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Two Wheeler Human Safety Systems

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***Abstract*—**Nowadays accidents are occur due to carelessness of the driver in wearing helmet properly.To avoid such problem we developed a system. The objective of the project is to design a helmet based vehicle safety system. This will work effectively if the driver doesn't wear the helmet. In our paper we propose one such security systems that makes it mandatory for the user to wear a protective guard or helmet before riding a two wheeler. This system reduces the probability of a severe injury or death during an accident. We also take into consideration a prototype that has been developed for motor cycle riders.

***Keywords*—** Accidents, Two Wheeler, Helmet, Injury or Death etc

I. INTRODUCTION

Present industry is increasingly shifting towards automation. Two principle components of today's industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation.

Microcontroller is the heart of the device which handles all the sub devices connected across it. It has flash type reprogrammable memory. It has some peripheral devices to play this project perform.

It also provides sufficient power to inbuilt peripheral devices. We need not give individually to all devices. The peripheral devices also activates as low power operation mode. These are the advantages are appear here.

II. SYSTEM SPECIFICATION

A. HARDWARE DESCRIPTION

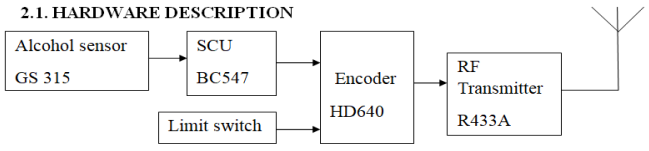

Fig 2.1Block diagram of Transmitter

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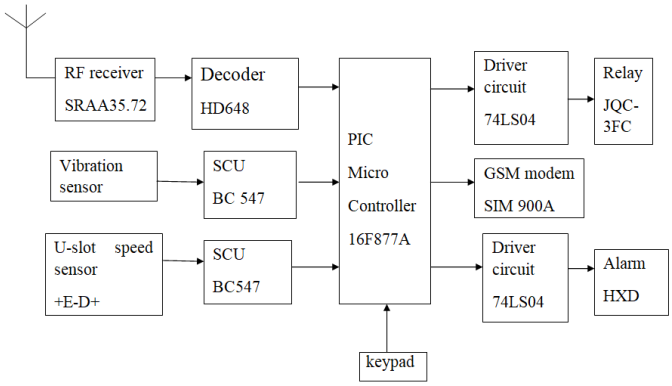


Fig 2.2Block diagram of Receiver

Fig 2.2Block diagram of Receiver

a) PIC MICROCONTROLLER

Microcontroller is a general purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt 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.

Microcontrollers are:

- ❖ Smaller in size
- ❖ Consumes less power
- ❖ Inexpensive

Micro controller is a standalone unit, which can perform functions on its own without any requirement for additional hardware like I/O ports and external memory.

The heart of the microcontroller is the CPU core. In the past, this has traditionally been based on an 8-bit microprocessor unit. For example Motorola uses a basic 6800 microprocessor core in their 6805/6808 microcontroller

devices.

In the recent years, microcontrollers have been developed around specifically designed CPU cores, for example the microchip PIC range of microcontrollers.

Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in PIC16F877A is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877A.

(1) SPECIAL FEATURES OF PIC MICROCONTROLLER 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
- ❖ Up to 8K x 14 words of Flash Program Memory,Up to 368 x 8 bytes of Data Memory (RAM) Up to 256 x 8 bytes of EEPROM data memory
- ❖ Pin out compatible to the PIC16C73/74/76/77
- ❖ Interrupt capability (up to 14 internal/external)
- ❖ Eight level deep hardware stack
- ❖ Direct, indirect, and relative addressing mode
- ❖ Power-on Reset (POR)
- ❖ Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- ❖ Watchdog Timer (WDT) with its own on-chip RC Oscillator for reliable operation
- ❖ Programmable code-protection
- ❖ Power saving SLEEP mode
- ❖ Selectable oscillator options
- ❖ Low-power, high-speed CMOS EPROM/EEPROM technology
- ❖ In-Circuit Serial Programming (ICSP) via two pins
- ❖ Only single 5V source needed for programming capability

PERIPHERAL FEATURES

- ❖ Timer0: 8-bit timer/counter with 8-bit prescalar
- ❖ Timer1: 16-bit timer/counter with prescalar, can be incremented during sleep via external crystal/clock
- ❖ Timer2: 8-bit timer/counter with 8-bit period register, prescalar and post scalar
- ❖ Two Capture, Compare, PWM modules
  - Capture is 16-bit, max resolution is 12.5 ns,
  - Compare is 16-bit, max resolution is 200 ns,
  - PWM maximum resolution is 10-bit
- ❖ 10-bit multi-channel Analog-to-Digital converter
- ❖ Synchronous Serial Port (SSP) with SPI. (Master Mode) and I2C. (Master/Slave)
- ❖ Universal Synchronous Asynchronous Receiver Transmitter (USART/SCI) with 9- Bit address detection.

(2) ARCHITECTURE OF PIC 16F877A

The complete architecture of PIC 16F877A is shown in the fig 2.1. Table 2.1 gives details about the specifications of PIC 16F877A. Fig 2.2 shows the complete pin diagram of the IC PIC 16F877A.

(3) SPECIFICATIONS

(4) PIN DIAGRAM OF PIC 16F877A

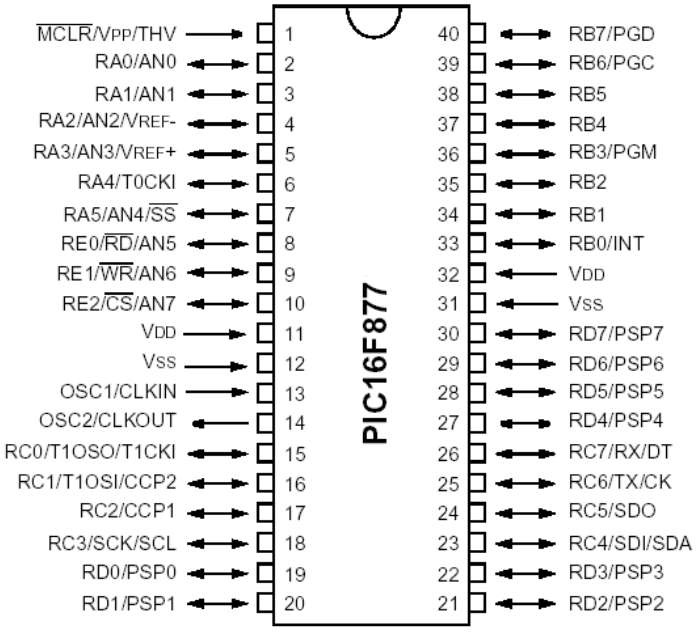


Fig 2.3 Pin diagram of PIC17F877A

PIN OUT DESCRIPTION

Table 2.1 Pin out description

Pin Name	DIP Pin#	PLCC Pin#	QFP Pin#	I/O/P Type	Buffer Type	Description
OSC1/CLKIN	13	14	30	I	ST/CMOS(4)	Oscillator crystal input/external clock source input.
OSC2/CLKOUT	14	15	31	O	—	Oscillator crystal output. Connects to crystal or resonator in crystal oscillator mode. In RC mode, OSC2 pin outputs CLKOUT which has 1/4 the frequency of OSC1, and denotes the instruction cycle rate.
MCLR/VPP/THV	1	2	18	I/P	ST	Master clear (reset) input or programming voltage input or high voltage test mode control. This pin is an active low reset to the device.
						PORTA is a bi-directional I/O port.
RA0/AN0	2	3	19	I/O	TTL	RA0 can also be analog input0
RA1/AN1	3	4	20	I/O	TTL	RA1 can also be analog input1
RA2/AN2/VREF-	4	5	21	I/O	TTL	RA2 can also be analog input2 or negative analog reference voltage
RA3/AN3/VREF+	5	6	22	I/O	TTL	RA3 can also be analog input3 or positive analog reference voltage
RA4/T0CKI	6	7	23	I/O	ST	RA4 can also be the clock input to the Timer0 timer/counter. Output is open drain type.
RA5/SS/AN4	7	8	24	I/O	TTL	RA5 can also be analog input4 or the slave select for the synchronous serial port.
						PORTB is a bi-directional I/O port. PORTB can be software programmed for internal weak pull-up on all inputs.
RB0/INT	33	36	8	I/O	TTL/ST(1)	RB0 can also be the external interrupt pin.
RB1	34	37	9	I/O	TTL	
RB2	35	38	10	I/O	TTL	
RB3/PGM	36	39	11	I/O	TTL	RB3 can also be the low voltage programming input
RB4	37	41	14	I/O	TTL	Interrupt on change pin.
RB5	38	42	15	I/O	TTL	Interrupt on change pin.
RB6/PGC	39	43	16	I/O	TTL/ST(2)	Interrupt on change pin or In-Circuit Debugger pin. Serial programming clock.
RB7/PGD	40	44	17	I/O	TTL/ST(2)	Interrupt on change pin or In-Circuit Debugger pin. Serial programming data.

