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VEHICLE SPEED MONITORING AND CONTROL USING CAN PROTOCOL

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Abstract - *Today's automation industry are hugely dependent on electrical parts for efficient operation and growth of automobiles. Previously analog driver-vehicle interface was used for indicating fuel level, engine temperature, speed etc., in vehicles but this project focused on the digital driver-vehicle interface implementation by using CAN protocol which is an advance driver-vehicle interface.*
An AVR based DAS is used in this project, which convert all data from analog to digital format by using ADC and LCD is used for the display of the data. In this project CAN is used as a vehicle bus for the interaction of ATmega328 microcontroller and other electronic parts of the system.

Key Words: • **CAN (Controller Area Network), LCD (Liquid Crystal Display), IR Sensor, LED (Light Emitting Diode), ECU (Engine Control Unit), and RPM (Revolution per min**).

1. INTRODUCTION

With rapidly changing computer and information technology and most of the technologies finding new ways into vehicles. They are undergoing sudden changes in their capabilities and the way they interact with the drivers. As some of the vehicles have special features to either show indications for the human driver or controlling the vehicle on their own, they normally make these decisions in real time with only incomplete and little information. So, it is very important that human drivers still have some control over the vehicle to react to various conditions like sudden changes in vehicles like low indication of fuel. Advanced in-vehicle information systems provide vehicles with various types and levels of intelligence to support with some more indications the driver. The introduction into the vehicle design has allowed an almost mutual relationship between the vehicle and driver by providing a sophisticated & intelligent driver-vehicle interface through an intelligent information network using master slave working principle. This paper discusses the growth and advancement of such a control system for the vehicles which shows supportive and mutual understanding of drivers and vehicles for real time decision making and control.

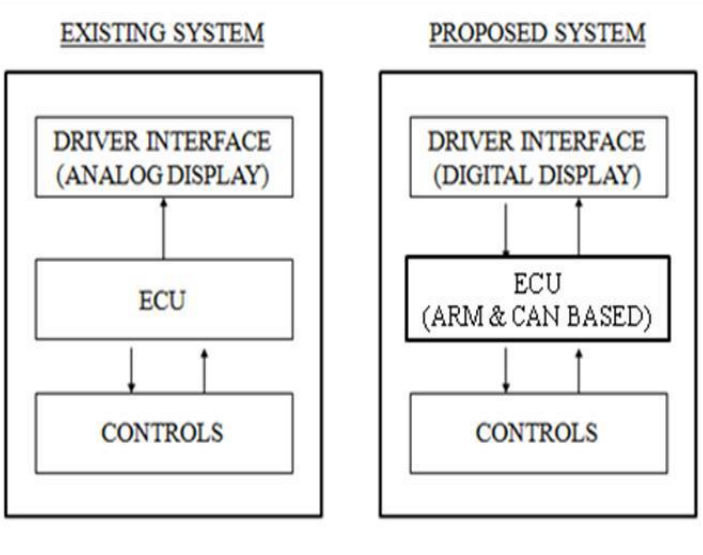

Fig 1: Existing and Proposed vehicle control system

2. HARDWARE DESCRIPTION

The hardware of the proposed system is basically consists of two parts in which one part works as transmitter and other as receiver. Both the parts are connected by CAN bus for the transmission. The transmitter and receiver both the part consists of ATmega328 microcontroller and CAN bus module. The transmitter part also consists of IR sensor connected to motor and receiver part consists of LCD for the display purpose.

So hardware structure mainly integrates ATmega328, CAN bus module, LCD and IR sensor. The brief description of important hardware is given below:

CAN Bus

It is a LAN (Local Area Network) controller which transfers the data serially. Fig shows an architectural behavior from an automotive. In CAN bus sub-systems are accessible via the control unit on the CAN bus interface for sending and receiving data. CAN bus is a multi-channel transmission system. When a unit failure takes place, it does not affect others. In CAN bus vehicle system, the data transfer rate is different. This approach differentiates various channels and increases the transmission efficiency.

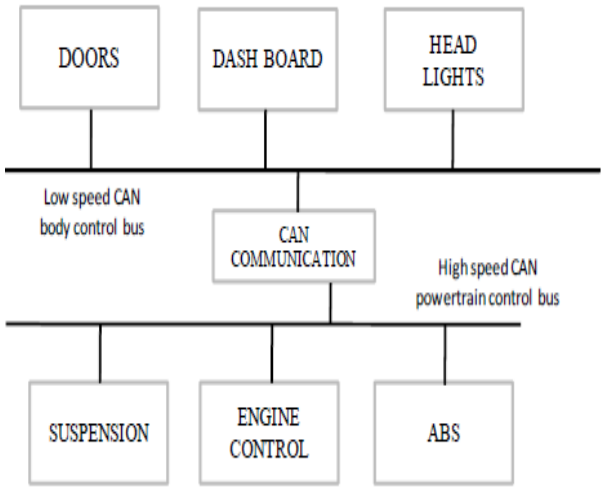

Fig 2. CAN bus system in an Automobile

ATmega328

ATmega328 is a high performance 8-bit AVR RISC based microcontroller created by Atmel .It is now a days highly used in Arduino for different project development. It combines 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, a byte-oriented 2-wire serial interface, serial programmable USART, 6-channel 10-bit analog to digital convertor, SPI serial port, programmable watchdog timer with internal oscillator, and five software selectable power saving modes, 32 kB ISP flash memory with read while write capabilities. The device achieves throughputs approaching 1MIPS per MHz by executing powerful instructions in a single clock cycle.

