International Journal of Application or Innovation in Engineering & Management (IJAIEM)
Web Site: www.ijaiem.org Email: editor@ijaiem.org
Volume 6, Issue 3, March 2017 **ISSN 2319 - 4847**

REVIEW PAPER BASED ON MONITORING CONDITIONS OF VEHICLE AND AVOID ACCIDENT BY USING"CAN"

DevkuleAbhijeet.G[1], Honrao S.B[2]

[1](Student,Department of Electronics & Telecommunication Engineering, AdityaEngineering College, Beed, Maharashtra, India)

[2](Lecturer,Department of Electronics & Telecommunication Engineering, Aditya Engineering College, Beed, Maharashtra, India)

ABSTRACT

Advancement in CAN technologies for faster communication make the system completely reliable ,safe, and stable and it attains the expected results of real time analysis of data very effectively to provide a safer drive The Controller Area Network (CAN) protocol has been the main focus of automotive security studies ,and it has no direct support for security projection. Hoppe et al. demonstrated that the operations of electric window lifts, warning lights, and airbag control systems may be affected through the CAN protocol. A collision avoidance system is a system of sensors that is placed within a car to warn its driver of any dangers that may lie ahead on the road. Some of the dangers that these sensors can pick upon include how close the car is to other car surrounding it, how much its speed needs to be reduced while going around a curve, and how close the car is to going off the road.

KEYWORDS : CAN, Automobile, Embedded system, sensor, GPS, GSM.

1.INTRODUCTION

Safety and comfort are essential things during the design of an automobile.Vehicles are increasing ,accidents are increasing .Therefore manufacturers require a monitoring system in vehicle that helps to avoid accidents .Accident avoidance system is to reduce the chances of collision and continuous monitoring of health of driver and also vehicle condition.Accidents occurs mostly due to drivers'scarelessness and also cases of drunken driving.

1.1CAN

Up until now, we've considered our embedded control system to be self-contained: an algorithm implemented in software resident on a single microprocessor, communicating with its environment through sensors and actuators via peripheral devices such as an analog-to-digital converter. In fact, many embedded systems are distributed, consisting of multiple microprocessors communicating over one or more networks to accomplish shared tasks. For example, a modern automobile may have seventy or more microprocessors communicating over several networks to man entertainment and navigation functions, central locking mechanisms, lighting and other vehicle systems. Safety systems such as air bags employ dedicated high speed network communication, as does power train control for communication between, for example, the engine and transmissioncontrollers. Figure 1 illustrates some of the networks connecting automotive embedded systems[1, 2]. Although we will consider only wired networks, "wireless" is clearly a crucial technology for everything from assisted living to national defense [4], and wireless networking is a growing area of importance to the twenty-first century automobile. Applications include toll collection, fleet vehicle management, stolen vehicle tracking, automatic collision notification and remote diagnostics. One may expect that the confluence of in-vehicle and external communication technologies will lead to new information, entertainment and safety services such as the in-vehicle display of roadway emergency warnings or even active mitigation of collisions at intersections and vehicle-to-vehicle cooperation for improvement of safety and traffic flow [3].The Controller Area Network was developed by Robert Bosch GmbH for automotive applications in the early 1980s and publicly released in 1986. The Bosch CAN specification became an ISO standard (ISO 11898) in1993 (CAN 2.0A), and extended in 1995 to permit longer device identifiers (CAN 2.0B) [5]. Typically, CANinterconnects a network of modules (or nodes) using two wire, twisted pair cable. Many companies implementCAN devices. In the Freescale MPC 5xx series of processors, the CAN device is called the TouCAN module;in the MPC 55xx

series it's called FlexCAN. CAN is a serial, multimaster, multicast protocol, which meansthat when the bus is free, any node can send a message (multimaster), and all nodes may receive and act onthe message (multicast). The node that initiates the message is called the transmitter; any node not sendinga message is called a receiver. Messages are assigned static priorities, and a transmitting node will remaina transmitter until the bus becomes idle or until it is superseded by a node with a higher priority messagethrough a process called arbitration. A CAN message may contain up to 8 bytes of data. A message identifierdescribes the data content and is used by receiving nodes to determine the destination on the network. Bitrates up to 1 Mbit/s are possible in short networks (_ 40 m). Longer network distances reduce the available bit rate (125 kbit/s at 500 m, for example). "High speed" CAN is considered to be 500 kbit/s.

