SMART VEHICLE SAFETY USING LI-FI TECHNOLOGY

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Abstract—*A good product along good welcome from public which will be more comfortable, easier and worth full in day to day life. Accidents are happening everywhere and also in all the cities. Many have been suffered a lot due to brutal accidents. Adding a few more points to this, congestion is the main problem in traffic areas. Some people might disobey the road rules by turning without any prior indication/information; and few might stop the vehicle all of sudden, this leads to accident. To avoid this, we are developing a system, named 'LIFI based precaution to avoid accidents while travelling in vehicle'. In this system, we are using transmitter and receiver on each vehicle. Such that the transmitter should be placed at the back side of the vehicle and the receiver should be placed in the front side of the vehicle. All the necessary information will be transmitted from one vehicle to other.*

Keywords—Li-Fi; Sensors; Accident Prevention

1. INTRODUCTION

Today, we need to face many obstacles while travelling in a vehicle such as, manual monitoring of the activities of the vehicle going in front of our vehicle; while driving on the road. Some drivers might stop the car suddenly at any circumstance; the sudden breaking will affect the following control of following vehicle. This leads to brutal accidents. And there are many reasons for occurrence of accidents. To avoid this several technological solutions have been developed, adding the efficiency to the current safety measures we are using the concept of visible light communication instead of using wireless standards such as ZigBee, Bluetooth etc,. Also we are using the LIFI transmitter and receiver on each and every vehicle.

2. EXISTING SYSTEM

In Existing method we don't use any technological devices for identifying the activities of the front going vehicle. Just we have to notice the movements through the indication lights. And also, it is difficult to react suddenly to those indications. All the time, it is difficult to notice the activities of front going vehicle, because some people might disobey the road rules by turning left/right without any proper indication; and few might stop the vehicle all of sudden. These two causes are the main reason for road accidents. Even though there are some facilities to secure the life of those passengers in vehicle. There are no methods implemented to avoid/control the occurrence of accidents

A. Disadvantages:

- Without any indication, it is difficult to predict the action of front going vehicle.
- It is difficult react suddenly to the indications from the front going vehicle.
- Chances for the occurrence of accidents.

3. PROPOSED SYSTEM

The proposed system illustrates to avoid the accidents while driving/travelling in a vehicle. This system consists of PIC microcontroller, LIFI transmitter and LIFI receiver, LCD exhibit, speaker system, tilt sensors. The LIFI transmitter is placed at the back side of the vehicle and the LIFI receiver must be placed at the front side of the vehicle to share the information. The activities of the vehicle are shared by the lightening system. We use this technique because; the accident might happen in few seconds. Light has the capability to transmit the data at faster rate; The light's travelling speed is 3*10^8. LiFi is 100 times faster than wifi. In our system, we are going to monitor the activities of front going vehicle by using to components. The first component is tilt sensor; it is used to watch the activities of the vehicle whether it is turning left or right. These actions are watched; if the vehicle going front turns, then the actions will be sensed and a voice message will be send to the vehicle travelling behind it. The other component is break sensor; it is used to identify the action of front going vehicle; if the vehicle stops suddenly, there are some chances to get crashed by the following vehicle. To avoid this, break sensor is used; the sensor will sense the action and transfer the information to the following vehicle and also calm down the speed of the following vehicle compared to the force given at the front going vehicle's brake pedal to stop it.

A. ADVANTAGES

- Occurrence of accidents can be reduced.
- Life of many people is secured.
- Very fast when compared to other data transmission.
- 100 * times faster compared to Wi-Fi.
- Data will be transferred with the short amount of time.

