the LED they emit light. Three colors of LEDs are used in the project. They are Red, Yellow, Green lights.

ISD 1820 IC: This IC is also known as Voice and playback recorder. This is used to take voice signal as input and play it in the speakers as the output.

LM 7805: This is a 3 terminal positive voltage regulator.

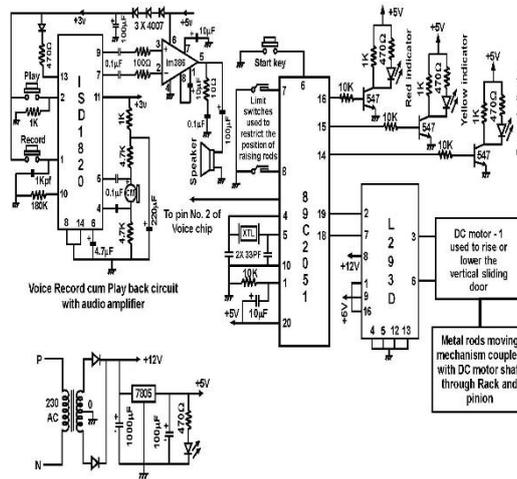
12V DC Motor: A Direct Current motor also known as DC motor is a device that converts electrical energy into mechanical energy. This is generally used for rotary purposes in many fields. The capacity of the motor depends on the voltage of the motor that is being used.

H Bridge IC: This Integrated Circuit is also known as L293D IC. This IC is used to elevate and lower the metal rods.

Arduino UNO: As we know Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

IV. METHODOLOGY

The block diagram in Figure 2 represents the connections between the components. As it is clearly seen the Microcontroller acts as the operating source for all other components. In the initial condition, the microcontroller sends an instruction to the lamp post containing LEDs to flash the red light. A time delay is set in the code of the microcontroller which delays this red signal for about 45 seconds and then the other two lights are also flashed in accordance to the time delay set in the code dumped in the microcontroller.



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Fig 2: Circuit Diagram

V. RESULTS

The system was implemented by first designing the hardware and later the software. It was thoroughly tested for its proper process and consistency. Software design was started after the hardware was fully fabricated and tested successfully. Programs were written in the Keil Uvision for individual modules and tested independently. After each module was tested, integration of all software modules after which debugging was carried out.

The results that we obtained can be categorised into certain stages according to the signal light at each stage in the prototype. The obtained results are as follows:

Stage-1

This stage is considered as the primary stage. The red light is flashed with the instructions of the microcontroller. The H-bridge IC on the other hand is activated and elevates the metal rods above the ground level. This signal is flashed for a duration of 45 seconds.

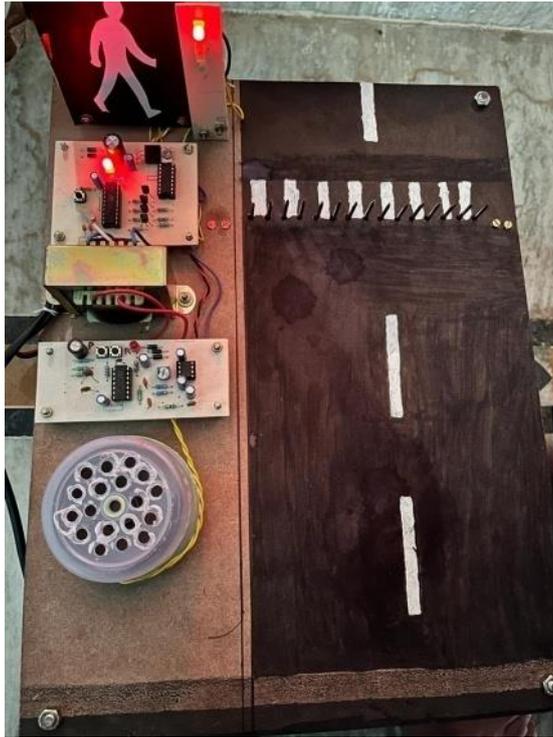


Fig 3:Signal Post flashing red light and the metal rods are elevated.

Stage-2

At this stage, the H-Bridge IC is instructed to lower the metal rods and the signal post flashes yellow light. At this point, the pedestrians are restricted from crossing the road.