2.SYSTEM REQUIREMENT

To obtain the desired results we require a system which is reliable ,secure and also efficient .The system require compact package of hardware and software .it must fulfill the necessary qualities such as real time continuous monitoring and exact statistic series**.**

2.1 HARDWARE ARCHITECTURE

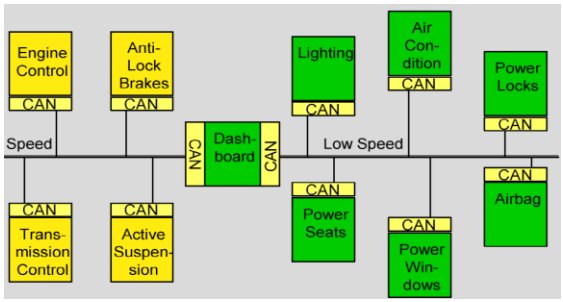

Fig.2.1 CAN BUS

2.1.1 ARM7 TDMI-S

The ARM7TDMI-S processor is a member of the ARM family of general-purpose 32-bit microprocessors. The ARM family offers high performance for very low-powerconsumption and gate count. The ARM architecture is based on Reduced Instruction Set Computer(RISC)principles.The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer(CISC) designs. This simplicity gives:• a high instruction throughput• an excellent real-time interrupt response• a small, cost-effective, processor macro cell The ARM7TDMI-S processor has two instruction sets:• the 32-bit ARM instruction set• the 16-bit Thumb instruction set. The ARM7TDMI-S processor is an implementation of the ARM architecture v4T. For

full details of both the ARM and Thumb instruction sets, see the ARM Architecture Reference Manual.

Microprocessor architectures traditionally had the same width for instructions and data. Therefore, 32-bit architectures had higher performance manipulating 32-bit data and could address a large address space much more efficiently than 16-bit architectures.16-bit architectures typically had higher code density than 32-bit architectures, and greater than half the performance. Thumb implements a 16-bit instruction set on a 32-bit architecture to provide:

higher performance than a 16-bit architecture• higher code density than a 32-bit architecture. The Thumb instruction set is a subset of the most commonly used 32-bit ARM instructions. Thumb instructions are each 16 bits long, and have a corresponding 32-bitARM instruction that has the same effect on the processor model. Thumb instructions operate with the standard ARM register configuration, allowing excellent

interoperability between ARM and Thumb states .On execution, 16-bit Thumb instructions are transparently decompressed to full 32-bitARM instructions in real time, without performance loss.

Thumb has all the advantages of a 32-bit core:• 32-bit address space• 32-bit registers• 32-bit shifter and Arithmetic Logic Unit(ALU)• 32-bit memory transfer .Thumb therefore offers a long branch range, powerful arithmetic operations, and a large address space.

Fig2.1.1 .ARM7 LPC2148

2.1.2 SENSORS

2.1.2.1 VIBRATION SENSORS

This basic piezo sensor can be used in anti-theft devices, electronic locks, mechanical equipmentvibration detection, sound gesture application and detection range bull's-eye counts vibration sensoroccasions. These vibration levels could be given to any controller/processor and necessary decisions could be taken through it. Module triple output mode, digital output simple, analog output more accurate, serial output with exact[6]

Readings.Sensitivity adjustable. The vibration detection has no direction. With analog, digital and TTL level output signal .With mounting holes, firmware installation flexible and convenient. Module triple output mode, digital output is simple, analog output more accurate, serial output with exact readings. Applications ,Vibration analysisShock detection and event capture Condition monitoring[6]

Fig2.1.2.1. Vibration sensor

2.1.2.2 ULTRASONIC SENSORS

Ultrasonic sensors from SICK perform measurement and detection in a wide variety of application areas on colored, shiny, or transparent surfaces, which are particularly challenging for optical sensors. Even adverse ambient conditions such as dust, dirt, or fog hardly affect the measurement result. The broad detection range also allows

a large field to be monitored with only one sensor 1. Maximum reliability thanks to the advanced and intelligent analysis of measurement values 2. Temperature compensation right on the active sensor surface for more precise measurement results 3.Exceptionally simple synchronization and multiplexingfor maximum reliability, even when using multiple sensors 4. Simple and reliable solution for virtually any applicationusing the “Distance to object”, “Window” ,or “Object between sensor and background”switching modes 5. Solution for complex applications thanks to theavailability of filter settings which can be adjusted to suit individual applications

Fig2.1.2.2. Ultrasonic sensor

Ultrasonic specifications

Operating range

For the complete temperature range, measured object ≥ 20x20mm0 … 800mmAdjustment range 0 … 800mm in stepsUltrasonic frequency 300kHzTyp. opening angle see diagramsTemperature drift ± 0.17%/K, see remarks

