CAR ACCIDENT WARNING AND PREVENTION SYSTEM

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ABSTRACT

CAR ACCIDENT WARNING AND PREVENTION SYSTEM

Trying to balance out between the vehicle speed limit and the protection of driver, the safety mechanism is continuously evolving with improvement in the performance of new vehicle. In view a multi sensor automatic car accident prevention and warning system is designed. This is achieved using data feeds from a number of auxiliary sensors (i-e Automatic Tyre Pressure Indicator Module, Low-Speed Following Mode (LSM) Module, Lane Keeping Assist (LKA) Module and Intelligent Night Vision (INV) Module) and the results are displayed on the LCD one by one after the programmed delay to assist in viewing of the driver. This is accompanied by a series of LED’s and alarms to warn the driver of the unwanted situation, and to take necessary action to avoid the accident, maintain his vehicle in the best condition and improve its performance and fuel efficiency.

CERTIFICATE OF CORRECTNESS AND APPROVAL

It is certified that the work contained in this thesis titled "CAR ACCIDENT WARNING AND PREVENTION SYSTEM", carried out by Waqar Ahmad, Usman Jamil and Jibran Danish under the supervision of Dr. Adil Masood Siddiqui in partial fulfillment of the Bachelors of Telecommunication Engineering, is correct and approved.

Approved By

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Dr. Adil Masood Siddiqui

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Military College of Signals, NUST

For Mian Jawad Hameed, Abiha Waqar and our respected parents

ACKNOWLEDGMENTS

We acknowledge the sincere efforts of Dr. Adil Masood Siddiqui which made us able to understand and complete our project in given time; also his presence was a great source of learning for our group.

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Chapter 1 Introduction

1.1 Problem Statement

The new vehicle performance has been continuously improved and the study results relating to the safety of car driving have also been continuously reported and demonstrated, it is trying to find a balance point between the development of vehicle speed limit and the protection of driver's safety. In the current study and development of various products, no matter it is in the enforcement of vision system, radar detection or the tracing and control it is always asking the driver to watch or handle the possible issues after the occurrence of accidents.

1.2 Project Description

A multi sensor automatic car accident protection and warning system is designed. This is achieved using data feeds from a number of auxiliary sensors and the results are displayed on the LCD one by one after the programmed delay to assist in viewing of the driver. This is accompanied by a series of LED's and alarms to warn the driver of the unwanted situation, and to take necessary action to avoid the accident, maintain his vehicle in the best condition and improve its performance and fuel efficiency.

The project is based on the following four systems:

- Automatic Tyre pressure indicator Module
- Low-Speed following Mode (LSM) Module
- Lane Keeping Assist (LKA) Module
- Intelligent Night Vision (INV) Module

1.3 System Model

The system model is shown in Figure 1-1 describing the complete working of the project by combining the input of pressure sensors mounted on four tyres of the vehicles with speed sensor mounted on vehicle tyre. This data gets combined in Main microcontroller where it is processed and displayed on the LCD for user viewing. Warning buzzer is also included to warn user for any unwanted condition.

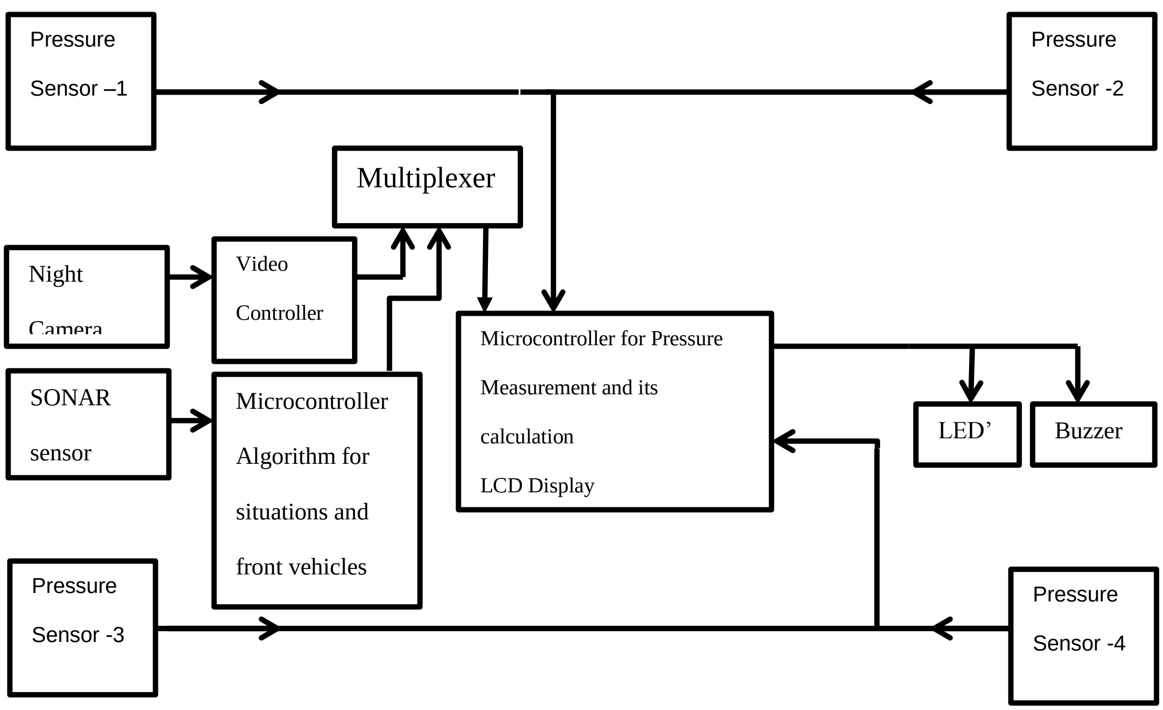

Figure 1-1: Project Model

1.4 Scope, Specifications and Deliverables

The details of the systems included in this project are as under:

1.4.1 Automatic Tyre Pressure Indicator Module

Automatic tyre pressure indicator continuously indicates the tyre pressure of the car to avoid any road accident. Pressure sensors are used for this purpose which continuously transmits a signal to the vehicle which is displayed in the panel (LCD).

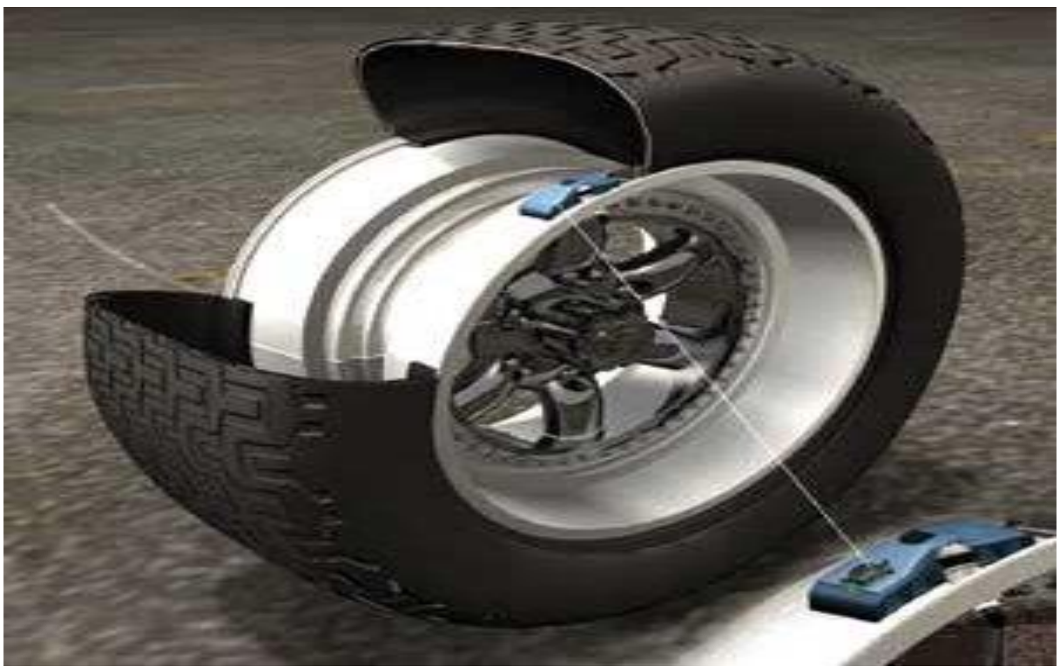

Figure 1-2: Automatic Tyre Pressure Indicator Module

1.4.2 Low-Speed Following Mode (LSM) Module

The LSM detect the acceleration, deceleration and stopping of the front car to estimate the distance away from the front car, meanwhile it also controls the brake and the fuel systems to maintain the car within the safety range. If the front car experiences an abnormal condition the system will raise alarm to warn the driver.