Legend: I = input O = output I/O = input/output P = power

— = Not used TTL = TTL input ST = Schmitt Trigger input

Note:

i. This buffer is a Schmitt Trigger input when configured as an external interrupt.

ii. This buffer is a Schmitt Trigger input when used in serial programming mode.

iii. This buffer is a Schmitt Trigger input when configured as general purpose I/O and a TTL input when used in the Parallel Slave Port mode (for interfacing to a microprocessor bus).

iv. This buffer is a Schmitt Trigger input when configured in RC oscillator mode and a CMOS input otherwise.

Pin Name	DIP Pin#	PLCC Pin#	QFP Pin#	I/O/P Type	Buffer Type	Description
						PORTC is a bi-directional I/O port.
RC0/T1OSO/T1CKI	15	16	32	I/O	ST	RC0 can also be the Timer1 oscillator output or a Timer1 clock input.
RC1/T1OSI/CCP2	16	18	35	I/O	ST	RC1 can also be the Timer1 oscillator input or Capture2 input/Compare2 output/PWM2 output.
RC2/CCP1	17	19	36	I/O	ST	RC2 can also be the Capture1 input/Compare1 output/ PWM1 output.
RC3/SCK/SCL	18	20	37	I/O	ST	RC3 can also be the synchronous serial clock input/ output for both SPI and I^2C modes.
RC4/SDI/SDA	23	25	42	I/O	ST	RC4 can also be the SPI Data In (SPI mode) or data I/O (I^2C mode).
RC5/SDO	24	26	43	I/O	ST	RC5 can also be the SPI Data Out (SPI mode).
RC6/TX/CK	25	27	44	I/O	ST	RC6 can also be the USART Asynchronous Transmit or Synchronous Clock.
RC7/RX/DT	26	29	1	I/O	ST	RC7 can also be the USART Asynchronous Receive or Synchronous Data.
						PORTD is a bi-directional I/O port or parallel slave port when interfacing to a microprocessor bus.
RD0/PSP0	19	21	38	I/O	ST/TTL(3)	
RD1/PSP1	20	22	39	I/O	ST/TTL(3)	
RD2/PSP2	21	23	40	I/O	ST/TTL(3)	
RD3/PSP3	22	24	41	I/O	ST/TTL(3)	
RD4/PSP4	27	30	2	I/O	ST/TTL(3)	
RD5/PSP5	28	31	3	I/O	ST/TTL(3)	
RD6/PSP6	29	32	4	I/O	ST/TTL(3)	
RD7/PSP7	30	33	5	I/O	ST/TTL(3)	
						PORTE is a bi-directional I/O port.
RE0/RD/AN5	8	9	25	I/O	ST/TTL(3)	RE0 can also be read control for the parallel slave port, or analog input5.
RE1/WR/AN6	9	10	26	I/O	ST/TTL(3)	RE1 can also be write control for the parallel slave port, or analog input6.
RE2/CS/AN7	10	11	27	I/O	ST/TTL(3)	RE2 can also be select control for the parallel slave port, or analog input7.
Vss	12,31	13,34	6,29	P	—	Ground reference for logic and I/O pins.
Vdd	11,32	12,35	7,28	P	—	Positive supply for logic and I/O pins.
NC	—	1,17,28, 40	12,13, 33,34		—	These pins are not internally connected. These pins should be left unconnected.

Legend: I = input O = output I/O = input/output P = power

— = Not used TTL = TTL input ST = Schmitt Trigger in

Note:

i. This buffer is a Schmitt Trigger input when configured as an external interrupt.

ii. This buffer is a Schmitt Trigger input when used in serial programming mode.

iii. This buffer is a Schmitt Trigger input when configured as general purpose I/O and a TTL input when used in the Parallel Slave Port mode (for interfacing to a microprocessor bus).

iv. This buffer is a Schmitt Trigger input when configured in RC oscillator mode and a CMOS input otherwise.

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

(5) MEMORY ORGANISATION

There are three memory blocks in each of the PIC16F877A MUC's. The program memory and Data Memory have separate buses so that concurrent access can occur.

PROGRAM MEMORY ORGANISATION

The PIC16F87A devices have a 13-bit program counter capable of addressing 8K *14 words of FLASH program memory.

Accessing a location above the physically implemented address will cause a wraparound.

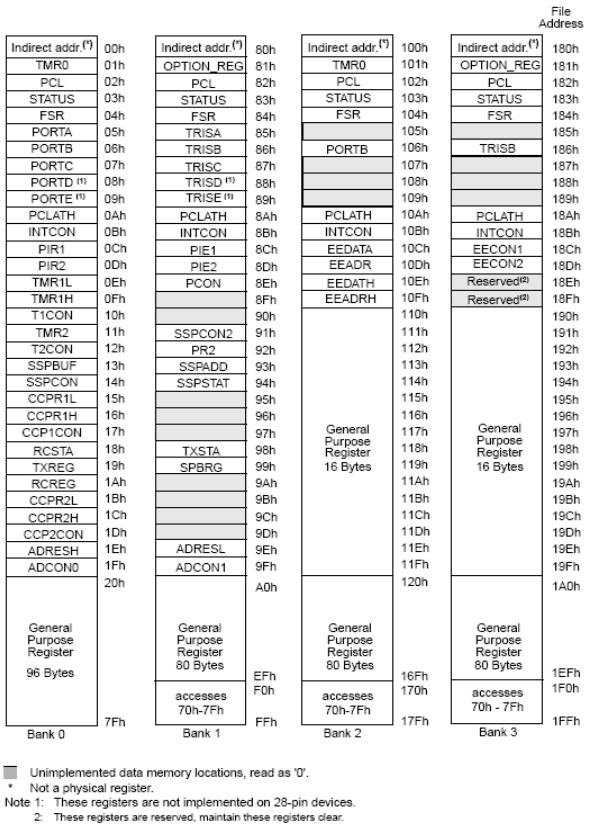
The RESET vector is at 0000h and the interrupt vector is at 0004h

DATA MEMORY ORGANISTION

The data memory is partitioned into multiple 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.

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.

(6) PIC16F877A REGISTER FILE MAP



Unimplemented data memory locations, read as '0'.
* Not a physical register.
Note 1: These registers are not implemented on 28-pin devices.
2: These registers are reserved, maintain these registers clear.

Table 2.2 PIC 16F877A register file map

(7) GENERAL PURPOSE REGISTER FILE

The register file can be accessed either directly or indirectly through the File Selected Register (FSR). There are some Special Function Registers used by the CPU and peripheral

modules for controlling the desired operation of the device. These registers are implemented as static RAM. The Special Function Registers can be classified into two sets; core (CPU) and peripheral. Those registers associated with the core functions.

(8) INSTRUCTION SET SUMMARY

Each PIC 16F877A instruction is a 14-bit word, divided into an OPCODE which specifies the instruction type and one or more operand which further specify the operation of the instruction. The PIC16F877 instruction set summary in Table 2.13 lists byte-oriented, bit-oriented, and literal and control operations. It shows the Opcode Field descriptions.

OPCODE FIELD DESCRIPTION

Field	Description
F	Register file address (0x00 to 0x7F)
W	Working register (Accumulator)
B	Bit address within an 8-bit file register
K	Literal field, constant data or label
X	Don't care location (=0 or 1) The assembler will generate code with x=0. It is the recommended form of use for compatibility with all Microchip software tools.
D	Destination select; d=0: store result in w, d=1: store result in f. Default is d=1.
Pc	Program counter
TO	Time-out bit
PD	Power-down bit

Table 2.3 Opcode field description

For byte-oriented instructions, 'f' represents a file register designator and'd' represents a destination designator. The file register designator specifies which file register is to be used by the instruction. The destination designator specified where the result of the operation is to be placed. If'd' is zero, the result is placed in the w register. If'd' is one, the result is placed in the file register specified in the instruction.