TimingSwitching frequency max. 250HzDelay before start-up 2ms

Electrical dataOperating voltage UB 20 … 30V DC (incl. ± 10% residual ripple)Residual ripple ± 10% of UBBias current receiver ≤ 25mA, transmitter ≤ 35mASwitching output 1 PNP and 1 NPN transistorFunction characteristics object detectedOutput current max. 150mASwitch positions IndicatorsGreen LED readyYellow LED object detected

Mechanical dataHousing metalWeight 70g eachConnection type M12 connector, 5-pin (turning)Environmental dataAmbient temp. (operation/storage) 0°C … +70°C/-40°C … +85°C

Protective circuit 2) 1=short-circuit and overload protection, 2=polarity reversal protection (not for analogue inputs), 3=wire break andinductive protection1, 2, 3VDE safety class IIIProtection class IP 67Standards applied IEC 60947-5-2

2.1.2.3 HEART BEAT SENSORS

Fig2.1.2.3. Heart beat sensor

This heart beat sensor is designed to give digital output of heart beat when a finger is placed on it[6]. When the heartbeat detector is working, the top-most LED flashes with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse. Module dual output mode, digital output is simple, serial output with exact readings .Features1.Heart beat indication by led.2. Compact size.3.Total heart beat count can be obtained serially(TTL) every minute.4. Instant output digital signal for directly connecting to microcontroller.5. Module dual output mode, digital output is simple, serial output with exact readings.Applications1. Digital heart rate monitor.2.Bio-feedback control of robotics and applications exercise machines.Specifications Parameter Value Operating Voltage +5v dc regulated Operating current 100mAHeart beat detect Indicated by high active pulseConnect regulated DC power supply of 5 Volts. Black wire is Ground, Nextmiddle wire is Brown which is output and Red wire is positive supply. Place the finger on the

marked position, and you can view the beat LEDblinking on each heart beat.The output is active high for each beat and can be given directly tomicrocontroller for interfacing applications.

2.1.2.4 ALCOHOL DETECTION SENSORS

Drowsiness of driver can causes mishap evasion that can be reason of death .MQ3 sensor with breath analyser is used here to check the liquor level Sensitive material of MQ-3gas sensor is SnO2, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity gets higher along with the gas concentration rising. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit. MQ-3gas sensor has high sensitivity to alcohol gas and can resistant to the interference of gasoline, smoke and vapour. It is with low cost and suitable for various applications of detecting alcohol at different concentration[7].

Fig 2.1.2.4.MQ3 Alcohol detection sensor

2.1.2.4 IR SENSORS

IR sensor emits to observe surrounding aspects .It is used for obstacle detection.An IR sensor measure the heat of object and detects the motion as well.An infrared sensor is an electronic device, that emits inorder to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well asdetects the motion.These types of sensors measuresonly infrared radiation, rather than emitting it that iscalled as a passive IR sensor. Usually in the infraredspectrum, all the objects radiate some form of thermalradiations. These types of radiations are invisible toour eyes, that can be detected by an infraredsensor.The emitter is simply an IR LED (LightEmitting Diode) and the detector is simply an IRphotodiode which is sensitive to IR light of the samewavelength as that emitted by the IR LED. When IRlight falls on the photodiode, Theresistances and theseoutput voltages, change in proportion to the magnitudeof the IR light received.

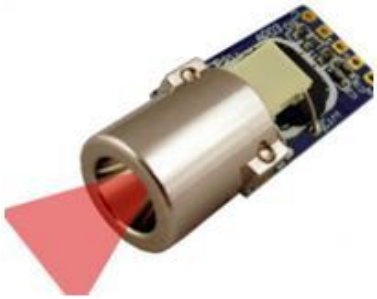

Fig2.1.2.4: IR Sensor

An infrared sensor circuit is one of the basic and popular sensor module in an electronic device. Thissensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one ofthe common applications in real time.This circuit comprises of the following components- LM358 IC 2 IR transmitter and receiver pair-Resistors of the range of kilo ohms.-Variable resistors.- LED (Light Emitting Diode).In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to bereceived by an IR receiver module. An IR output terminal of the receiver varies depending upon itsreceiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to acomparator circuit. Here an operational amplifier (opamp) of LM 339 is used as comparator circuit.When the IR receiver does not receive a signal, the potential at the inverting input goes higher than thatnon-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but theLED does not glow. When the IR receiver module receives signal to the potential at the inverting inputgoes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1(100), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively.

Resistor VR2 (preset=5k) is used toadjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram.

