SPEAKING LIGHT: THE LIGHT OF THE FUTURE

Vishnu Agarwal, Indrajit Khuntia, Rajendra Devganiya, Aditya Kumar Valkeri

***Abstract*— In our day today life we see much irresponsibility of people like in the smart zones such as hospital zones, school zones the speed limit is 30-40 km/h and also blowing horn is restricted but no one cares about it and also at the traffic signal, some vehicles cross the signal when the signal is red.**
To overcome this problem we are presenting this paper. Using visible light and IR light we transmit the information to the receiver attached to the vehicles and control the vehicles.

***Index Terms*— smart zones, school zone, hospital zone, visible light, IR light.**

I. INTRODUCTION

The project presented here is a novel approach towards vehicle navigation & safety implementation.
The title of the project is speaking light because all the information we are transmitting through light only.
In convention, these special zones or areas are indicated at the roadside on a pillar or road sign poles. As an example, near school zone, the sign board displays "School Zone Ahead, Drive Slowly", or near a hospital, "Hospital Area-Do not Blow Horn", but in reality rarely this is practices. Drivers go at very high speed as usual near school zone, or operate the harsh horns loudly causing inconvenience to the patients in the hospital. Even though these are meant for the safety of the vehicles traveling and also for the general public, it is hardly practices by the vehicle drivers. As a result, making the whole concept of displaying warning sign and messages on the roadside boards meaningless.

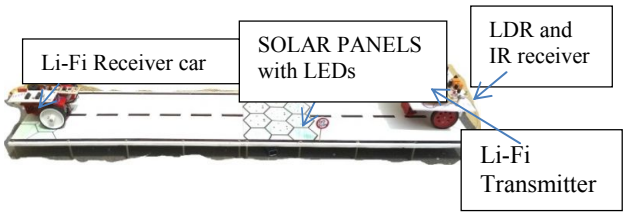

Fig.1 Side view of the model

The solar panels are fitted under the road. In those solar panels LEDs are fitted. In the smart zone when the vehicle crosses the zone the vehicle will become slow and when it reaches the traffic signal it stops when the signal is red. The vehicles will not start until the signal will become green.

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Using visible light the car blows the horn to the front car as shown in the fig 1. So that we can reduce the sound pollution.
On the solar panel which is fitted inside the road are covered by very strong temper glass. So that any heavy vehicle will not affect the solar panels.

This project consists of some important sections such as:

- Power supply
- Variable power supply
- Li-Fi transmitter
- Li-Fi receiver
- Buffer and relay Driver
- DTMF Encoder
- DTMF Decoder

II. POWER SUPPLY

The circuit needs two different voltages, +5V & +12V, to work. These dual voltages are supplied by this specially designed power supply. The power supply, unsung hero of every electronic circuit, plays very important role in smooth running of the connected circuit. The main object of this 'power supply' is, as the name itself implies, to deliver the required amount of stabilized and pure power to the circuit.
The stabilization of D.C. output is achieved by using the three terminal voltage regulator IC. This regulator IC comes in two flavors: 78xx for positive voltage output and 79xx for negative voltage output.

III. VARIABLE POWER SUPPLY

A very good designed circuit of a regulated stable adjustable power supply using IC LM317T. LM317T is a very famous IC and easily available in the market comes with 3 pins, supporting input voltage is from 3 volt to 40 volt DC and delivers a stable output between 1.25 volt to 37 volt DC. It is a very high performance IC contains a built in current limiter, built in thermal overload protection & safe area protection.
LM317T output current is 1.5A but many other low and high current models are also available in the market. The Output voltage is adjustable between 1.25v to 37v and the maximum output current is 1.5A. The circuit is very simple to build &contain fewer components but will give very best results. The output voltage is adjusted by 5.1K potentiometer.

IV. LI-FI TRANSMITTER

It uses visible light LEDs to transmit the information. LM 741 IC is used in this. The LM741 series are general purpose operational amplifiers which feature improved performance over industry standards like the LM709.
They are direct, plug-in replacements for the 709C, LM201, MC1439 and 748 in most applications. The amplifiers offer many features which make their application nearly foolproof: overload protection on the input and output, no latch-up when

the common mode range is exceeded, as well as freedom from oscillations.

V. LI-FI RECEIVER

This simple module of Li-Fi receiver which have two stages pre-amplifier and power amplifier. IC LM 358 is used as pre-amplifier and IC LM 386 is used as power amplifier.

The LM358 is a great, easy-to-use dual channel opamp. Opamps have so many applications. We should probably carry at least one in a DIP package. LM358 applications include transducer amplifiers, DC gain blocks and all the conventional op-amp circuits. If you're looking for a good, standard opamp the LM358 should fill most of your needs. It can handle a supply of 3-32VDC and source up to 20mA per channel. This opamp is great if you need to operate two individual opamps from a single power supply. Comes in an 8-pin DIP package.