For bit-oriented instructions, 'b' represents a bit field designator which selects the number of the bit affected by the operation, which 'f' represents the address of the file in which the bits is located. For literal and control operations, 'k' represents an eight or eleven bit constant or literal value.

The instruction set is highly orthogonal and is grouped into three basic categories:

- ❖ Byte-oriented operations
- ❖ Bit-oriented operations
- ❖ Literal and control operations

All instructions are executed within one single instruction cycle, unless a conditional test is true or the program counter is changed as a result of an instruction. In this case, the execution takes two instruction cycles with the second cycle executed as a NOP. One instruction cycle consists of four oscillator periods. Thus, for an oscillator frequency of 4 MHz, the normal instruction execution time is 1 ms. If a conditional test is true or the program counter is changed as a result of an instruction, then the instruction execution time is 2 ms.

(9) PIC 16F877A INSTRUCTION SET

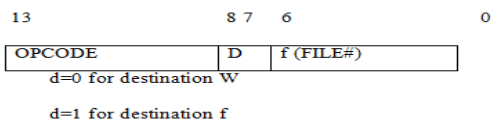
Mnemonic, Operands		Description	Cycles	14-Bit Opcode MSb LSb	Status Affected	Notes
BYTE-ORIENTED FILE REGISTER OPERATIONS						
ADDWF	f, d	Add W and f	1	00 0111 dfff ffff	C,DC,Z	1,2
ANDWF	f, d	AND W with f	1	00 0101 dfff ffff	Z	1,2
CLRF	f	Clear f	1	00 0001 1fff ffff	Z	2
CLRW	-	Clear W	1	00 0001 0xxx xxxx	Z	
COMF	f, d	Complement f	1	00 1001 dfff ffff	Z	1,2
DECF	f, d	Decrement f	1	00 0011 dfff ffff	Z	1,2
DECFSZ	f, d	Decrement f, Skip if 0	1(2)	00 1011 dfff ffff		1,2,3
INCF	f, d	Increment f	1	00 1010 dfff ffff	Z	1,2
INCFSZ	f, d	Increment f, Skip if 0	1(2)	00 1111 dfff ffff		1,2,3
IORWF	f, d	Inclusive OR W with f	1	00 0100 dfff ffff	Z	1,2
MOVF	f, d	Move f	1	00 1000 dfff ffff	Z	1,2
MOVWF	f	Move W to f	1	00 0000 1fff ffff		
NOP	-	No Operation	1	00 0000 0xx0 0000		
RLF	f, d	Rotate Left f through Carry	1	00 1101 dfff ffff	C	1,2
RRF	f, d	Rotate Right f through Carry	1	00 1100 dfff ffff	C	1,2
SUBWF	f, d	Subtract W from f	1	00 0010 dfff ffff	C,DC,Z	1,2
SWAPF	f, d	Swap nibbles in f	1	00 1110 dfff ffff		1,2
XORWF	f, d	Exclusive OR W with f	1	00 0110 dfff ffff	Z	1,2
BIT-ORIENTED FILE REGISTER OPERATIONS						
BCF	f, b	Bit Clear f	1	01 00bb bfff ffff		1,2
BSF	f, b	Bit Set f	1	01 01bb bfff ffff		1,2
BTFSC	f, b	Bit Test f, Skip if Clear	1 (2)	01 10bb bfff ffff		3
BTFSS	f, b	Bit Test f, Skip if Set	1 (2)	01 11bb bfff ffff		3
LITERAL AND CONTROL OPERATIONS						
ADDLW	k	Add literal and W	1	11 111x kkkk kkkk	C,DC,Z	
ANDLW	k	AND literal with W	1	11 1001 kkkk kkkk	Z	
CALL	k	Call subroutine	2	10 0kkk kkkk kkkk		
CLRWDT	-	Clear Watchdog Timer	1	00 0000 0110 0100	$\overline{TO}$,$\overline{PD}$	
GOTO	k	Go to address	2	10 1kkk kkkk kkkk		
IORLW	k	Inclusive OR literal with W	1	11 1000 kkkk kkkk	Z	
MOVLW	k	Move literal to W	1	11 00xx kkkk kkkk		
RETFIE	-	Return from interrupt	2	00 0000 0000 1001		
RETLW	k	Return with literal in W	2	11 01xx kkkk kkkk		
RETURN	-	Return from Subroutine	2	00 0000 0000 1000		
SLEEP	-	Go into standby mode	1	00 0000 0110 0011	$\overline{TO}$,$\overline{PD}$	
SUBLW	k	Subtract W from literal	1	11 110x kkkk kkkk	C,DC,Z	
XORLW	k	Exclusive OR literal with W	1	11 1010 kkkk kkkk	Z	

Note 1: When an I/O register is modified as a function of itself (e.g., `MOVF PORTB, 1`), the value used will be that value present on the pins themselves. For example, if the data latch is '1' for a pin configured as input and is driven low by an external device, the data will be written back with a '0'.
2: If this instruction is executed on the TMR0 register (and, where applicable, d = 1), the prescaler will be cleared if assigned to the Timer0 Module.
3: If Program Counter (PC) is modified or a conditional test is true, the instruction requires two cycles. The second cycle is executed as a NOP.

Table 2.4 PIC 16F877A Instruction set

(10) GENERAL FORMAT FOR INSTRUCTIONS

Byte-oriented file register operations

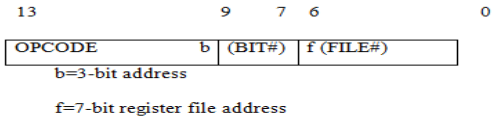


d=0 for destination W

d=1 for destination f

f=7-bit register address

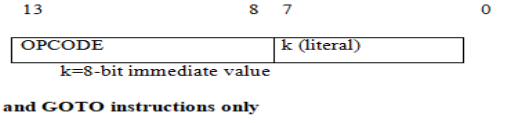
Bit-oriented file register operations



b=3-bit address

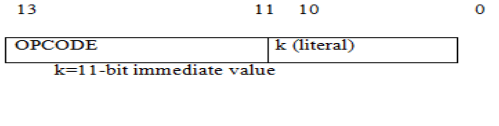
f=7-bit register file address

Literal and control operations



k=8-bit immediate value

CALL and GOTO instructions only



k=11-bit immediate value

B. LCD DISPLAY

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.

An LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle.

One each polarizer are pasted outside the two glass panels. This polarizer would rotate the light rays passing through them to a definite angle, in a particular direction.

When the LCD is in the off state, light rays are rotated by the two polarizer and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizer, which would result in activating / highlighting the desired characters.

The LCD's are lightweight with only a few millimeters thickness. Since the LCD's consume less power, they are compatible with low power electronic circuits, and can be powered for long durations. The LCD does don't generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD's more customer friendly. The LCDs used exclusively in watches, calculators and measuring instruments are the simple seven-segment displays, having a limited amount of numeric data. The recent advances in technology have resulted in better legibility, more information displaying capability and a wider temperature range. These have resulted in the LCDs being extensively used in telecommunications and entertainment electronics. The LCDs have even started replacing the cathode ray tubes (CRTs) used for the display of text and graphics, and also in small TV applications

A Liquid Crystal Display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs does not emit light directly.

They are used in a wide range of applications including: computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have displaced cathode ray tube (CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in. LCDs are more energy efficient and offer safer disposal than CRTs. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically-modulated optical device made up of any number of pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome. The earliest discovery leading to the development of LCD technology, the discovery of liquid crystals, dates from 1888. By 2008, worldwide sales of televisions with LCD screens had surpassed the sale of CRT units.

