GSM BASED VEHICLE CONTROL SYSTEM USING "CAN" PROTOCOL

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Abstract – In recent years the Automobile sector is mainly focused on safety and comfort. The drawbacks in the existing vehicle (Four wheel Drive) control are tried to overcome in this project .The safety controls implemented in this project are Human body sense during auto window sliding, Obstacle detection while parking vehicle in both front and rear side of vehicle, Impact detection in case of accident , Z axis movement detection , Fire detection . In addition to these controls the driver-vehicle interfaces implemented here are digital fuel level measurement, Digital speedo meter, Auto head lamp ON-OFF system. LCD (Liquid crystal display) is used to display obstacle distance, Fuel level & Speed. The system uses ARM controller and ADC to bring all data in digital format .The Master & slave communication between two controller are developed via Controller area network (CAN) The System is having GSM (Global system for mobile communication) modem , which will help to communicate to or from remote location in case of any emergency. The system uses µcos-II operating system. This operating system enhances performance of control and simplifies the design and management software.

Index Terms - CAN Controller area network, GSM (Global system for mobile communication), PIR: Proximity infrared

I. INTRODUCTION

Modern change in technology have great impact on vehicle control system development. Proposed vehicle system gives various type of intelligence to assist driver. Existing system have Analog scale to measure parameter but here we can measure fuel level, speed of vehicle & obstacle distance in digital scale.

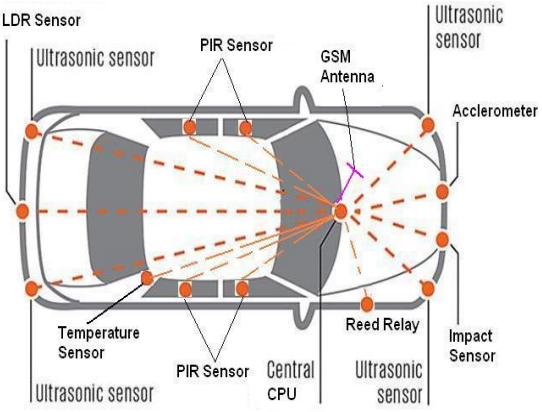

Fig 1: Vehicle with sensor network

In order to achieve high speed and secure data transmission CAN network is used among controllers. This information is given to central CPU via CAN. Fuel level, Obstacle measurement is carried by ultrasonic principle. Impact sensor gets activated in case of accident. Z axis movement is required as safety control if vehicle lifted on crane. PIR sensor is used to detect human body interface for motorized mirror. Reed relay is used for speed measurement. This speed can be governed by central CPU. LDR sensor used to turn ON / OFF

head lamps according to light condition. ON-OFF of Head lamp is required because most of time Driver of vehicle forgot to switch off the Head lamp when vehicle comes out from tunnel or from dark to light condition.

II. LITRETURE REVIEW STAGE

A deep and profound literature survey is backbone of any successful project. Extensively search has been carried out for past and related work in this field. Internet tool is used as source of information for carrying out this literature survey

(1) "Vehicle control system implementation Using CAN protocol" By S. Vijayalakshmi IJAREEIE Vol. 2, Issue 6, June 2013

The various sensor interfaced are, IR (Infrared) based device for obstacle detection, Temperature measurement, Pressure measurement, Fuel level measurement. Here CAN bus is used to for communication between master slave controllers. Fuel indication is shown as High, Low fashion.

(2) "Design of the Smart Vehicle Control System based

On ARM and μC/OS-II". By Chunru Xiong and Jufang Hu IEEE2012

This paper describes implemented modules such as Voice recognition and playback module, Ultrasonic obstacle avoidance module. This system uses ARM7 controller with μC.OS-II enhances the performance of control and simplifies the design and management of software.

(3) "Real Time Generator Fuel level Measurement Meter Embedded with Ultrasound Sensor and Data Acquisition System" joace Vol. 1, No. 4, December 2013

This paper describes real time fuel level measurement from Generator tank using ultrasonic principle.