Figure 1-3: Low-Speed Following Mode (LSM) Module

1.4.3 Lane Keeping Assist (LKA) Module

The LKA uses camera to monitor the passing or dividing lane in the front and the system will give warning signal if the driver crosses the passing lane or enters into the opposite direction passing lane without giving or giving improper direction signal.

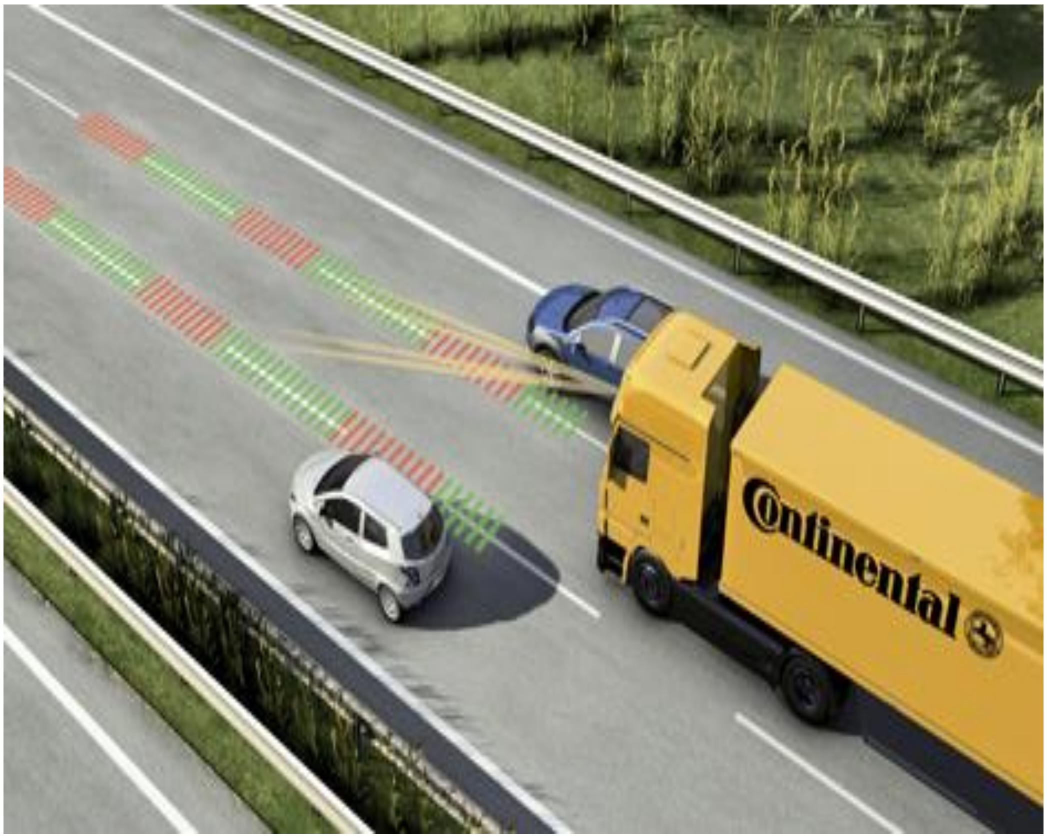

Figure 1-4: Lane Keeping Assist (LKA) Module

1.4.4 Intelligent Night Vision (INV) Module

In driving at night or in heavy rain the driver's visible range will be restricted and also the light illuminating range will be limited to prevent the driver from clearly noticing any pedestrian along the roadside or the person is in repairing his out of condition car the INV will display the front road condition on the LCD screen of the car by using infrared camera to monitor the road condition to present to the driver a complete knowledge of the front road condition to greatly reduce the possible occurrences of accidents.

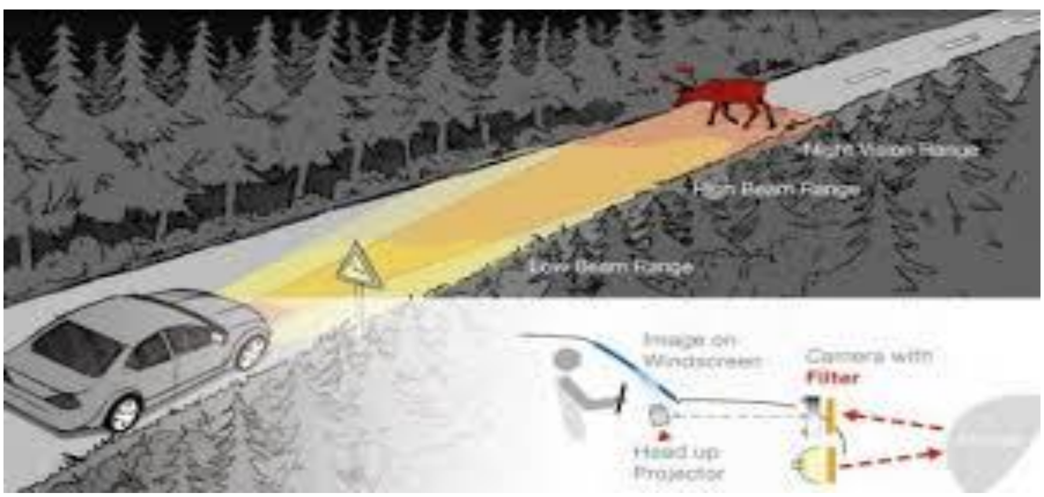

Figure 1-5: Intelligent Night Vision (INV) Module

1.4.5 Applications

- Can be installed in private cars and vehicles to prevent accidents.
- Military vehicles can be installed with this system while moving in convoys to prevent crash.
- Military tanks and heavy vehicles can also be equipped with this system to move in dark and bad weather conditions.

1.4.6 Deliverables

The End product of this project is a Proto-type vehicle with Accident prevention system which includes:

- Tyre pressure, Speed and inter-vehicle distance display & warning system
- Lane keeping assistance

Chapter 2 Literature Review

2.1 PIC Microcontroller 16F877A

The basic building block of PIC 16F877A is based on Harvard architecture.PIC 16F877 is one of the most advanced microcontrollers from Microchip. This controller is widely used for experimental and modern applications due to its low price, wide range of applications, high quality, and ease of availability. It is ideal for applications such as machine control applications, measurement devices, study purpose, and so on. The PIC 16F877 features all the components which modern microcontrollers normally have. The PIC16FXX series has more advanced and developed features when compared to its previous series. It has a few important features such as:

- High performance
- Only 35 simple word instructions
- Fully static design
- Wide operating voltage range (2.0-5.56) V
- High sink or source current (25mA)
- Commercial, industrial and extended temperature range
- Low power consumption

In order to write a program, we need a memory to run some system before interface on the IC. Program memory contains the programs that are written by the user. The program counter (PC) executes these store commands one by one. Usually PIC16F877A devices have a 13 bits wide program counter that is capable of addressing 8K*14 bit program memory space. This memory is primarily used for storing the program that are written (burned) to be used by the PIC. These devices also have 8K*14 bits of flash memory that can be electrically erasable or reprogrammed. Each time to write a new program to the controller, must delete the old one at that time.