C. ALCOHOL SENSOR

GS-315 Hot-wire type alcohol sensor

GS-315 type alcohol sensor through alcohol absorption on the metal oxide semiconductor generates hot conduction and electronics conduction change principal, the white coil resistor change detecting gas concentration. GS-315 consists detecting element and compensation element, both elements are placed in a wheatstone bridege circuit, when the alcohol concentration appears, the detecting element resistor reduces, bridge circuit output changes, the voltage will increase according to the alcohol concentration increase, the compensation element refer to the temperature compensation affection .

Features:

- ❖ High sensitivity
- ❖ Large output
- ❖ Fast primary stability time
- ❖ Quick response
- ❖ Remarkable reproducibility and reliability
- ❖ Good selectivity, avoid smoke ethanol disturb
- ❖ Low consumption, miniature design

Applications:

- ❖ Domestic, Industrial spot alcohol concentration detection.
- ❖ Alcohol tester, detector and breath tester.

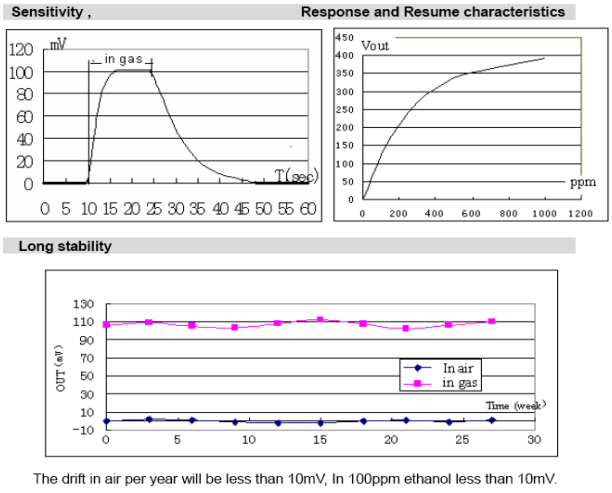


Fig 2.4 Characteristics of alcohol sensor

D. VIBRATION SENSOR

(1) piezoelectric sensor

A piezoelectric sensor is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical signal.

ELECTRICAL PROPERTIES

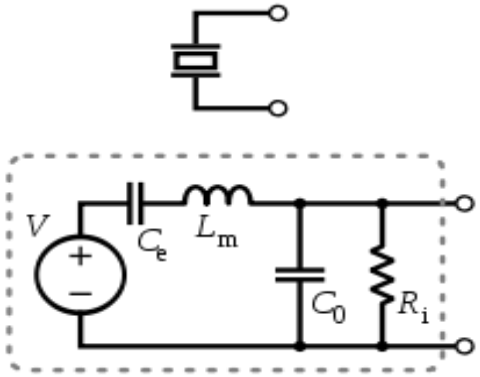


Fig 2.5 Electrical properties of a piezoelectric sensor

A piezoelectric transducer has very high DC output impedance and can be modeled as a proportional voltage source and filter network. The voltage V at the source is directly proportional to the applied force, pressure, or strain.[2] The output signal is then related to this mechanical force as if it had passed through the equivalent circuit.

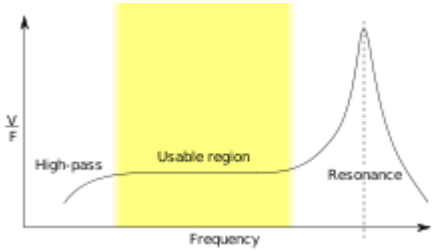
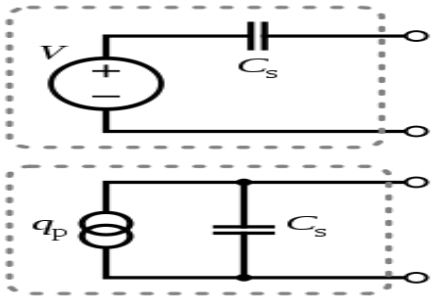


Fig 2.5 Frequency response of a piezoelectric sensor
Output voltage vs. applied force

A detailed model includes the effects of the sensor's mechanical construction and other non-idealities. The inductance Lm is due to the seismic mass and inertia of the sensor itself.

Ce is inversely proportional to the mechanical elasticity of the sensor.

C0 represents the static capacitance of the transducer, resulting from an inertial mass of infinite size. Ri is the insulation leakage resistance of the transducer element. If the sensor is connected to a load resistance, this also acts in parallel with the insulation resistance, both increasing the high-pass cutoff frequency.



In the flat region, the sensor can be modeled as a voltage source in series with the sensor's capacitance or a charge source in parallel with the capacitance.

For use as a sensor, the flat region of the frequency response plot is typically used, between the high-pass cutoff and the resonant peak. The load and leakage resistance need to be large enough that low frequencies of interest are not lost. A simplified equivalent circuit model can be used in this region, in which Cs represents the capacitance of the sensor surface itself, determined by the standard formula for capacitance of parallel plates.[3][4] It can also be modeled as a charge source in parallel with the source capacitance, with the charge directly proportional to the applied force, as above.

SENSING MATERIALS

Two main groups of materials are used for piezoelectric sensors: piezoelectric ceramics and single crystal materials. The ceramic materials (such as PZT ceramic) have a piezoelectric constant / sensitivity that are roughly two orders of magnitude higher than those of single crystal materials and can be produced by inexpensive sintering processes. The piezoeffect in piezoceramics is "trained", so unfortunately their high sensitivity degrades over time. The degradation is highly correlated with temperature. The less sensitive crystal materials (gallium phosphate, quartz, and tourmaline) have a much higher – when carefully handled, almost infinite – long term stability

E. IR SENSOR

An Infrared sensor (IR sensor) is an electronic device that measures (IR) light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. All objects emit what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose.

- "Infra" meaning below our ability to detect it visually, and "Red" because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red, and applies to many sources of invisible energy.

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and

receiver should be placed straight line to each other.

❖ The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver.

❖ When receiver receives the signal from the transmitter it resistance value is low. It resistance value become high when the signal was cut. By this sensor sense the value.

F. RF TRANSMITTER AND RECEIVER

❖ Radio frequency (RF) radiation is a subset of electromagnetic radiation with a wavelength of 100km to 1mm, which is a frequency of 3 KHz to 300 GHz respectively. This range of electromagnetic radiation constitutes the radio spectrum and corresponds to the frequency of alternating current electrical signals used to produce and detect radio waves. RF can refer to electromagnetic oscillations in either electrical circuits or radiation through air and space. Like other subsets of electromagnetic radiation, RF travels at the speed of light.

- *a) RADIO COMMUNICATION*

❖ In order to receive radio signals, for instance from AM/FM radio stations, a radio antenna must be used. However, since the antenna will pick up thousands of radio signals at a time, a radio tuner is necessary to tune in to a particular frequency (or frequency range). This is typically done via a resonator (in its simplest form, a circuit with a capacitor and an inductor). The resonator is configured to resonate at a particular frequency (or frequency band), thus amplifying sine waves at that radio frequency, while ignoring other sine waves. Usually, either the inductor or the capacitor of the resonator is adjustable, allowing the user to change the frequency at which it resonates.

b) SPECIAL PROPERTIES OF RF ELECTRICAL SIGNALS

❖ Electrical currents that oscillate at RF have special properties not shared by direct current signals. One such property is the ease with which they can ionize air to create a conductive path through air. This property is exploited by 'high frequency' units used in electric arc welding, although strictly speaking these machines do not typically employ frequencies within the HF band. Another special property is an electromagnetic force that drives the RF current to the surface of conductors, known as the skin effect. Another property is the ability to appear to flow through paths that contain insulating material, like the dielectric insulator of a capacitor. The degree of effect of these properties depends on the frequency of the signals.

G. ENCODER AND DECODER

An encoder is a device, circuit, transducer, software program, algorithm or person that converts information from one format or code to another, for the purposes of standardization, speed, secrecy, security, or saving space by shrinking size.

❖ A decoder is a device which does the reverse of an encoder, undoing the encoding so that the original information can be retrieved. The same method used to encode is usually just reversed in order to decode.

❖ In digital electronics, a decoder can take the form of a multiple-input, multiple-output logic circuit that converts coded inputs into coded outputs, where the input and output codes are different. E.g. n-to-2^n, binary-coded decimal decoders. Enable inputs must be on for the decoder to function, otherwise its outputs assume a single "disabled" output code word. Decoding is necessary in applications such as data multiplexing, 7 segment display and memory address decoding.