(4) "CAN based real time implementation in automobile using ARM" By Mr. Vijay Bhamrae & Mar. Chirinjeevi. International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 2, Issue 3, March 2013

This paper describes monitoring parameter such as temperature, humidity

III. PROPOSED SYSTEM

By considering drawbacks & strength of literature survey the proposed Vehicle system is as

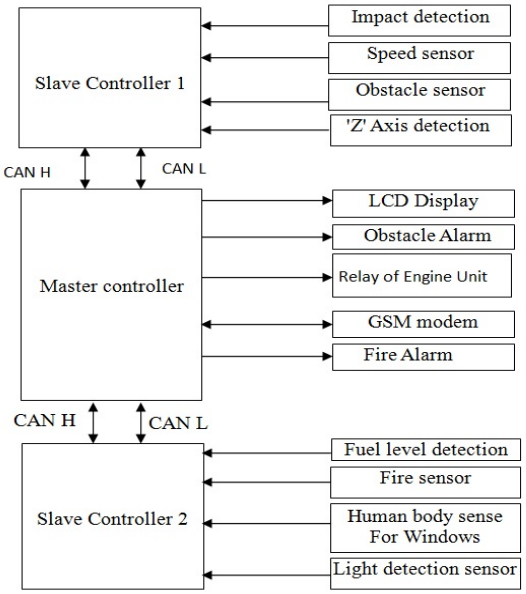

Fig 2: "Block Diagram of GSM Vehicle control system"

Block diagram of CAN vehicle control system is shown in Fig 2. It consists of one master node and two slave nodes. ARM controller act as the master controller, which controls the vehicle status with various sensors. Two ARM ICs are used as slave nodes to receive the inputs of vehicle status. The communication between these sensors is done by using CAN controller. Slave controller receives the signals from vehicles like temperature, fuel level, and obstacles .GSM is interfaced with master controller. Master controls the status of vehicle and sends the feedback to operator panel by providing digital information's via LCD display and alarms. Here Operator interface is digital type. By this operator can easily see the signals and able to control the vehicle. Obstacle sensor helps in identifying the obstacles presence around the vehicle. Vibration sensor detects external force (Hit by other vehicle or medium etc.,) and sends the signal to GSM. GSM will send the message to the owner of the vehicle. By GSM modem we can establish communication to or from vehicle. Human body sense for windows of vehicle is detected by PIR sensor.

A) Fuel Level detection : For Fuel level & obstacle ultrasonic sensor is used HC-SR04.

Digitized scale of fuel level, Maximum distance

The operating principle as shown in diagram covered by vehicle with existing fuel, obstacle distance are displayed on LCD display of vehicle

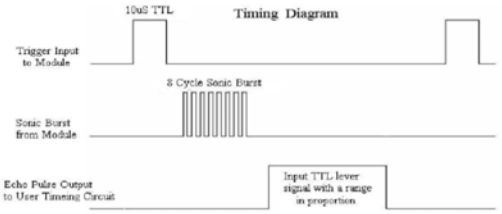

Fig 3: "Tx and Rx wave form of HC-Hr 04"

Distance can be calculated as time between sending trigger and receiving echo.

Distance: microsecond / 58 Unit: centimeter.

B) Human Body Sense :

For Human body PIR (Proximity infrared sensor) HC- SR501 sensor used. Which gives high output when object is in 7 meter distance range. This sensor arrangement is required to detect human body in a window of vehicle.

The angle of detection 120 degree and disctence covered upto 7 meter

Human body present	TTL out put
Yes	3.3V
No	0V

Fire sensor:

For detection of temperature Texas make LM35 is used. This IC has temperature detection range is typically -50 to +150 degree. Typical application is as

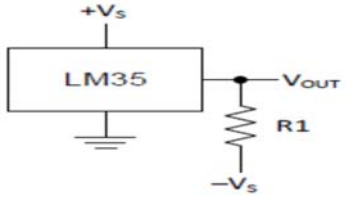

Fig 4: "LM35 Reference Diagram for Full range"

Vs is kept at zero potential. Since we do not required to measure –ve temperature.

LM35 has scale factor of 10mV/degree Centigrade.

C) Z axis measurement :

For Z axis measurement IC is ADXL335 is used.

The accelerometer can measure the static acceleration of gravity in tilt-sensing applications as well as dynamic acceleration resulting from motion, shock, or vibration

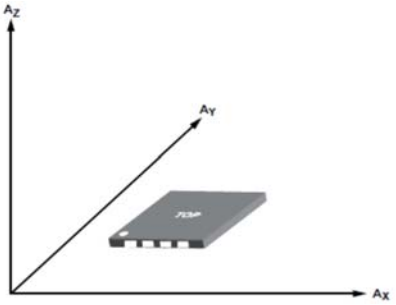

Fig 5: "ADXL335 three axis measurement "

The ADXL have an adjustment in band limiting at XOUT, YOUT, and ZOUT pins. Capacitors are required to add at these pins to implement low-pass filtering for antialiasing and noise reduction. The equation for the 3 dB bandwidth is

$$F_{-3\ dB} = 1/(2\pi(32\ k\Omega) \times C(X, Y, Z))$$

It can be simplified as

$$F_{-3\ dB} = 5\ \mu F/C(X, Y, Z)$$

Filter capacitor selection as

Bandwidth (Hz)	Capacitor (µF)
1	4.7
10	0.47
50	0.10
100	0.05
200	0.027
500	0.01

D) GSM Modem: SIM 900 can be used for communicating remote location in case of emergency situation of vehicle or monitoring vehicle parameter such as fuel level.