2.2 SONAR Sensor

SONAR sensors (also known as transceivers when they both send and receive, but more generally called transducers) work on a principle similar to radar or sonar which evaluates attributes of a target by interpreting the echoes from radio or sound waves respectively. SONAR sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring wind speed and direction (anemometer), tank or channel level, and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure tank or channel level, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms and non-destructive testing. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed. The technology is limited by the shapes of surfaces and the density or consistency of the material. Foam, in particular, can distort surface level readings.

2.3 Tyre Pressure Monitoring System

Tyre pressure monitoring systems (TPMS) are electronic systems designed to monitor the air pressure inside the tyres on various types of vehicles. TPMS can report real-time tyre-pressure information to the driver of the vehicle, either via a gauge, a pictogram display, or a simple low-pressure warning light. We are using Direct TPMS.

2.3.1 Direct TPMS

Direct TPMS employs pressure sensors on each tyre, either internal or external. The sensors physically measure the tyre pressure in each tyre and report it to the vehicle's instrument cluster or a corresponding monitor.

Some units also measure and alert temperatures of the tyre as well. These systems can identify under-inflation in any combination, be it one tyre or all, simultaneously. Although the systems vary in transmitting options, many TPMS products (both OEM and aftermarket solutions) can display real time tyre pressures at each location monitored whether the vehicle is moving or parked. There are many different solutions but all of them have to face the problems of limited battery lifetime and exposure to tough environments. If the sensors are mounted on the outside of the wheel, which is the case for some aftermarket systems, they are in danger of mechanical damage, aggressive fluids and other substances as well as theft. If they are mounted on the inside of the rim, they are no longer easily accessible for service like battery change and additionally, the RF communication has to overcome the damping effects of the tyre which additionally increases the need for energy.

A direct TPMS sensor consists of following main functions requiring only a few external components e.g., battery, housing, PCB to get the sensor module that is mounted to the valve stem inside the tyre:

- Pressure sensor
- Analog-digital converter
- Microcontroller
- System controller
- Oscillator

2.4 Automotive Night Vision

An automotive night vision system is a system to increase a vehicle driver's perception and seeing distance in darkness or poor weather beyond the reach of the vehicle's headlights. They are currently offered as optional equipment on certain premium vehicles.

2.4.1 Display Type

- Instrument cluster using a high resolution liquid-crystal display (LCD), newest type
- Navigation system or information screen, least expensive and with display's location further away from driver's field of vision.
- Windshield via head-up display, earliest type, dimmer knob can reduce brightness, display nearest to driver's line of sight

There are two types of systems, either passive or active systems, both have advantages and disadvantages when compared to the other

2.4.2 Active Systems

Active systems use an infrared light source built into the car to illuminate the road ahead with light that is invisible to humans. There are two kinds of active systems: gated and non-gated. The gated system uses a pulsed light source and a synchronized camera that enable long ranges (250m) and high performance in rain and snow.

- Pros: higher resolution image, superior picture of inanimate objects, works better in warmer conditions; smaller sensor can be mounted to rearview mirror.

- Cons: does not work as well in fog or rain, lower contrast for animals, shorter range of 150-200 meters or 500-650 feet.

2.4.3 Passive Systems

Passive systems do not use an infrared light source; instead they capture thermal radiation already emitted by the objects, using a thermo graphic camera.

- Pros: greater range of about 300 meters or 1,000 feet, higher contrast for living objects.
- Cons: grainy, lower resolution image, works poorly in warmer weather conditions, larger sensor.

Chapter 3 Design and Development

3.1 Main Block

The main block consists of LCD, PIC 16F877A IC, pressure circuit, warning LEDs and a COMM port.

The purpose of LCD is to display all the data i.e. tyre pressure, current speed, inter vehicular distance at random. The LCD can be programmed to display one reading at a time but it is programmed to display all readings one by one after specific intervals.

PIC 16F877A is a 8-bit microcontroller which features 256 bytes of EEPROM data memory, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions. All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications. This microchip processes the analogue signals coming from pressure and SONAR sensors, converts them into digital form and fed it to the LCD for user display. Also it gets input from the speed processing microchip and controls the relay based on speed data. The microchip controls the speed relay according to programmed values and adjusts motor speed according to the conditions. This includes vehicle slow down or stop at certain programmed threshold distance from the immediate vehicle or obstacle.

LEDs are used for warning purposes under different conditions which can be programmed according to the user needs.

COMM port serves as bridge between hardware and computer software i.e. it is used to display video data on computer screen. The video data is taken directly from the camera mounted at the front of the vehicle which will be used for Lane keeping purpose. The software is programmed to process colors and notify the user about the current position of the vehicle.

Figure 3-1 shows Main Controller Block. The code is attached as Appendix A.

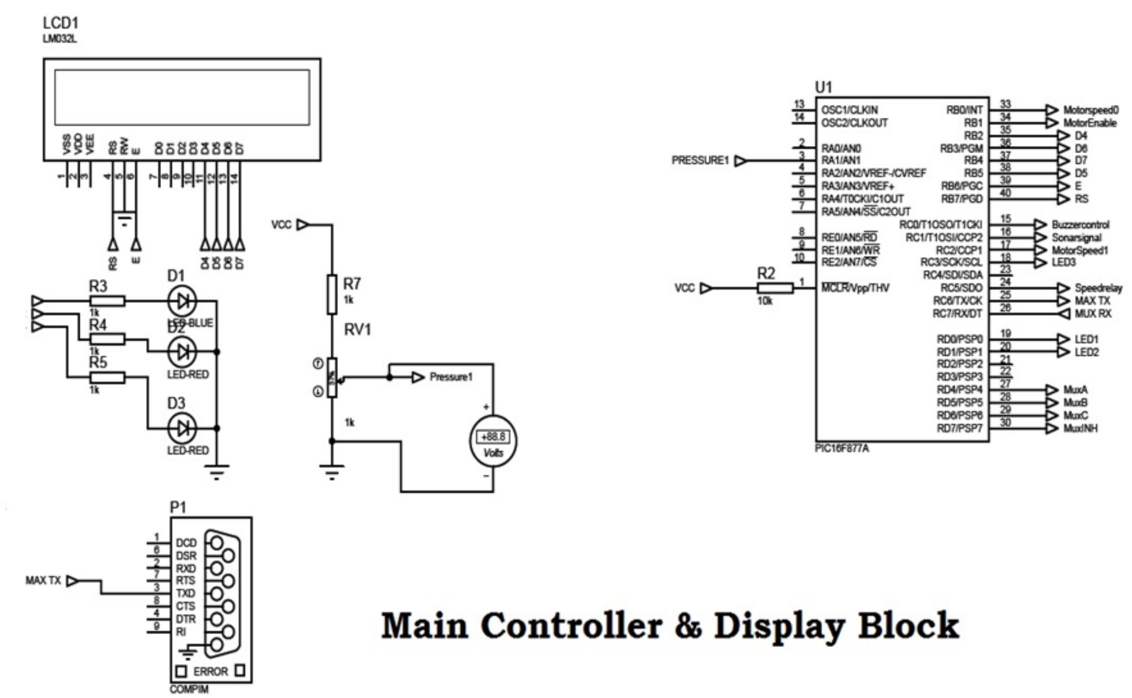

Figure 2-1: Main Controller Block

3.2 Speed Control Block

The speed control block consists of PIC 16F628A 8-bit microcontroller which features 4MHz internal oscillator, 128 bytes of EEPROM data memory, a capture/compare/PWM, a USART, 2 Comparators and a programmable voltage reference that makes it ideal for analog/integrated level applications in automotive, industrial, appliances and consumer applications. This microchip processes the incoming speed signal, converts it into digital form and sends it to multiplexer block.

The code is attached as Appendix B.