The example decoder circuit would be an AND gate because the output of an AND gate is "High" (1) only when all its inputs are "High." Such output is called as "active High output". If instead of AND gate, the NAND gate is connected the output will be "Low" (0) only when all its inputs are "High". Such output is called as "active low output".

A slightly more complex decoder would be the n-to-2^n type binary decoders. These types of decoders are combinational circuits that convert binary information from 'n' coded inputs to a maximum of 2^n unique outputs. We say a maximum of 2^n outputs because in case the 'n' bit coded information has unused bit combinations, the decoder may have less than 2^n outputs. We can have 2-to-4 decoder, 3-to-8 decoder or 4-to-16 decoder. We can form a 3-to-8 decoder from two 2-to-4 decoders (with enable signals).

Similarly, we can also form a 4-to-16 decoder by combining two 3-to-8 decoders. In this type of circuit design, the enable inputs of both 3-to-8 decoders originate from a 4th input, which acts as a selector between the two 3-to-8 decoders. This allows the 4th input to enable either the top or bottom decoder, which produces outputs of D (0) through D (7) for the first decoder, and D (8) through D (15) for the second decoder.

A decoder that contains enable inputs is also known as a decoder-demultiplexer. Thus, we have a 4-to-16 decoder produced by adding a 4th input shared among both decoders, producing 16 outputs.

H.LIMIT SWITCH

The switch, which is one of the most basic of all sensors, comes in two types. i) Normally open and ii) normally closed. Prior to advances in sensor technology, mechanical switches were used extensively in control applications. Due to improved reliability and performance, mechanical switches are still used for this purpose, but they are primarily used where switch actuation and wear are minimal. The standard limit switch is a mechanical device that uses physical contact to detect the target. A typical limit switch consists of a switch body and an operating head.

The switch body contains electrical contacts to energize or de-energize a circuit. The operating head incorporates a lever arm or plunger. This is also called an actuator. The actuator rotates when the target applies force. This movement changes the state of contacts within the switch body. Several types of actuators are available.

The roller type actuator is most suited to applications where a sliding contact causing the rotary part to rotate would

otherwise cause contact wear to take place over a period of time.

The fork-style actuator must be physically reset after each operation and is suitable for critical stop applications in movement control. (i.e.) where a limit of movement has been exceeded and a manual reset is required following an emergency stop.

Flexible loop and spring rod actuators can be actuated from all directions, making them suitable for applications where the direction of approach is constantly changing.

I. DRIVER CIRCUIT

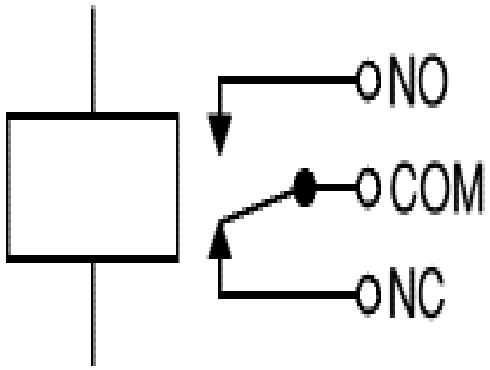
In electronics, a **driver** is an electrical circuit or other electronic component used to control another circuit or other component, such as a high-power transistor. The term is used, for example, for a specialized computer chip that controls the high-power transistors in AC-to-DC voltage converters. An amplifier can also be considered the driver for loudspeakers, or a constant voltage circuit that keeps an attached component operating within a broad range of input voltages.

The following circuit will allow you to drive a 12V relay using logic voltage (an input of 4V or greater will trip the relay). The circuit has its own 12V power supply making it self contained but the power supply portion can be left out if an external supply will be used. The circuit shows an output from the power supply that can be used to power other devices but it should be noted that the supply is unregulated and not particularly powerful with the parts stated. The 12V DC output is suitable for powering a few LEDs or low voltage lights but should not be used to power other electronic boards or motors.

J. RELAY

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.



Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay. The animated picture shows a working relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts. There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.

The relay's switch connections are usually labeled COM, NC and NO:

- COM = Common, always connect to this; it is the moving part of the switch.
- NC = Normally Closed, COM is connected to this when the relay coil is off.
- NO = Normally Open, COM is connected to this when the relay coil is on.

K. GSM MODEM

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.

- A GSM modem exposes an interface that allows applications such as NowSMS to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. To perform these tasks, a GSM modem must support an “extended AT command set” for sending/receiving SMS messages, as defined in the ETSI GSM 07.05 and 3GPP TS 27.005 specifications.
- A GSM modem could also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. Any phone that supports the “extended AT command set” for sending/receiving SMS messages, as defined in ETSI GSM 07.05 and/or 3GPP TS 27.005, can be supported by the Now SMS & MMS Gateway. Note that not all mobile phones support this modem interface.
- Due to some compatibility issues that can exist with mobile phones, using a dedicated GSM modem is usually preferable to a GSM mobile phone. This is more of an issue with MMS

messaging, where if you wish to be able to receive inbound MMS messages with the gateway, the modem interface on most GSM phones will only allow you to send MMS messages. This is because the mobile phone automatically processes received MMS message notifications without forwarding them via the modem interface.

- When you install your GSM modem, or connect your GSM mobile phone to the computer, be sure to install the appropriate Windows modem driver from the device manufacturer. To simplify configuration, the Now SMS & MMS Gateway will communicate with the device via this driver. If a Windows driver is not available for your modem, you can use either the "Standard" or "Generic" 33600 bps modem driver that is built into windows. A benefit of utilizing a Windows modem driver is that you can use Windows diagnostics to ensure that the modem is communicating properly with the computer.

The Now SMS & MMS gateway can simultaneously support multiple modems, provided that your computer hardware has the available communications port resources.

L. SOFTWARE DESCRIPTION

a) MPLAB

MPLAB IDE is an integrated development environment that provides development engineers with the flexibility to develop and debug firmware for various Microchip devices

MPLAB IDE is a Windows-based Integrated Development Environment for the Microchip Technology Incorporated PIC Microcontroller (MCU) and dsPIC digital signal controller (DSC) families.

b) MPLAB SIMULATOR

MPLAB SIM is a discrete-event simulator for the PIC microcontroller (MCU) families. It is integrated into MPLAB IDE integrated development environment. The MPLAB SIM debugging tool is designed to model operation of Microchip Technology's PIC microcontrollers to assist users in debugging software for these devices

In the MPLAB IDE, you can:

- Create source code using the built-in editor.
- Assemble, compile and link source code using various language tools. An assembler, linker and librarian come with MPLAB IDE. C compilers are available from Microchip and other third party vendors.
- Debug the executable logic by watching program flow with a simulator, such as MPLAB SIM, or in real time with an emulator, such as MPLAB ICE. Third party emulators that work with MPLAB IDE are also available.
- Make timing measurements.
- View variables in Watch windows.
- Program firmware into devices with programmers such as PICSTART Plus or PRO MATE II.
- Find quick answers to questions from the MPLAB IDE on-line Help.