- High security for the vehicle
- It's more safety while travelling in night

B. BLOCK DIAGRAM OF TRANSMITTER

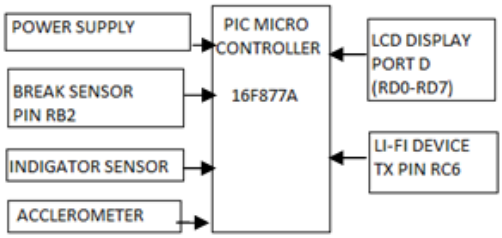

Figure3.1.Block Diagram of Transmitter

C. BLOCK DIAGRAM RECEIVER

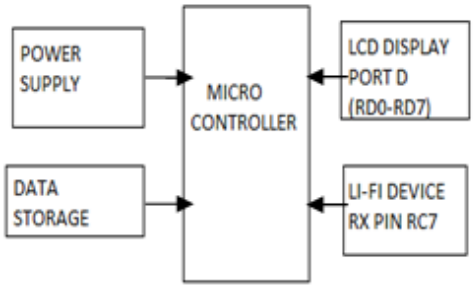

Figure3.2. Block Diagram of Receiver

4. SYSTEM ARCHITECTURE

A. POWER SUPPLY

Almost all basic household electronic circuits need an unfettered AC to be converted to constant DC, in order to operate the electronic tool. All devices will have a certain power supply limit and the electronic circuits within these devices must be able to supply a steady DC voltage within this limit. That is, all the active and passive electronic devices will have a certain DC in service point (Q-point or Quiescent point), and this point must be achieved by the source of DC power. The DC power supply is practically converted to each and every stage in an electronic system. Thus a common requirement for all this phases will be the DC power supply. All low power system can be run with a battery. But, for long time in service devices, batteries could prove to be costly and complicated. The best method used is in the form of an unregulated power supply –a combination of a transformer, rectifier and a filter.

5. MICROCONTROLLER

A. CONCEPTS OF MICRO CONTROLLER

Microcontroller is a general purpose piece of equipment, which integrate a number of the components of a microprocessor system on to single chip. It has integral CPU, memory and peripherals to make it as a mini computer. A microcontroller combines on to the same microchip:

The CPU core

- Memory(both ROM and RAM)
- Some parallel digital i/o

Microcontrollers will combine other devices such as:

- A timer module to allow the microcontroller to perform tasks for certain time periods.
- A serial i/o port to allow data to flow between the controller and other devices such as a PIC or another microcontroller.
- An ADC to allow the microcontroller to accept analogue input data for processing

B. INTRODUCTION TO PIC

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller manufacture in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory.

The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count. The main advantage of CMOS is that it has immunity to noise than other fabrication techniques.

C. PIC START PLUS PROGRAMMER

The PIC start plus development system from microchip technology provides the product development engineer with a highly flexible low cost microcontroller design tool set for all microchip PIC micro devices. The pic start plus development system includes PIC start plus development programmer and mplab ide.

The PIC start plus programmer gives the manufactured goods developer ability to program ser software in to any of the supported microcontrollers. The PIC start plus software running under mp lab provides for full interactive control over the programmer.

6. SPECIAL FEATURES OF PIC MICROCONTROLLER

A. CORE FEATURES

- High-performance RISC CPU
- Only 35 single word instructions to learn
- All single cycle instructions except for program branches which are two cycle
- In service speed: DC - 20 MHz clock input
- DC - 200 ns instruction cycle
- Up to 8K x 14 words of Flash Program Memory.

B. ARCHITECTURE OF PIC 16F877

The complete architecture of PIC 16F877 is shown in the figure gives details about the specifications of PIC 16F877. Fig shows the complete pin diagram of the IC PIC 16F877.