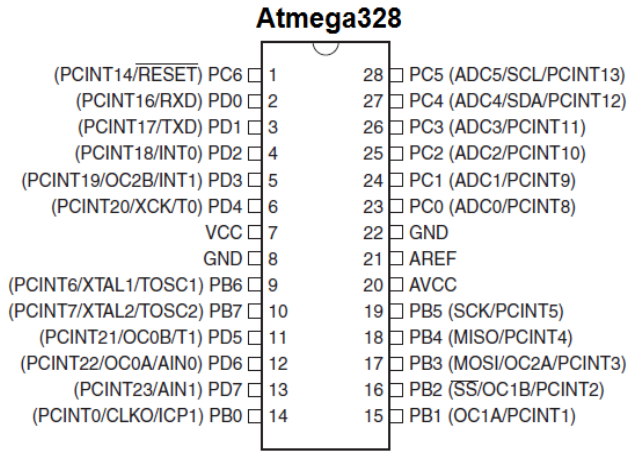

Fig 3: ATmega328 pin out

CAN bus module

It performs all the functions on the CAN bus for receiving and transmitting messages. Loading of the appropriate message buffer and control registers is done for message transmission. Implementation of CAN specification, version 2.0B is done by MCP2515 which is a stand-alone Controller Area Network controller. MCP2515 is capable of transmitting and receiving both standard and extent data and remote frames. It interfaces with microcontroller through an industry standard SPI.SPI read and write commands are used for reading from and writing to, all registers.

IR sensor

This circuit is one of the most popular sensor module in electronic device. This circuit consists of LM358 IC ,variables resistors ,2 IR transmitter and receiver pair and LED.LM358 is an op-amp and we are using is as a voltage comparator. This has two independent voltage comparators inside it but we are using one.

LCD

LCD is a display module used in various electronics applications. Common LCD module used in embedded projects is LCD 16x2 which consists of 16 rows and 2 columns. It has 16 pin with back light, contrast adjustment function.

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight V_{CC} (5V)	Led+
16	Backlight Ground (0V)	Led-

Fig 4: LCD pin description

3. SOFTWARE DESCRIPTION

The designing of the PCB is done using pad2pad software and the coding and compilation of the program is performed using Arduino software. The compilation of the program can also be done using different other software also like make files and/or AVR Studio.

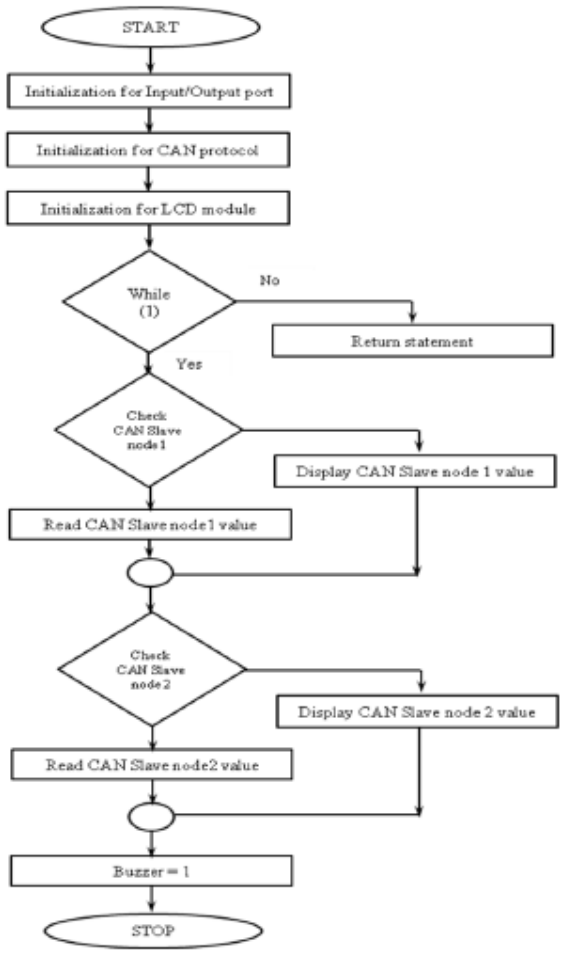

Fig 5: Flowchart

4. CONCLUSIONS

This project comprises an automobile vehicular system with a combination of CAN bus systems. Control of vehicle in real time operation is an important step of modern technology. With the ongoing and fast development of embedded technology, with introduction of high performance embedded processor is merged into the auto industry, which is highly reliable, low cost and other features to meet the needs and demands of modern vehicular system control. The proposed high speed CAN bus system solves the problem of controlling the vehicle in real time situations, also has a certain practical use and significance. With AVR as the main controller and it makes full use of high performance of ATmega328, high-speed reduction of CAN bus communication control network and instrument control so as to get full sharing of data between nodes and enhance their work. This system features efficient data transfer among different nodes in practical applications.

REFERENCES

[1] S. Vijayalakshmi. (June 2013) —VEHICLE CONTROL SYSTEM IMPLEMENTATION USING CAN PROTOCOL||. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering. Vol. 2, Issue 6, June 2013.

[2] ISO (1993). Road Vehicles: Interchange of Digital Information: Controller Area Network (CAN) for High Speed Communication. ISO 11898:1993.

[3] B.Gmbh, "CAN specification" vol 1 Version 2.0, 1991

[4] Mr. R.Manoj Prasanth, S. Raja, L.Saranya. (March 2014). —VEHICLE CONTROL USING CAN PROTOCOL FOR IMPLEMENTING THE INTELLIGENT BRAKING SYSTEM (IBS)||.International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering. Vol. 3, Issue 3, March 2014.

[5] Pazul, —Controller Area Network (CAN) Basics||, Microchip technology Inc., AN713, May 1999