III. PROJECT IMPLEMENTATION

A. PROPOSED CIRCUIT DIAGRAM

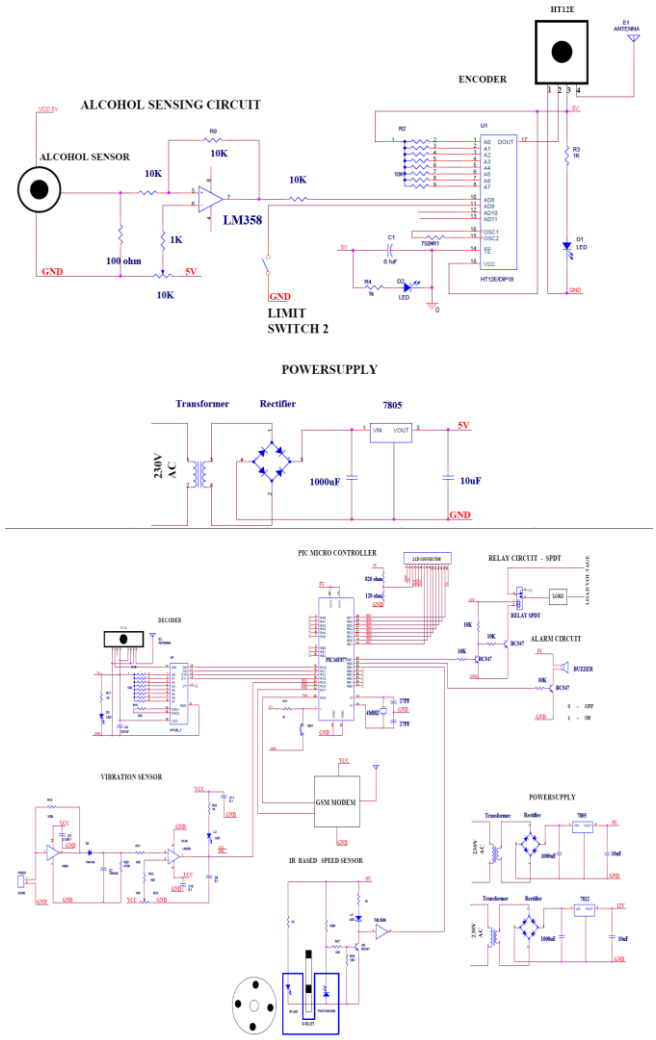


Fig 3.1 Proposed circuit diagram

B. CIRCUIT DIAGRAM DESCRIPTION

a) ALCOHOL SENSOR

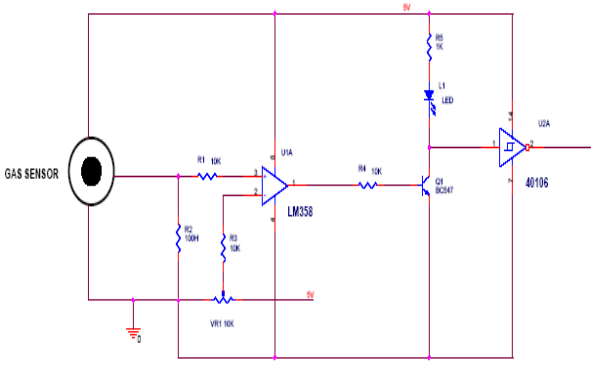


Fig 3.2 Alcohol sensor circuit

Ideal sensor for use to detect the presence of a dangerous alcohol use and drive or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke.

FEATURES

- ❖ High Sensitivity
- ❖ Detection Range: 100 - 10,000 ppm iso-butane propane.
- ❖ Fast Response Time: <10s.

Heater Voltage: 5.0V

Dimensions: 18mm Diameter, 17mm high excluding pins, Pins - 6mm High

b) RELAY WITH DRIVER CIRCUIT

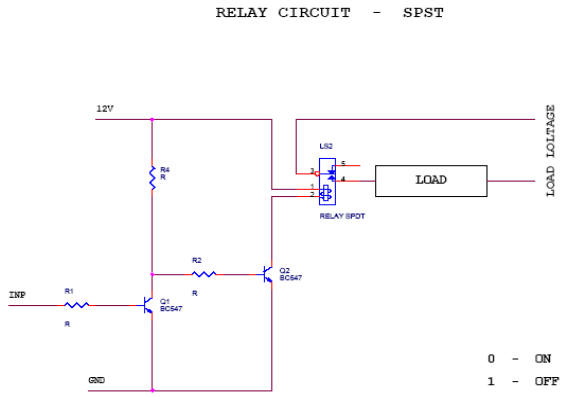


Fig 3.3 Relay with driver circuit

This circuit is designed to control the load. The load may be motor or any other load. The load is turned ON and OFF through relay. The relay ON and OFF is controlled by the pair of switching transistors (BC 547). The relay is connected in the Q2 transistor collector terminal. A Relay is nothing but electromagnetic switching device which consists of three pins. They are Common, Normally close (NC) and normally open (NO).

The relay common pin is connected to supply voltage. The normally open (NO) pin connected to load. When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero signals is given to base of the Q2 transistor. So the relay is turned OFF state.

When low pulse is given to base of transistor Q1 transistor, the transistor is turned OFF. Now 12v is given to base of Q2 transistor so the transistor is conducting and relay is turned ON. Hence the common terminal and NO terminal of relay are shorted. Now load gets the supply voltage through relay.

c) ENCODER WITH RF TRANSMITTER

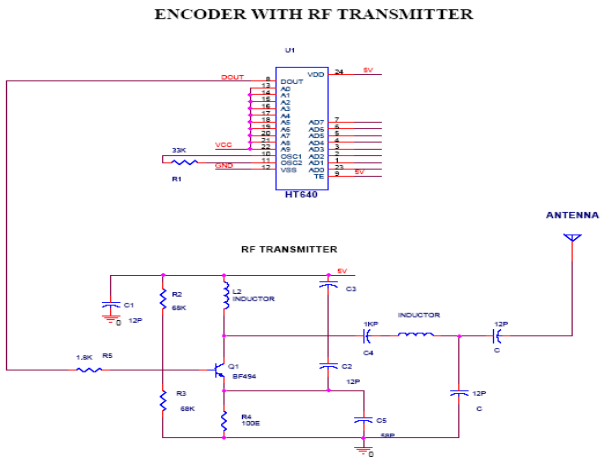


Fig 3.4 Encoder with RF transmitter

ENCODER

In this circuit HD 640 is used as encoder. The 3^{18} encoders are a series of CMOS LSIs for remote control system application. They are capable of encoding 18 bits of information which consists of N address bit and 18-N data bits. Each address/data input is externally ternary programmable if bonded out. It is otherwise set floating internally. Various packages of the 3^{18} encoders offer flexible combination of programmable address/data is transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger type further enhances the application flexibility of the 3^{18} series of encoders.

In this circuit the input signal to be encoded is given to AD7-AD0 input pins of encoder. Here the input signal may be from key board, parallel port, microcontroller or any interfacing device. The encoder output address pins are shorted so the output encoded signal is the combination of (A0-A9) address signal and (D0-D7) data signal. The output encoded signal is taken from 8^{th} which is connected to RF transmitter section.

RF TRANSMITTER

Whenever the high output pulse is given to base of the transistor BF 494, the transistor is conducting so tank circuit is oscillated. The tank circuit is consists of L2 and C4 generating 433 MHz carrier signal. Then the modulated signal is given LC filter section. After the filtration the RF modulated signal is transmitted through antenna.

d) DECODER WITH RF RECEIVER

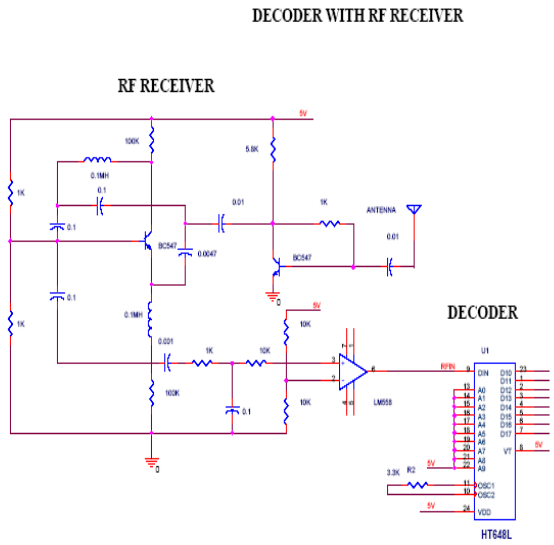


Fig 3.5 Decoder with RF receiver

RF RECEIVER

The RF receiver is used to receive the encoded data which is transmitted by the RF transmitter. Then the received data is given to transistor which acts as amplifier. Then the amplified signal is given to carrier demodulator section in which transistor Q1 is turn on and turn off conducting depends on the signal.

Due to this the capacitor C14 is charged and discharged so carrier signal is removed and saw tooth signal is appears across the capacitor. Then this saw tooth signal is given to comparator. The comparator circuit is constructed by LM558. The comparator is used to convert the saw tooth signal to exact square pulse. Then the encoded signal is given to decoder in order to get the decoded original signal.

DECODER

In this circuit HD648 is used as decoder. The 3^{18} decoder are a series of CMOS LSIs for remote control system application. They are paired with 3^{18} series of encoders. For proper operation a pair of encoder/decoder pair with the same number of address and data format should be selected. The 3^{18} series of decoder receives serial address and data from that series of encoders that are transmitted by a carrier using an RF or an IR transmission medium. It then compares the serial input data twice continuously with its local address. If no errors or unmatched codes are encountered, the input data codes are decoded and then transferred to the output pins. The VT pin also goes high to indicate a valid transmission.