E) Software flow chart for vehicle control using µC/OS-II

There are various advantage of µC/OS-II as it has Primitive, multitasking kernel, source code

portability, OS can manage up to 64 tasks. The overall system program structure is as shown below.

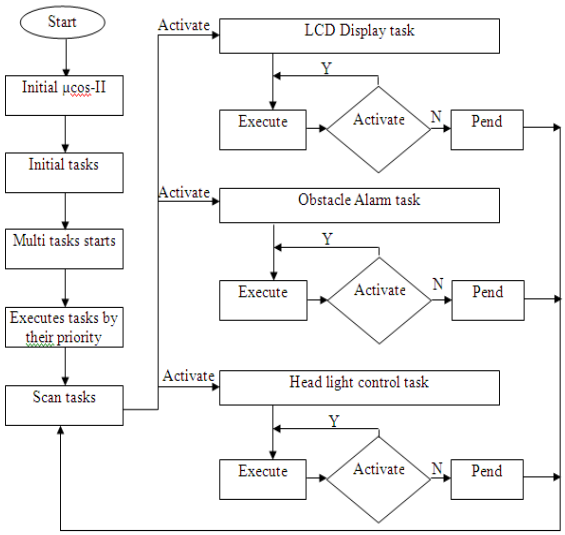

Fig 6: "Software Flow chart"

IV WORKING MODEL AND TEST RESULT

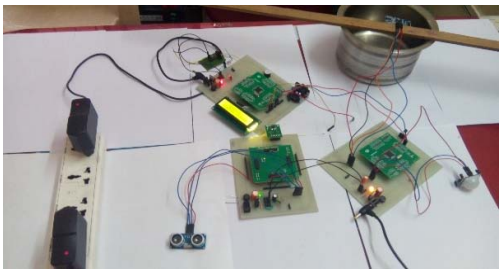

Fig 7: "Compete setup of one Master & two slave PC2129"

Fig 8: Ultronic sensor setup

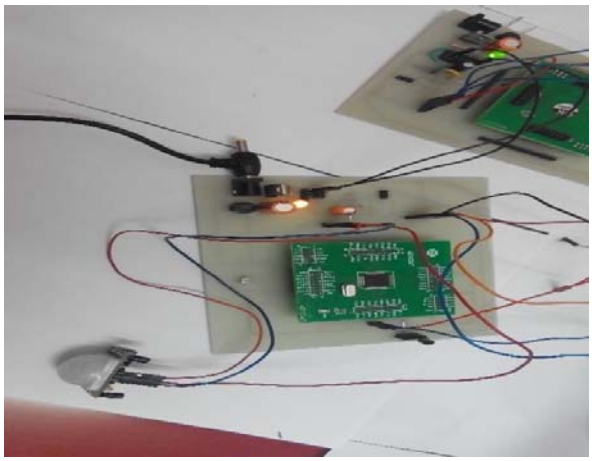

Fig 9: PIR sensor setup

V TEST RESULT

Fig 10: Message Displayed during boot up

Fig 10: Obstacle detection Message. Obstacle at 2 meter.

Fig 9: Vehicle temperature measured as 30 Degree Celsius

VI CONCLUSION

The presented project gives, use of modem technology as for resolving the vehicle related problem to achieve safety and comfort drive. Use of high speed CAN, made the design robust to noise. Because of modular structure of software we can plug the additional sensor with minimum changes in operating system.

VII ACKNOWLEDGMENT

I would like to acknowledge all the people who have been of the help and assist me throughout my analysis of project work. It gives me a great pleasure in bringing out the project work entitled, "GSM BASED VEHICLE CONTROL SYSTEM USING CAN PROTOCOL". It is observed outcome of the exciting work, done under the inspiring guidance of my guide Dr.P.K.Srivastava.

VIII REFERENCES

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