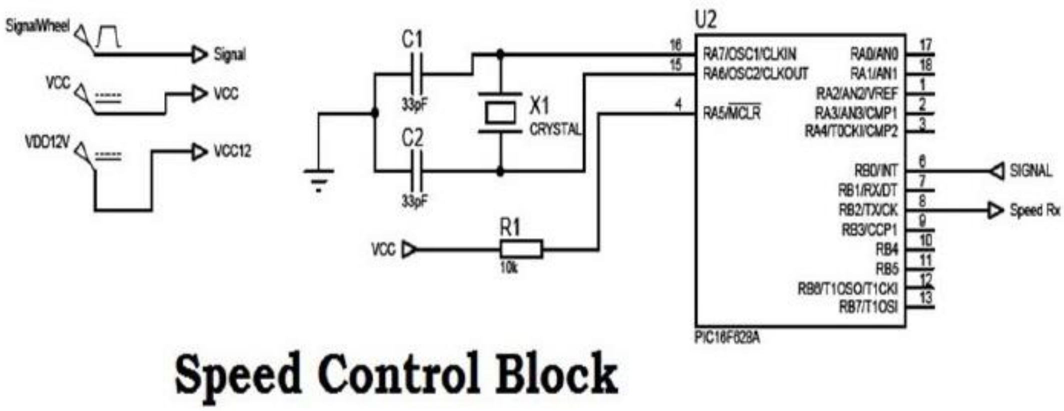

Figure 3-2: Speed Control Block

3.3 Motor Control Block

The motor control block consists of the CD4053B MUX, relay circuit and L296 IC with motor.

CD4053B which is a triple 2-Channel multiplexer having three separate digital control inputs, A, B, and C, and an inhibit input. Each control input selects one of a pair of channels which are connected in a single-pole, double-throw configuration. We are giving speed, pressure and SONAR signal as input to this MUX and its desired output will be controlled by the main controller to display one value at a time on the LCD.

L296 IC which is a SWITCHING REGULATOR is used to control motor as per inputs provided by main controller. This is dependent on the threshold values provided in the main controller to either slow down or to stop the vehicle in case of emergency.

The relay circuit is used to enable motor control and sound warning in desired conditions.

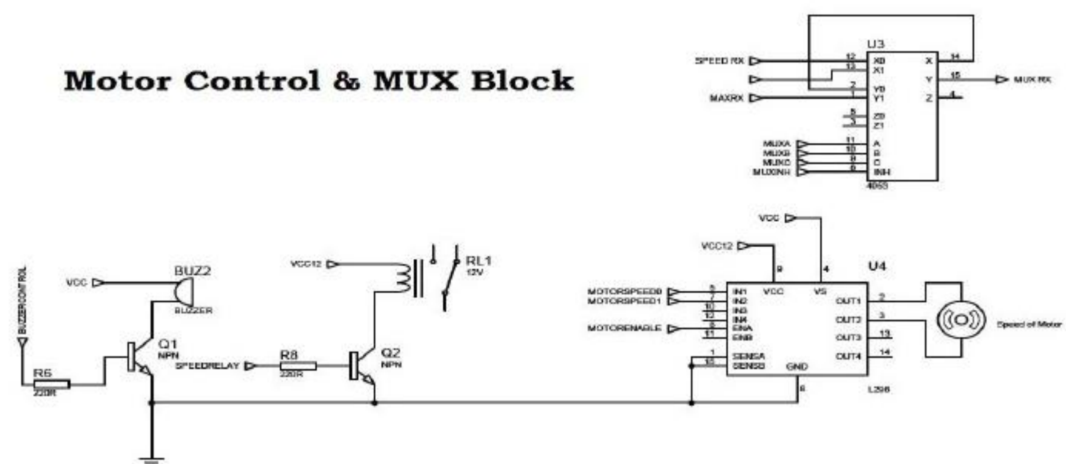

Figure 3-3: Motor Control Block

3.4 SONAR Signal Block

The SONAR signal block consists of PIC 16F628A microchip which is used to send and receive signals from a SONAR sensor and then process the analogue signal to transmit it to the MUX. The SONAR signal data is then used by main controller to control the speed of the vehicle. The code is attached as Appendix C.

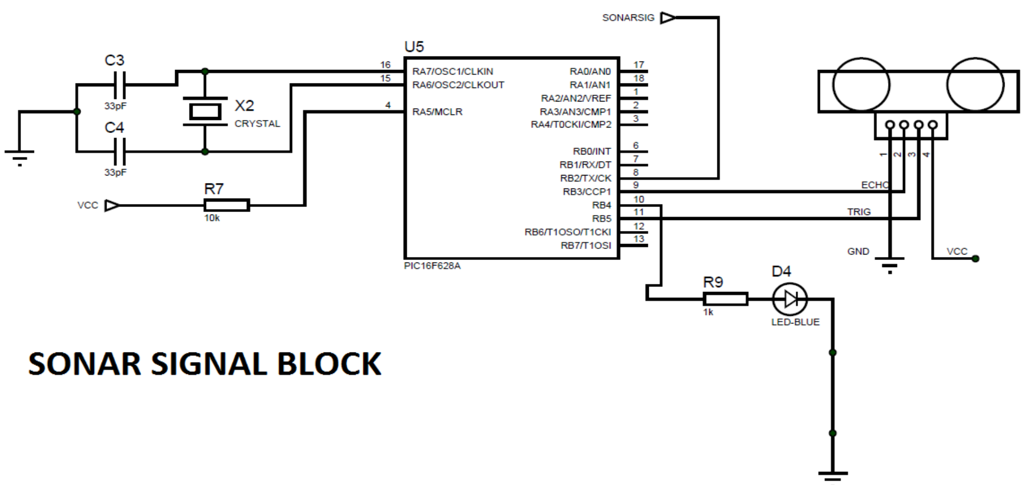

Figure 2-2: SONAR Sensor Block

3.5 Design Procedure

The design procedure is as under:

- Pressure sensor module is mounted on each tyre of vehicle (4 Modules). Signals are transmitted using wire to the main controller where these are processed and displayed on LCD. This algorithm is used to avoid delays due to moving of tyres.
- Main Controller Module which is microprocessor (STM32 /PIC microcontrollers) controls the desire input which is displayed on LCD for user viewing purpose.
- IR sensors for night vision
- Sonar sensor for inter-vehicle distance measurement programmed on a certain threshold to avoid collision.
- Speed sensor to control speed of the vehicle in accordance with the sonar sensor which is controlled using a microcontroller.
- Camera for night vision and lane keeping.
- Display camera will show result on the LCD (If used in the vehicle).

Chapter 4 Project Results and Analysis

The simulation result of the designed program and prototype vehicle is attached.