The 3^{18} decoders are capable of decoding 18 bits of information that consists of N bits of address and 18-N bits of data. To meet various applications they are arranged to provide a number of data pins whose range is from 0 t08 and an address pin whose range is from 8 to 18. In addition, the 3^{18} decoders provide various combinations of address/ data numbering different package.

In this circuit the received encoded signal is 9th pin of the decoder. Now the decoder separate the address (A0-A9) and data signal (D0-D7). Then the output data signal is given to microcontroller or any other interfacing device.

e) ALARM WITH DRIVER CIRCUIT

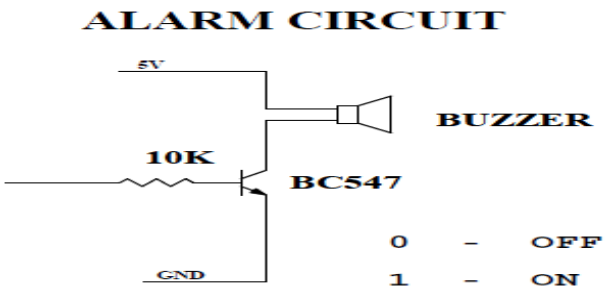


Fig 3.6 Alarm with driver circuit

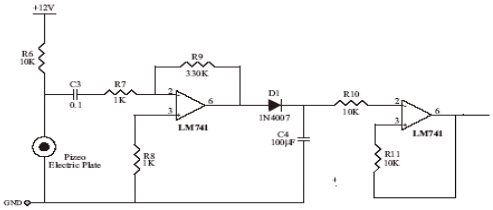


Fig 3.7 Vibration sensor circuit

The circuit is designed to control the buzzer. The buzzer ON and OFF is controlled by the NPN transistor (BC 547). The buzzer is connected in the transistor collector terminal.

When high pulse signal is given to base of the transistors it will be turned on and now alarm get ground so it will be on.

If low pulse is given to the NPN transistor base means it will be off and also alarm goes to the off state.

f) VIBRATION SENSOR CIRCUIT

Vibration circuit is used to sense the mechanical vibration. This circuit is constructed with

- ❖ Piezo electric plate
- ❖ Operational amplifier
- ❖ 555 IC timer

Piezo electric plate is the special type of sensor which is used to sense the mechanical vibration. Piezo electric plate converts the mechanical vibration to electrical signal. The converted electrical signal is in the range of small milli voltage signal.

Then the electrical signal voltage is given to amplifier unit through 0.1uf capacitor in order to filter the noise signal. The amplifier circuit is constructed with operational amplifier LM 741. The amplified output is in the form of AC signal the diode is used to rectify the negative signal.

g) U-SLOT SPEED MEASUREMENT CIRCUIT

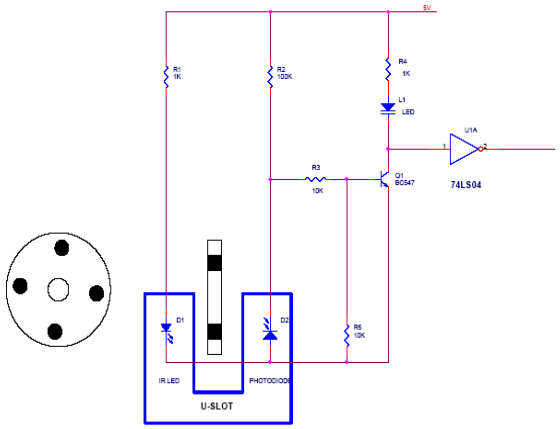


Fig 3.8 U-slot speed measurement circuit

This circuit is designed to monitor the speed of the motor. The holes type pulley is attached in the motor shaft. The pulley is rotated across the USLOT. The USLOT consists of IR transmitter and receiver.

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter.

One important point is both IR transmitter and receiver should be placed straight line to each other.

When supply is ON, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected to base of the BC 547 switching transistor through resistors. When motor is not rotating the IR transmitter passes the rays to the receiver. The IR receiver LED is conducting due to that less than 0.7V is given to transistor base so that transistor is not conducting. Now the VCC +5V is given to the input of the inverter (IC7404) and zero taken as output. When motor is rotating, the pulley attached in the shaft also rotating, so it interprets the IR rays between transmitter and receiver. Hence IR receiver LED is not conducting due to that more than 0.7V is given to base of the transistor. Now the transistor is conducting so it shorts the collector and emitter terminal. The zero voltage is given to inverter input and +5v is taken in the output. Hence depends on the motor speed the zero to 5v square pulse is generating at the output which is given to microcontroller in order to count the pulse. This pulse rate is equal to the speed of the motor.

C.ADVANTAGES

- ❖ The system provides safety.
- ❖ Indicate the carelessness in helmet wearing.
- ❖ Low power consumption
- ❖ Easy to handle the system

D.APPLICATIONS

- ❖ Device is useful for two wheeler drivers.