3.STATEMENT OF PROBLEM

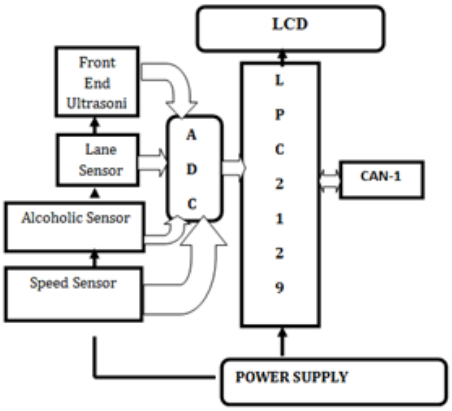

Fig3: Block diagram

In this project we aim at Designing of CAN based Accident avoidance system using two PhilipsLPC2129 32 bit microcontroller which is havingARM7TDMI processor with many onboard interfaceslike memory, LCD, I/O , CAN controller, serial port,I2C interface, UART, 10 bit ADC, and standardJTAG interface. These two microcontroller are connected by CAN bus The system uses sensors that send and receive signals from things like other cars; obstacles in the road, traffic lights, and even a central database are placed within the car and tell it of any weather or traffic precautions. A situation that provides a good example of how the system works is when a driver is about to change lanes, and there is a car in his blind spot. The sensors will detect that car and inform the driver before he starts turning, preventing him

3.1 DC MOTAR

DC motors are configured in many types and sizes, including brush less, servo, and gear motor types. Amotor consists of a rotor and a permanent magnetic field stator. The magnetic field is maintained usingeither permanent magnets or electromagnetic windings. DC motors are most commonly used invariable speed and torque .Motion and controls cover a wide range of components that in some way are used to generate and/or control motion. Areas within this category include bearings and bushings, clutches and brakes, controls and drives,drive components, encoders and resolves, Integrated motion control, limit switches, linear actuators, linear and rotary motion components, linear position sensing ,motors (both AC and DC motors), orientation position sensing, pneumatics and pneumatic components, positioning stages, slides and guides, power transmission (mechanical), seals, slip rings, solenoids ,springs .Motors are the devices that provide the actual speed and torque in a drive system. This family includes AC motor types (single and multiphase motors, universal

4.SOFT WARE DESIGN TOOLS

4.1KEIL SOFTWARE

Keil compiler is software used where the machinelanguage code is written and compiled. Aftercompilation, the machine source code is converted intohex code which is to be dumped into themicrocontroller for further processing. Keilcompileralso supports C language code.

4.2PROLOAD

Proload is software which accepts only hex files. Oncethe machine code is converted into hex code, that hexcode has to be dumped into the microcontroller placedin the programmer kit and this is done by the Proload.

Programmer kit contains a microcontroller on it otherthan the one which is to be programmed. Thismicrocontroller has a program in it written in such away that it accepts the hex file from the keil compilerand dumps this hex file into the microcontroller whichis to be programmed. As this programmer kit requirespower supply to be operated, this power supply isgiven from the power supply circuit designed above. Itshould be noted that this programmer kit contains apower supply section in the board itself but in order toswitch on that power supply, a source is required. Thusthis is accomplished from the power supply board withan output of 12volts or from an adapter connected to230 V AC.

5.CONCLUSION

This project Monitoring conditions of Vehicle and Avoid Accident by Using "CAN"is intended for secure and smooth journey. The car/ vehicle itself is aware of its movement. If the driver himself is not concentrating on driving or any other parameters, which may cause damage to vehicle as well a life, this intelligent car/vehicle warn the driver regarding the danger ahead. As the value of a human life is countless times more than the cost of this project, we are proud to be behind the success of this project

References

[1] NicolasNavet, Yeqiong Song, Fran¸coiseSimonot-Lion, and C´edricWilwert, "Trends in Automotive Communication Systems," Proceedings of the IEEE, Vol. 93, NO. 6, June 2005 Page(s):1204 – 1223
[2] GabrielLeen and Donal Heffernan, "Expanding Automotive Electronic Systems," IEEE Computer Volume 35, Issue 1, Jan. 2002 Page(s):88 – 93
[3] Jeffrey Cook, IlyaKolmanovsky, David McNamara, Edward Nelson and K. Venkatesh Prasad, "Control, Computing and Communications: Technologies for the Twenty-first Century Model T," Proceedings of the IEEE, February 2007.
[4] J.M. Eklund, J. Sprinkle, S. Sastry and T.R. Hansen, "Information Technology for Assisted Living at Home: building a wireless infrastructure for assisted living,"IEEE-EMBS 2005 27th Annual International Conference of the Engineering in Medicine and Biology Society, Sept. 2005 page(s): 3931- 3934.
[5] CAN in Automation Website, http://www.can-cia.org, viewed September 2006.
[6] WWW.researchdesignlab.com
[7] www.winsensor.com