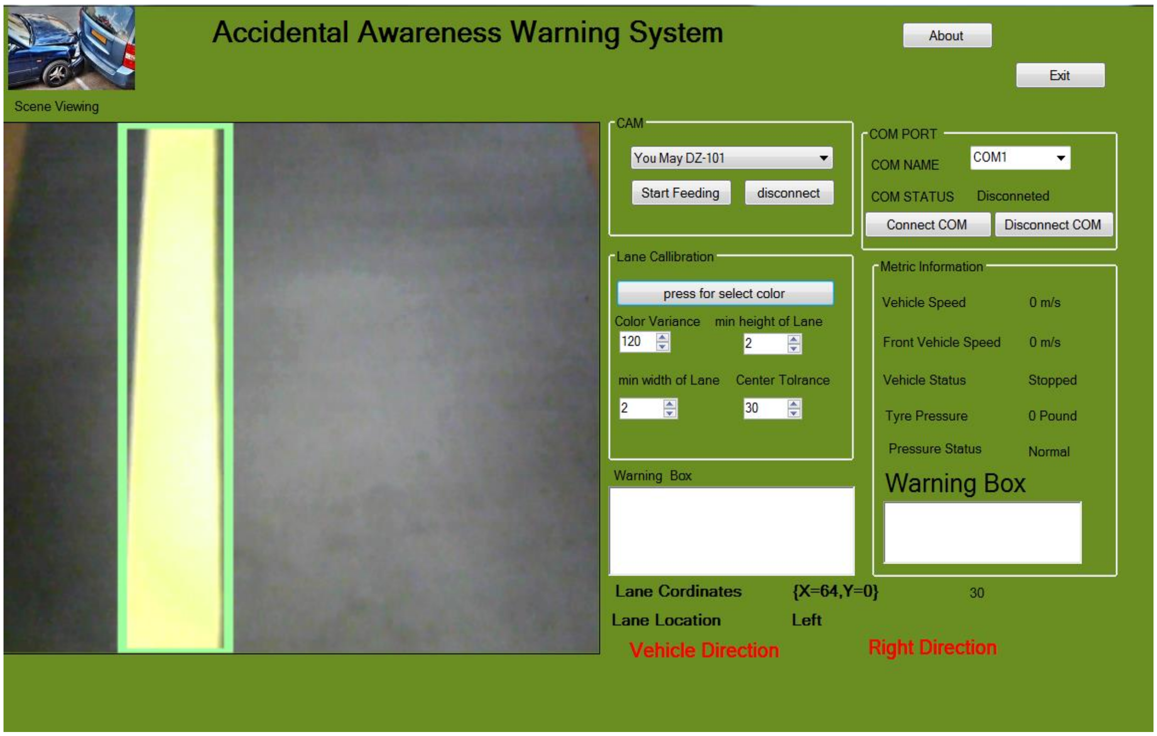

Figure 4-1: Lane Detection (Left)

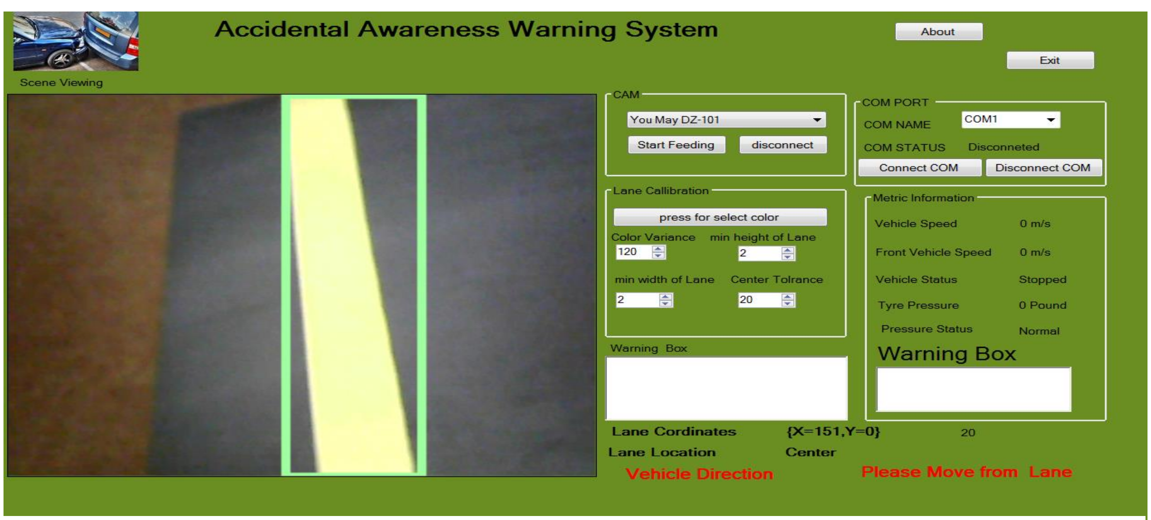

Figure 4-2: Lane Detection (Center)

Figure 4-3: Lane Detection (Right)