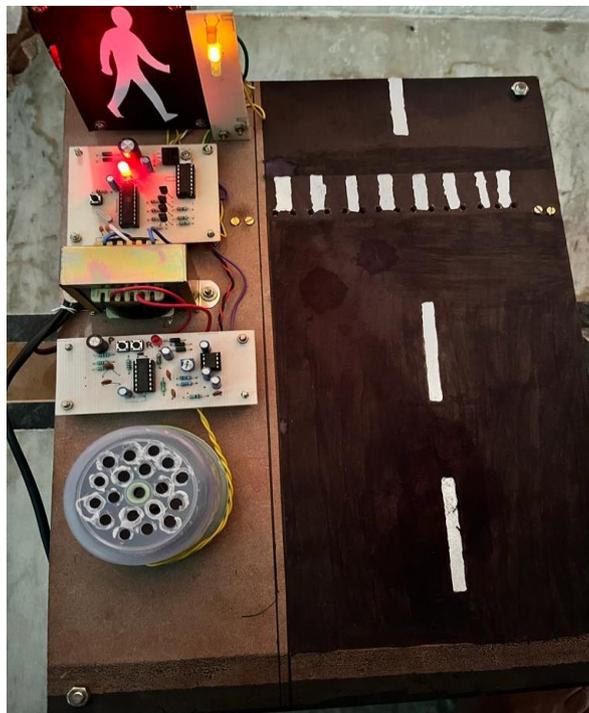


Fig 4:Signal Post flashing Yellow light and the metal rods are lowered.

Stage-3

In this stage, the signal post flashes green light and the vehicles are allowed to move ahead as the metal rods are continued to be lowered condition.

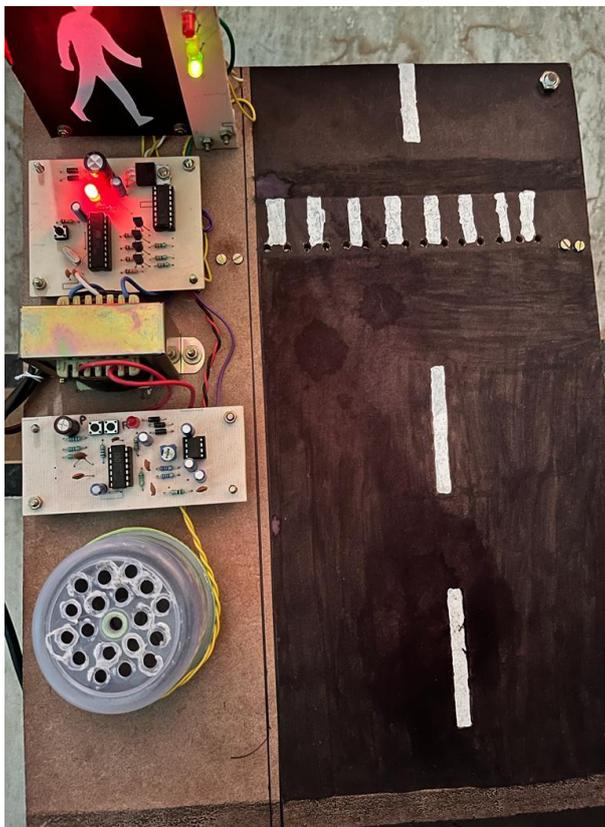


Fig 5: Signal post flashing green light and the metal rods are lowered.

VI. APPLICATIONS

The road spike system is used for numerous applications according to conditions like controlling traffic management, thus ensuring people to obey traffic rules properly. By using this system, the number of accidents reduces. To list out, following are some of the application domains of the proposed system.

1. It could be used in Traffic signal.
2. It could be used in restricted area such as Military Defense.
3. It can also be used in parking area like in Malls, Hospitals, Railways and Hotels.
4. Its use can be extended to barriers where security is in question, say, Security Zones and Prohibited Areas.

VII. CONCLUSION

To conclude with, a proto designed this project for Public road Safety and it is especially useful for pedestrians to carefully cross the road.. The proposed model is a prototyped one and can be used extensively when embedded to a huge scale project deployed on roads.

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