The LM386 is a power amplifier designed for use in low voltage consumer applications. The gain is internally set to 20 to keep external part count low, but the addition of an external resistor and capacitor between pins 1 and 8 will increase the gain to any value from 20 to 200. The inputs are ground referenced while the output automatically biases to one-half the supply voltage. The quiescent power drain is only 24 mill watts when operating from a 6 volt supply, making the LM386 ideal for battery operation.

VI. BUFFER, RELAY AND DRIVER

Buffers do not affect the logical state of a digital signal (i.e. a logic 1 input results in a logic 1 output whereas logic 0 input results in a logic 0 output). Buffers are normally used to provide extra current drive at the output but can also be used to regularize the logic present at an interface. Driver is used to drive the relay where the output is complement of input which is applied to the drive but current will be amplified. It is an electromagnetic device which is used to drive the load connected across the relay and the output of relay can be connected to controller or load for further processing.

IC 4050 is used as a buffer. This 16-pin DIL packaged IC 4050 acts as Buffer as-well-as a Converter. The input signals may be of 2.5 to 5V digital TTL compatible or DC analogue the IC gives 5V constant signal output. The IC acts as buffer and provides isolation to the main circuit from varying input signals. The working voltage of IC is 4 to 16 Volts and propagation delay is 30 nanoseconds. It consumes 0.01 mill Watt power with noise immunity of 3.7 V and toggle speed of 3 Megahertz.

ULN 2003 is used for the driver of relay. Since the digital outputs of the some circuits cannot sink much current, they are not capable of driving relays directly. So, high-voltage high-current Darlington arrays are designed for interfacing low-level logic circuitry and multiple peripheral power loads. The input of ULN 2003 is TTL-compatible open-collector outputs. As each of these outputs can sink a maximum collector current of 500 mA, miniature Controller relays can be easily driven. No additional free-wheeling clamp diode is required to be connected across the relay since each of the outputs has inbuilt free-wheeling diodes. The Series ULN20x4A/L features series input resistors for operation directly from 6 to 15V CMOS or PMOS logic outputs.

VII. DTMF ENCODER

The DTMF Encoder uses a radio frequency to transmit the control signals for generating the DTMF frequencies; a dedicated IC UM95089 is used here. It uses a quartz crystal of 3.58 MHz Each digit in DTMF (dual tone multi-frequency) code corresponds to a combination of two discrete frequencies, one each from a low and high group of frequencies, which are generated when any switch on a dialer key-pad is pressed. Such a key-pad along with the frequencies associated with each row and column. The key-pad is used in conjunction with a dialer IC such as UM9214 or UM9215 to generate the pair of frequencies as mentioned.

The DTMF signals transmitted over the telephone lines can be received and decoded using a DTMF receiver/decoder IC such as UM92870 or KT3170 or Motorola's MT8870. The decoded outputs can be suitably used along with certain additional circuitry to design a Call-Line-Identification-Product unit[popularly known as CLIP]. The four hexadecimal output obtained from the DTMF receiver/decoder IC corresponding to each digit on the telephone key-pad together with the associated dual-tone frequencies.

VIII. DTMF DECODER

The DTMF decoder used is CM8870. It is used to decode the mobile's audio signal, i.e., the keypad tone. When the user presses a button in the keypad of the mobile, it generates two tones at the same time. These tones are taken from a table comprising of a row frequency and a column frequency. Thus the resulting frequency signal is known as "Dual Tone Multi-Frequency" signal. A DTMF signal is an algebraic sum of two different frequencies, one from the row frequency (higher frequency) group and another from the low frequency (column frequency) group. The CM8870 decodes the received DTMF tone and then sends its equivalent binary code to the microcontroller. According to the program loaded into the microcontroller, the corresponding action starts.

The DTMF signals transmitted over the FM Transmitter/Receiver units can be received and decoded using a DTMF receiver/decoder IC such as UM92870 or KT3170 or Motorola's MT8870. The decoded outputs can be suitably used along with certain additional circuitry to design a Call-Line-Identification-Product unit [popularly known as CLIP]. The four hexadecimal output obtained from the DTMF receiver/decoder IC corresponding to each digit on the FM Communication key-pad together with the associated dual-tone frequencies can be put-it in a table form for easy reference.

CONCLUSION

Near school zone, the sign board displays "School Zone Ahead, Drive Slowly", or near a hospital, "Hospital Area-Do not Blow Horn", but in reality rarely this is practices. Drivers go at very high speed as usual near school zone, or operate the harsh horns loudly causing inconvenience to the patients in the hospital.

To provide a better alternative, one can develop a system which will automatically sense such traffic signs automatically and accordingly inform the drives and also assist him in controlling the vehicle voluntarily or forcibly. All in all resulting in a very effective and fail proof system to provide traffic regulation, safety and convenience of the people.

We can fit the transmitters inside the road with the solar panels. So that only one time cost we have to invest and after that they will pay for them self.

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