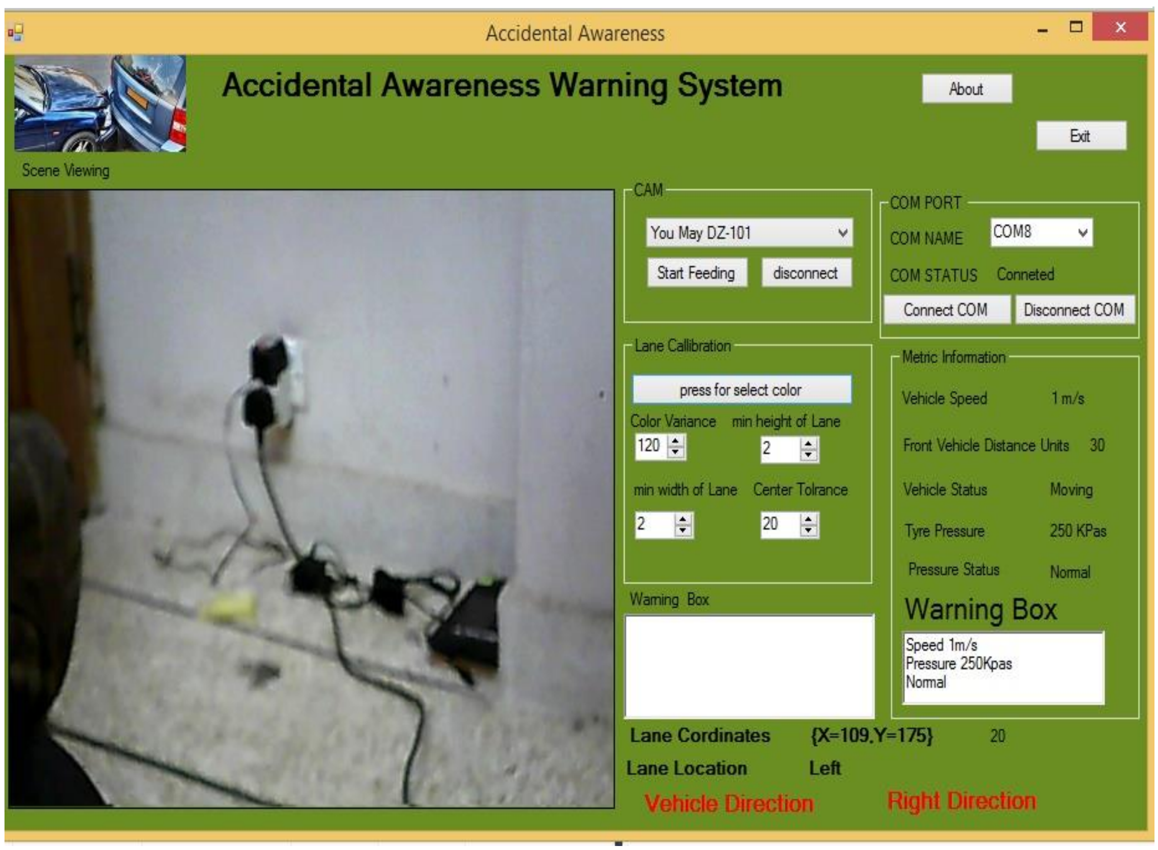

Figure 4-4: Tyre Pressure

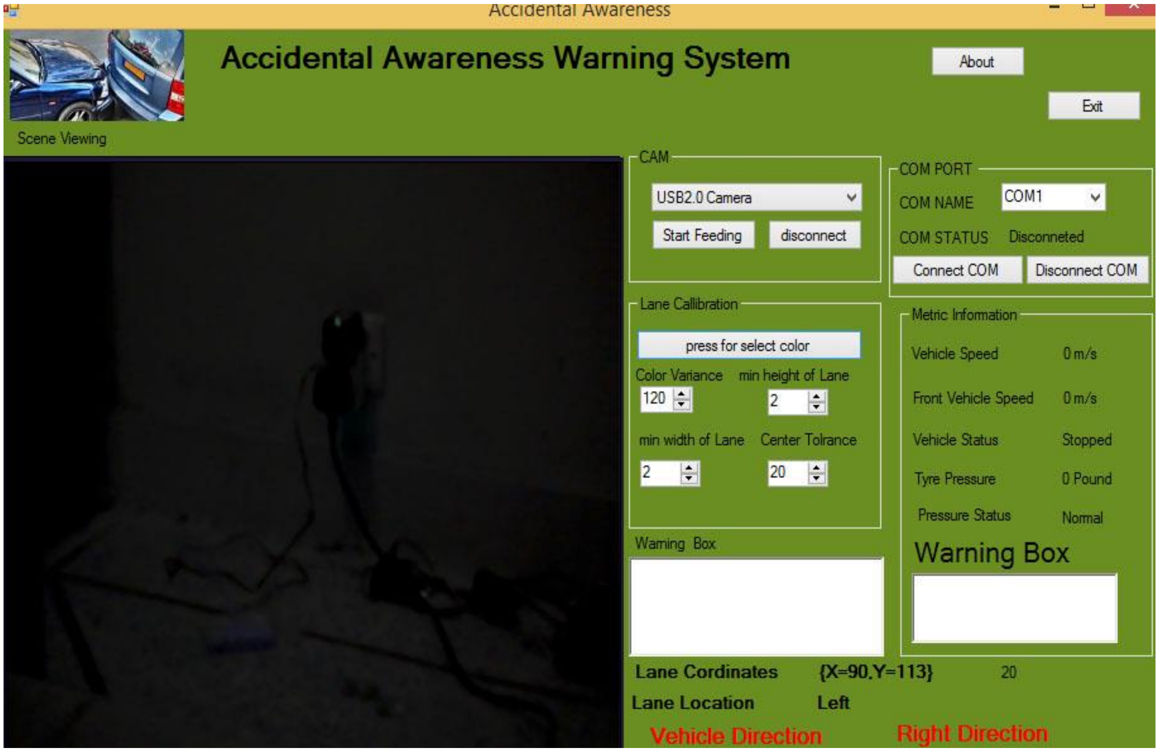

Figure 4-5: Night Vision

Figure 4-6: Proto-type Vehicle

Figure 4-7: Vehicle LCD and Main Controller

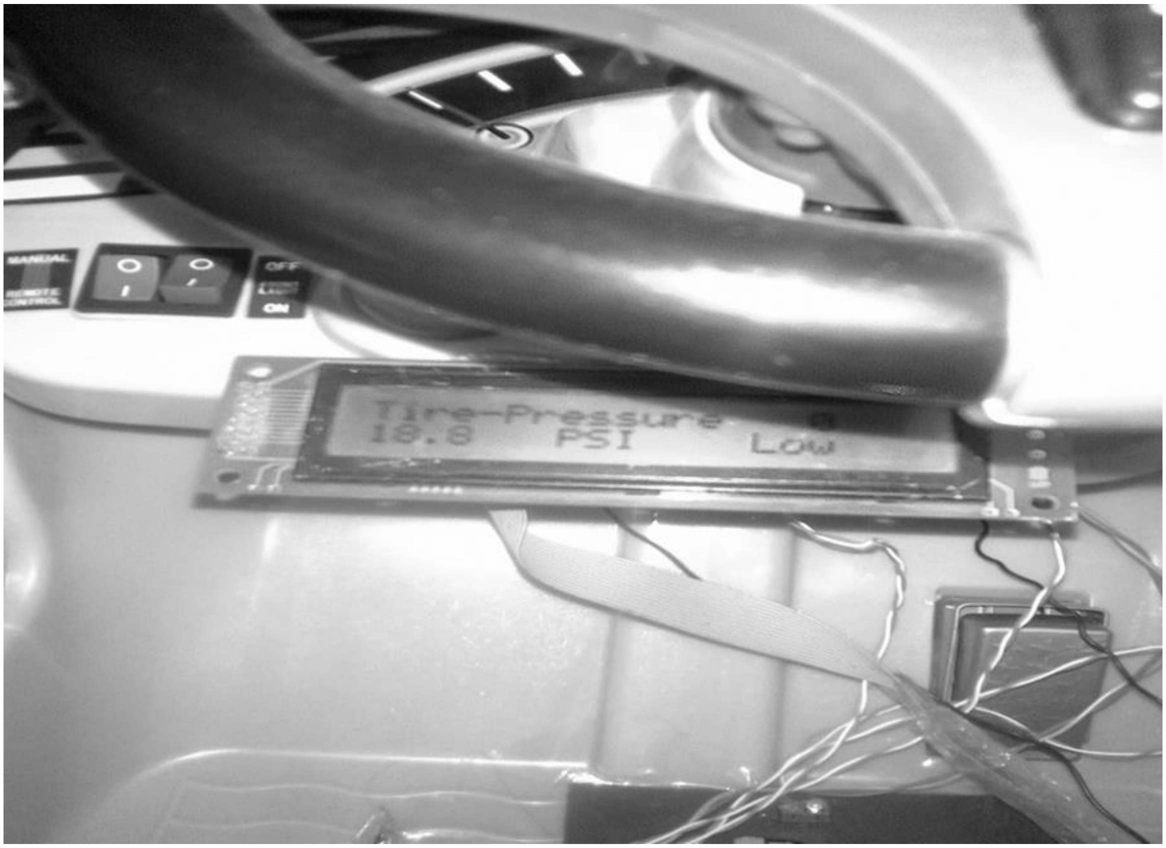

Figure 4-8: Tyre Pressure on LCD

Figure 4-9: Vehicle Distance on LCD

Chapter 5 Future Work Recommendations

Following are some recommendations for future work on this project:

- Real time implementation on a vehicle.
- Wet road detection module to identify slippery road.
- Water sensor to detect the presence of water in fuel.

Chapter 6 Conclusion

By completing this project all the objectives have been achieved. Lots of knowledge on the Accident prevention and Warning systems has been gained. And the most important thing is that an automatic accident prevention and warning system has been developed and integration of it on the vehicle has been carried out successfully.

In our study we also realized that in addition to the items we have tested and verified there are still some Tasks we can study in the near future, such as the task when the car is running along a sloppy road how the accident prevention and warning system can be incorporated in the vehicle to give early warning about road conditions to the driver and along with it water sensors incorporation with the system to detect the presence of water in the fuel can been carried out.