IV. RESULT

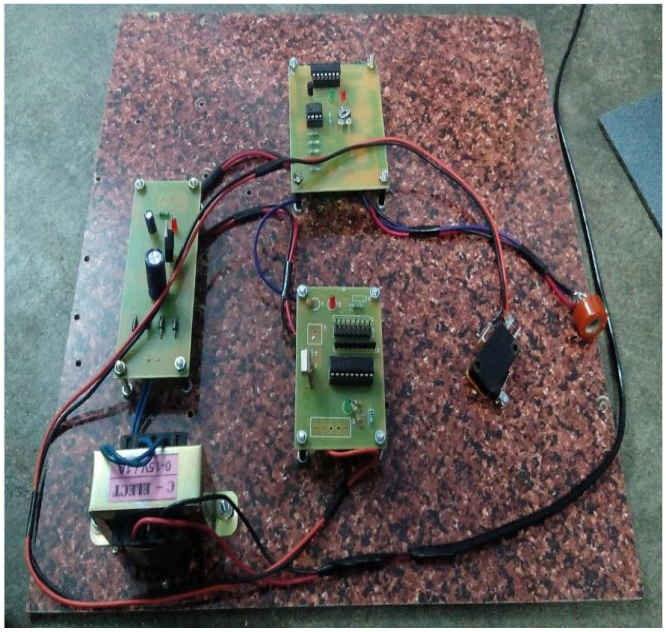


Fig 4.1 Transmitter

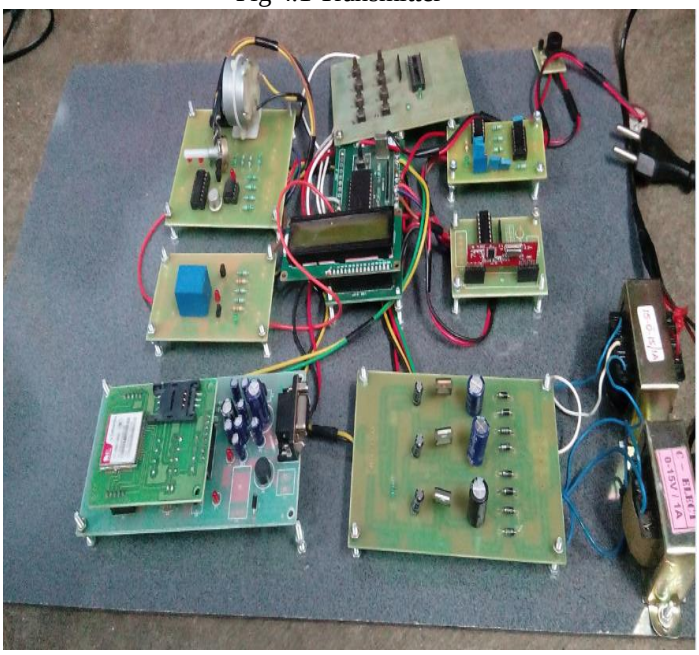


Fig 4.2 Receiver

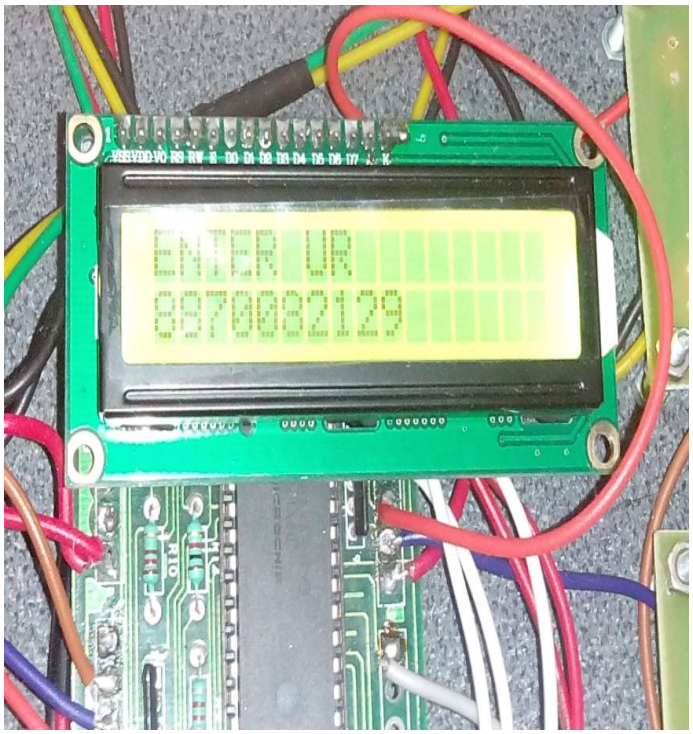


Fig 4.3 Entering the mobile number via keypad

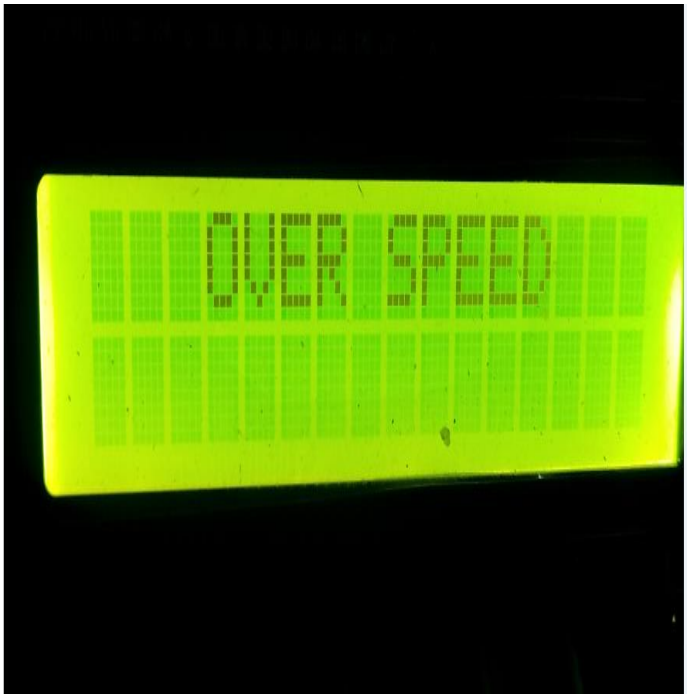


Fig 4.5 Over speed

Fig 4.4 Wear the helmet

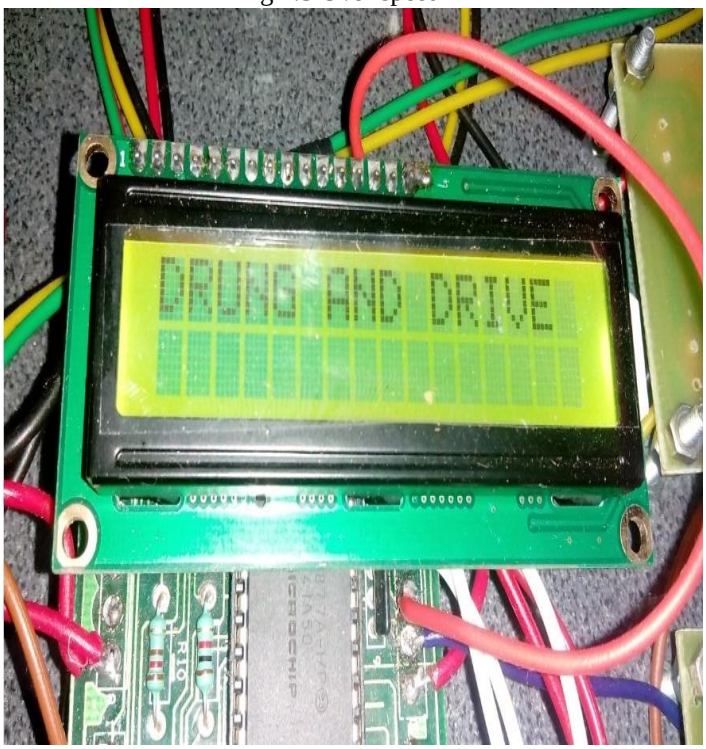


Fig 4.6 Drunk and drive

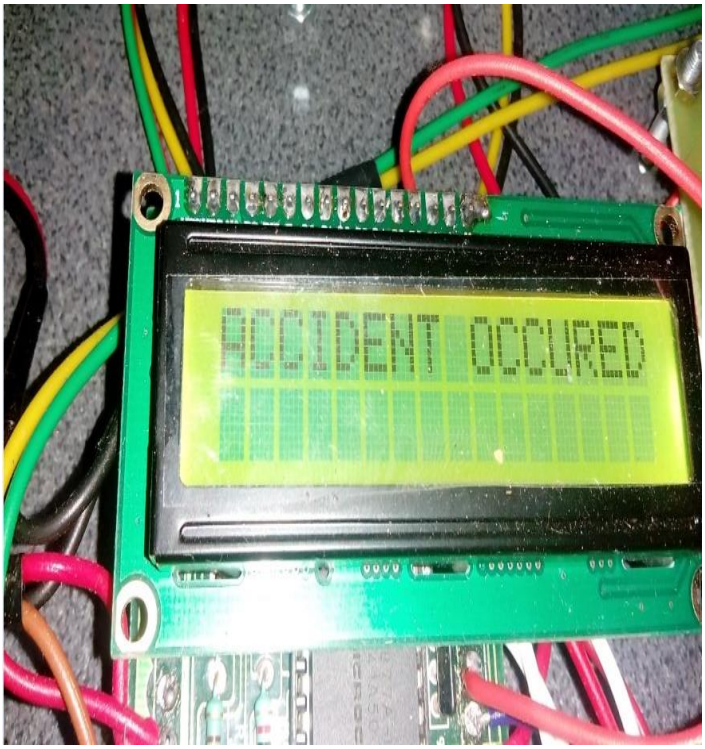


Fig 4.7 Detecting an accident

Fig 4.8 Calling to the entered number

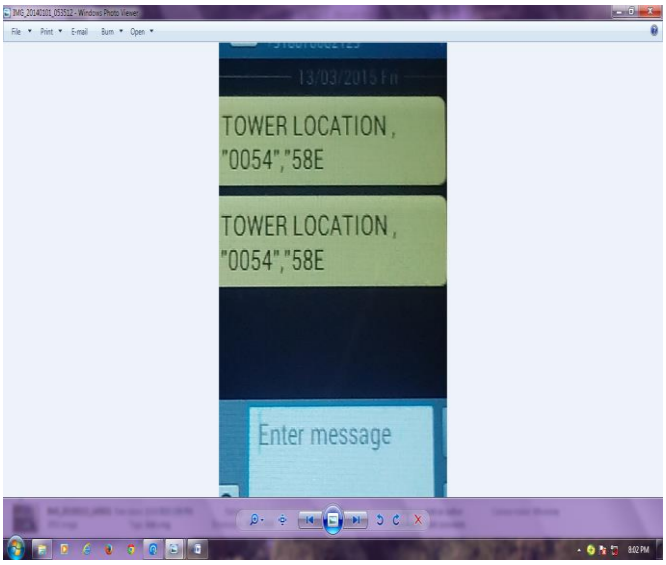


Fig 4.9 Output (Message to the entered mobile number) of GSM modem

V.CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The proposed system based on Atmel microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology (Atmel microcontroller) used this project is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

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