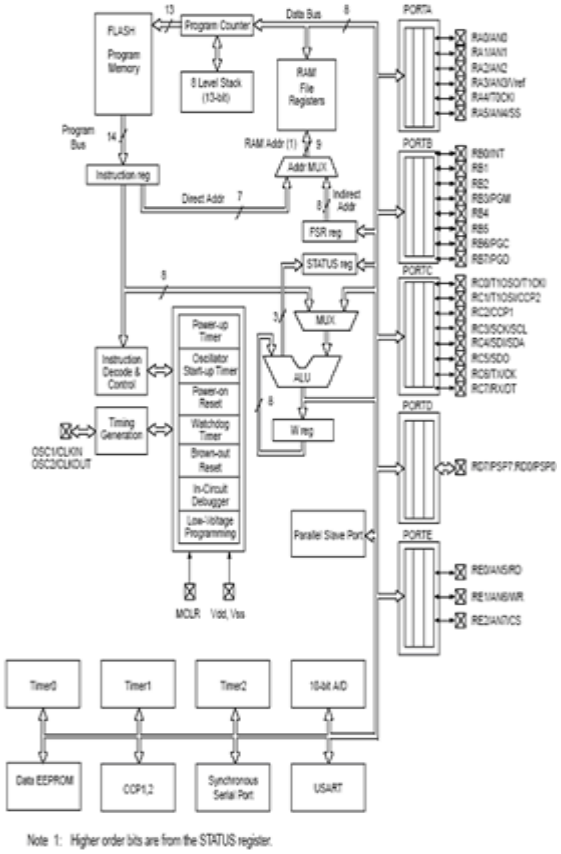

Figure6.1. Architecture Of PIC 16F877

C. *I/O PORTS*

Some pins for these I/O ports are multiplexed with an alternate function for the peripheral features on the device. In general, when a peripheral is enabled, that pin may not be used as a general purpose I/O pin. Additional Information on I/O ports may be found in the IC micro™ Mid-Range Reference Manual

D. *PORTA AND THE TRISA REGISTER*

PORTA is a 6-bit wide bi-directional port. The corresponding data direction register is TRISA. Setting a TRISA bit (=1) will make the corresponding PORTA pin an input, i.e., put the equivalent output driver in a Hi-impedance mode. Clearing a TRISA bit (=0) will make the equivalent PORTA pin an output, i.e., put the contents of the output latch on the selected pin. Reading the PORTA register reads the status of the
pins whereas script to it will write to the port latch. All write operations are read-modify-write operations. Therefore a write to a port implies that the port pins are read; this value is modified, and then written to the port data latch. Pin RA4 is multiplexed with the Timer0 module clock input to become the RA4/T0CKI pin. The RA4/T0CKI pin is a Schmitt Trigger input and an open drain output. All other RA port pins have TTL input levels and full CMOS output drivers. Other PORTA pins are multiplexed with analog inputs and analog VREF input. The operation of each pin is selected by clearing/setting the control bits in the ADCON1 register (A/D Control Register1).

The TRISA register controls the direction of the RA pins, even when they are being used as analog inputs. The user must ensure the bits in the TRISA register are maintained set when using them as analog inputs.

PORTB is an 8-bit wide bi-directional port. The corresponding data direction register is TRISB. Setting a TRISB bit (=1) will make the corresponding PORTB pin an input, i.e., put the corresponding output driver in a hi-impedance mode. Clearing a TRISB bit (=0) will make the corresponding PORTB pin an output, i.e., put the contents of the output latch on the selected pin. Three pins of PORTB are multiplexed with the Low Voltage Programming function; RB3/PGM, RB6/PGC and RB7/PGD. The alternate functions of these pins are described in the Special Features Section. Each of the PORTB pins has a weak internal pull-up. A single control bit can turn on all the pull-ups.

PORTC is an 8-bit wide bi-directional port. The corresponding data direction register is TRISC. Setting a TRISC bit (=1) will make the corresponding PORTC pin an input, i.e., put the corresponding output driver in a hi-impedance mode. Clearing a TRISC bit (=0) will make the corresponding PORTC pin an output, i.e., put the contents of the output latch on the selected pin. PORTC is multiplexed with several peripheral functions. PORTC pins have Schmitt Trigger input buffers.

E. *MEMORY ORGANISATION*

There are three memory blocks in each of the PIC16F877 MUC's. The program memory and Data Memory have separate buses so that concurrent access can occur.