Appendix

Appendix A

Main Microcontroller Code

The main microcontroller code is as following:

```
// Lcdpinout settings
sbit LCD_RS at RB7_bit;
sbit LCD_EN at RB6_bit;
sbit LCD_D7 at RB4_bit;
sbit LCD_D6 at RB3_bit;
sbit LCD_D5 at RB5_bit;
sbit LCD_D4 at RB2_bit;

sbit LED1 at RD0_bit;
sbit LED2 at RD1_bit;
sbitspeedrelay at RC3_bit;
sbit MUXA at RD4_bit;
sbit MUXB at RD5_bit;
sbit MUXC at RD6_bit;
sbit MUXINH at RD7_bit;
sbit buzzer at RC0_bit;
sbit relay at RC5_bit;
sbit motor0 at RB0_bit;
sbitmotorenable at RB1_bit;
// Pin direction
sbitLCD_RS_Direction at TRISB7_bit;
sbitLCD_EN_Direction at TRISB6_bit;
sbit LCD_D7_Direction at TRISB4_bit;
sbit LCD_D6_Direction at TRISB3_bit;
sbit LCD_D5_Direction at TRISB5_bit;
sbit LCD_D4_Direction at TRISB2_bit;

char output[7];
char text1[]="Accidental";
char text2[]="Awareness";
char text3[]="Velocity";
char text4[]="KM/sec";
char text5[]="Vehcile Distance";
char text6[]="Inches";
char text7[]="Stopped";
char text8[]="Tire-Pressure";
char text9[]="Pounds";
char text10[]="Normal";
char text11[]="Low";

unsigned char loopvalue=0;
unsignedint temp=0;
unsigned char pressuredigit[5]={0,0,0,0,0};
unsigned char tireno=49;
unsigned char tire=0;
```

```
unsigned short warningtrie=0;
unsigned char rec=0;
unsigned char threedigitunit[3]={0,0,0};
unsigned char rec2=0;



void main() {
 TRISB=0;
 TRISD.F0=0;
 TRISD.F1=0;
 TRISC.F3=0;
 TRISD.F4=0;
 TRISD.F5=0;
 TRISD.F6=0;
 TRISD.F7=0;
 TRISC.F6=0;
 TRISC.F7=1;
 TRISC.F0=0;
 TRISC.F5=0;
 TRISB.F0=0;
TRISB.F1=0;
TRISC.F1=0;  //sonar signal trigger
TRISC.F2=0;  //Motor Speed 1
TRISA=0xFF;

 LED1=1;
 LED2=1;
speedrelay=0;
 MUXA=0;
 MUXB=0;
 MUXC=0;
 MUXINH=0;
buzzer=0;
relay=1;
 motor0=0;
motorenable=1;

Lcd_Init();
Lcd_Cmd(_LCD_CLEAR);              // Clear display
Lcd_Cmd(_LCD_CURSOR_OFF);         // Cursor off
Lcd_Out(1,1,text1);               // Write text in first row
Lcd_Out(2,1,text2);
delay_ms(2000);
UART1_Init(9600);
PWM1_Init(1250);
PWM1_Set_Duty(150);
PWM1_Start();
//ADC_Init();
while(1){
if(loopvalue==0){
MUXA=0;
if (UART1_Data_Ready() == 1) {         // if data is received
```

```
rec = UART1_Read();
UART1_Write(rec);
//digitsconversion();
//calculation
{
if(rec<10){
threedigitunit[0]=0;
threedigitunit[1]=0;
threedigitunit[2]=rec;
}
if(rec>=10 && rec<100){
threedigitunit[0]=0;
threedigitunit[1]=rec/10;
threedigitunit[2]=rec%10;
}
if(rec>=100){
threedigitunit[0]=rec/100;
threedigitunit[1]=(rec%100)/10;
threedigitunit[2]=(rec%100)/10%10;
}
}
//calculation end
Lcd_Cmd(_LCD_CLEAR);              // Clear display
Lcd_Out(1,1,text3);
//Lcd_Out(2,1,threedigitunit);
Lcd_Chr(2,1,threedigitunit[0]+48);
Lcd_Chr(2,2,threedigitunit[1]+48);
Lcd_Chr(2,3,threedigitunit[2]+48);
Lcd_Out(2,7,text4);
//UART1_Write_Text(rec);
//RT1_Write_Text(text3);
delay_ms(500);
loopvalue++;
}

} //condition 1 end

  //condition 2 starts
if(loopvalue==1){
MUXA=1;
if (UART1_Data_Ready() == 1) {         // if data is received
rec2 = UART1_Read();
UART1_Write(rec2);
//emergency condition
{
if(rec2<50 && rec2>25)
LED1=0;
if(rec2<20){
LED2=0;
buzzer=1;
speedrelay=1;
}
else {
```

```
LED2=1;
LED1=1;
speedrelay=0;
}
} // emergeryconditon end

//calculation
{
if(rec2<10){
threedigitunit[0]=0;
threedigitunit[1]=0;
threedigitunit[2]=rec2;
}
if(rec2>=10 && rec2<100){
threedigitunit[0]=0;
threedigitunit[1]=rec2/10;
threedigitunit[2]=rec2%10;
}
if(rec2>=100){
threedigitunit[0]=rec2/100;
threedigitunit[1]=(rec2%100)/10;
threedigitunit[2]=(rec2%100)/10%10;
}
}
//calculation end
Lcd_Cmd(_LCD_CLEAR);            // Clear display
Lcd_Out(1,1,text5);
//Lcd_Out(2,1,threedigitunit);
Lcd_Chr(2,1,threedigitunit[0]+48);
Lcd_Chr(2,2,threedigitunit[1]+48);
Lcd_Chr(2,3,threedigitunit[2]+48);
Lcd_Out(2,7,text6);
//UART1_Write_Text(output);
//UART1_Write_Text(text3);
delay_ms(500);
loopvalue++;
}
}   //condition 2 ends

//condition 3 starts
if(loopvalue==2){

for(tire=0;tire<1;tire++)
{temp = ADC_Read(tire);
temp=(temp*48)+896;
pressuredigit[0]=(temp/10000)+48;
pressuredigit[1]=((temp%10000)/1000)+48;
pressuredigit[2]=46;
pressuredigit[3]=(((temp%10000)%1000)/100)+48;
pressuredigit[4]=(((temp%10000)%1000)%100)+48;

Lcd_Cmd(_LCD_CLEAR);
Lcd_Out(1,1,text8);
```

```
tireno=48+tire;
Lcd_Chr(1,17,tireno);
Lcd_Chr(2,1,pressuredigit[0]);
Lcd_Chr(2,2,pressuredigit[1]);
Lcd_Chr(2,3,pressuredigit[2]);
Lcd_Chr(2,4,pressuredigit[3]);
Lcd_Chr(2,5,pressuredigit[4]);
Lcd_Out(2,8,text9);
if(temp>=0){
Lcd_out(2,15,text11);
//Buzzer=1;
//LED1=0;
//LED2=0;

}
else {
Lcd_out(2,15,text10);
Buzzer=0;
LED1=1;
LED2=1;
}
delay_ms(500);
}
loopvalue=0;
Buzzer=0;
LED1=1;
LED2=1;

} //condition 3 end

} //while end

 } //Main end
```

Appendix B

Speed Controller Code

```
intcnt = 0;
void interrupt(){         // Interrupt rutine
if(INTCON.INTF == 1 ){
cnt++;              // Increment variable cnt
   INTCON.INTF = 0;      // Clear Interrupt Flag
  }
}

void main() {
  TRISB.B0=1;
  TRISB.B2=0;
  TRISB.B4=0;
  PORTB.B4=1;
  TRISB.B7=0;
  PORTB.B7=1;

  UART1_Init(9600);            // Initialize UART module at 9600 bps
Delay_ms(100);                // Wait for UART module to stabilize
   INTCON = 0x90;          // Interrupt flags:
                         //Enable Global Interrupt
                         //Enable External Interrupt

while(1){

      PORTB.B4=~PORTB.B4;
Delay_ms(990);
      UART1_Write(cnt);
cnt=0;
      }
```

Appendix C

SONAR Controller Code

```
sbit LED at RB4_bit;
sbit trig at RB5_bit;
sbit echo at RB3_bit;
void main ()
{
int width;
int range;
range=300;
 //TRISA=0x08;
 //TRISB=0x00;
 TRISB.B4=0;
 TRISB.B5=0;
 TRISB.B3=1;
 LED=1;
 UART1_Init(9600);
 Loop:
trig=0;
width=0;
range=0;
trig=1;    //send pulse with a 20us width
delay_us(20);
trig=0;
while (echo==0)  //wait until an echo is received
 {
 }
while (echo==1) //calculate the width of the echo received
 {
delay_us(10);
width++;
 }
range=(width*10)/58; //calculate range
 UART1_Write(range);
if (range<50)      //if range less than 100m turn on LED
 {
 LED=0;
delay_ms(200);
 }
 LED=1;
delay_ms(100);
 UART1_Write(range);
goto Loop;
}
```

Appendix D

Project Timeline

Status	Work Description
Complete	System design
Complete	Equipment purchase
Complete	Automatic Tyre pressure indicator Module
Complete	Low-Speed Following Mode (LSM) Module
Complete	Lane Keeping Assist (LKA) Module
Complete	Intelligent Night Vision (INV) Module
Complete	Integration with Hardware

Appendix E

Project Proposal

Extended Title: Car Accident Prevention and Warning System for Drivers.
Brief Description of The Project / Thesis with Salient Specs: Trying to balance out between the vehicle speed limit and the protection of driver, the safety mechanism is continuously evolving with improvement in the performance of new vehicle. In view a multi sensor automatic car accident prevention and warning system is proposed. This will be achieved using data feeds from a number of auxiliary sensors and the result will be displayed on the LCD one by one after the programmed delay to assist in viewing of the driver. This will be accompanied by a series of LED's and alarms to warn the driver of the unwanted situation.
Scope of Work: The project is based on the following four systems: • Automatic Tyre pressure indicator Module • Low-Speed Following Mode (LSM) Module • Lane Keeping Assist (LKA) Module • Intelligent Night Vision (INV) Module
Academic Objectives: • Practical applications of microcontrollers • Pressure sensors, sonar sensors working • Integrating/Interfacing different electric circuits
Application / End Goal Objectives: • Can be installed in private cars and vehicles to prevent accidents. • Military vehicles can be installed with this system while moving in convoys to prevent crash. • Military tanks and heavy vehicles can also be equipped with this

system to move in dark and bad weather conditions.
Previous Work Done on The Subject: • Night vision capability
Material Resources Required: The following equipment is required for this project design: • L298 IC • PIC 16f628A IC • PIC 16F877A IC • Display LM7805 • Display LM7812 • MAX232 • IC 4053 2:1 *3 MUX • Sonar Sensor • Speed Relay • Buzzer • LEDs • Motor
No of Students Required: 3
Special Skills Required: • Microcontroller programming • Image processing • Hardware integration through com port

Approval Status: Recommended
Supervisor Name & Signature:

Lt Col Dr Adil Masood Siddiqui

Assigned to: Capt Waqar Ahmad
Capt Usman Jamil
Capt Jibran Danish
BETE-47

Appendix F

PIC 16F877A IC Data Sheet

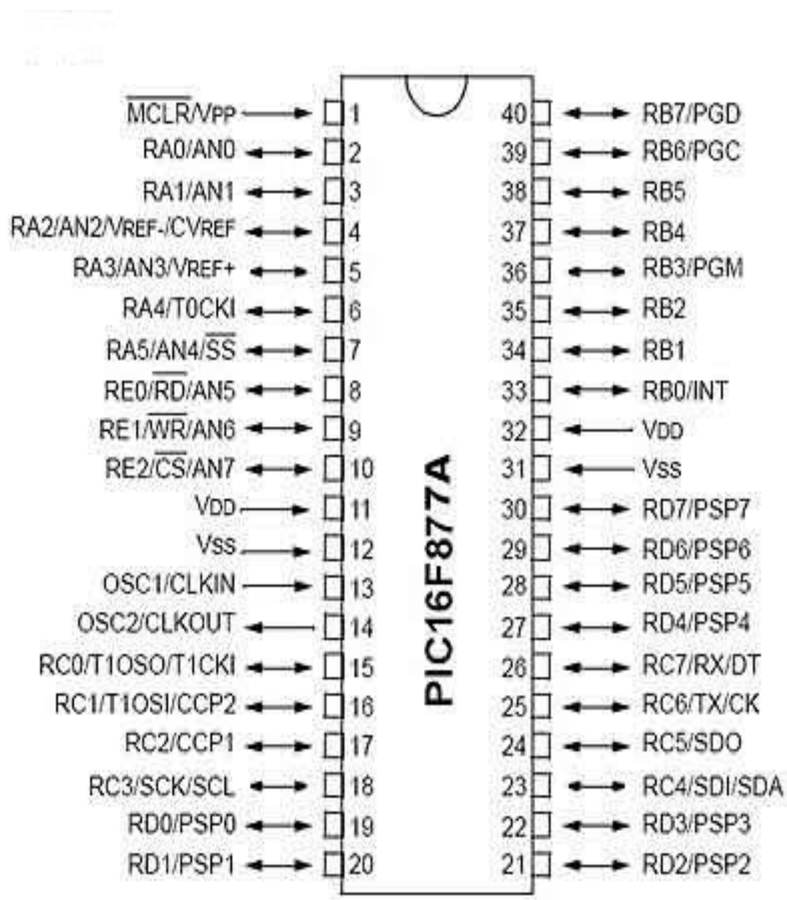

Figure 17: PIC 16F877A IC

Appendix G

PIC 16F628A Datasheet

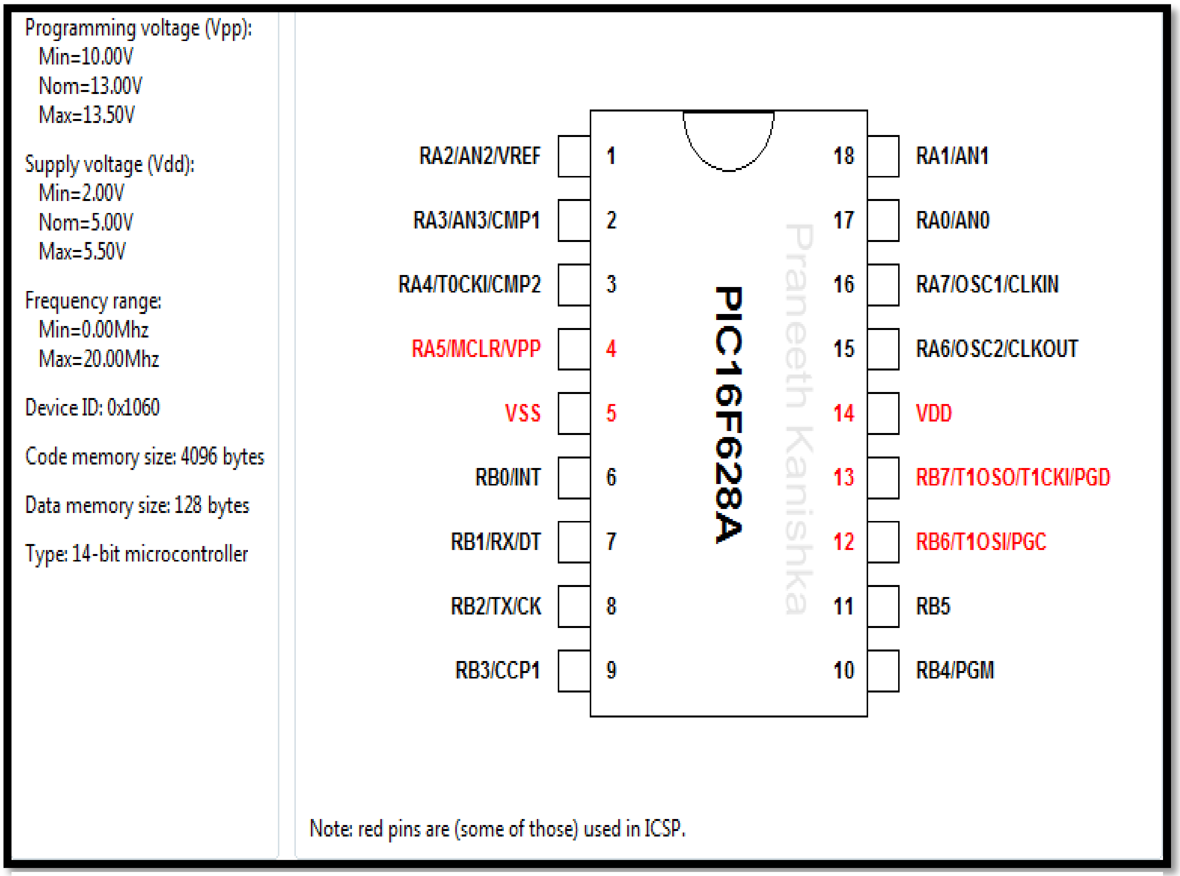

Figure 18: PIC 16F628A IC

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