F. *PROGRAM MEMORY ORGANISATION*

The PIC16f877 devices have a 13-bit program counter capable of addressing 8K *14 words of FLASH program memory. Accessing a location above the actually implemented address will cause a coil. The RESET vector is at 0000h and the interrupt vector is at 0004h.

G. *DATA MEMORY ORGANISTION*

The data memory is partitioned into numerous banks which contain the General Purpose Registers and the special functions Registers. Bits RP1 (STATUS<6) and RP0 (STATUS<5>) are the bank selected bits.

RP1:RP0	BANKS
00	0
01	1
10	2
11	3

Each bank extends up to 7Fh (1238 bytes). The lower locations of each bank are reserved for the Special Function Registers. Above the Special Function Registers are General Purpose Registers, implemented as static RAM. All implemented banks contain special function registers. Some frequently used special function registers from one bank may be mirrored in another bank for code reduction and quicker access.

H. LCD

There are many exhibit strategy used by the hobbyists. LCD exhibits are one of the most complicated exhibit devices used by them. Once you learn how to interface it, it will be the easiest and very reliable output device used by you! More, for micro controller based development, not every time any debugger can be used. So LCD displays can be used to test the outputs. Obviously, for last possibility, you need to know how to use this stuff pretty well.

I. DATA/SIGNALS/EXECUTION OF LCD

Now that was all about the signals and the hardware. Let us come to data, signals and implementation. LCD accepts two types of signals, one is data, and another is control. These signals are recognized by the LCD module from status of the RS pin. Now data can be read also from the LCD exhibit, by pulling the R/W pin high. As soon as the E pin is pulsed, LCD reads data at the falling edge of the pulse and implement it, same for the case of broadcast.

LCD exhibit takes a time of 39-43µS to place a character or implement a command. Except for payment exhibit and to seek cursor to residence location it takes 1.53ms to 1.64ms. Any attempt to send any data before this interval may lead to failure to read data or implementation of the current data in some devices. Some devices recompense the speed by storing the incoming data to some temporary registers.

LCD exhibits have two RAMs, naming DDRAM and CGRAM. DDRAM registers in which position which character in the ASCII chart would be exhibited. Each byte of DDRAM represents each unique position on the LCD exhibit. The LCD controller reads the in order from the DDRAM and exhibits it on the LCD screen. CGRAM allows user to define their custom characters. For that reason, address space for first 16 ASCII characters are set aside for users. After CGRAM has been setup to exhibit characters, user can easily exhibit their custom characters on the LCD screen.

J. LCD DISPLAY

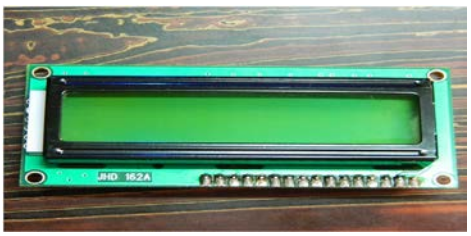

Figure7.1. LCD Display front side

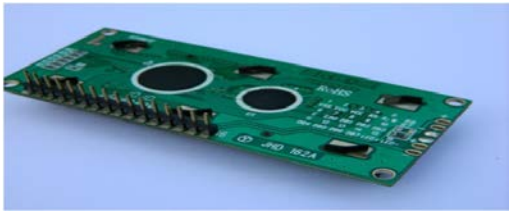

Figure7.2. LCD Display Connecting Pins

K. LCD EXHIBIT INTERFACING –FLOWCHART

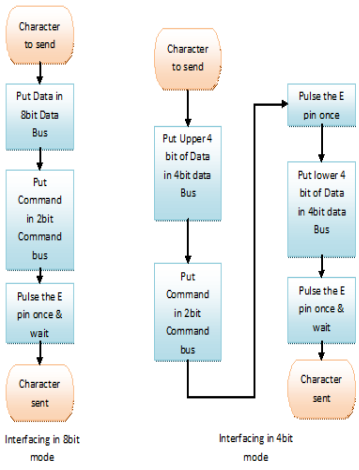

Fig: Flow chart of interfacing LCD display

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