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CAN BASED REAL TIME IMPLEMENTATION IN AUTOMOBILE USING ARM.

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Abstract: This project aims in designing a system which helps in monitoring and controlling multi-regions using CAN (Controller Area Network) protocol using LPC 2148ARM. This system helps in achieving communication between transmitter and receiver modules using multiple sensors like temperature, humidity, pressure of automobiles. The development of CAN began when more and more electronic devices were implemented into modern motor vehicles. Examples of such devices include temperature control if temperature goes to beyond level user turning on the ac and active pressure control indicates for vehicle safety point. The humidity sensors control internal level of humidity in the cabin effectively.

Keywords-CANBus,ARM-7LPC2148,
ECU,MCP2551 Transceiver, Sensors &PIC.

I –INTODUCTION

The devices which are connected by a CAN network are typically sensors, actuators and control devices. A CAN message reaches these devices through host processor and a CAN controller. As the technology is developing, the use of electronic control units (ECU) in vehicles is increases rapidly, making the communication between them very complex. Multiplexed communication was eventually developed to decrease the interconnections (cables) and the complexity between the ECUs. But the multiplexed communication has not met the real time communication requirements. BOSCH,a technology based corporation designed a multimaster serial communication protocol called Controller Area Network (CAN) which is robust, real time and also reduces the amount of cables to be used for the interconnections. The CAN protocol is a two wire, half duplex system which has data rates up to 1Mbps and offers a very high level of security. Some of the areas it is widely used are industrial machinery, avionics, medical equipments, building automation.

II. SYSTEM DESIGN

The modules in this project are temperature sensor capable of detecting temperature, humidity sensor to detect humidity level in the environment, Pressure sensor to get the pressure, Buzzer to give alerts. The CAN transceiver is to establish communication between two ARM-7 LPC2148 ARM-7 LPC2148 Microcontrollers, LCD to display the parameters.

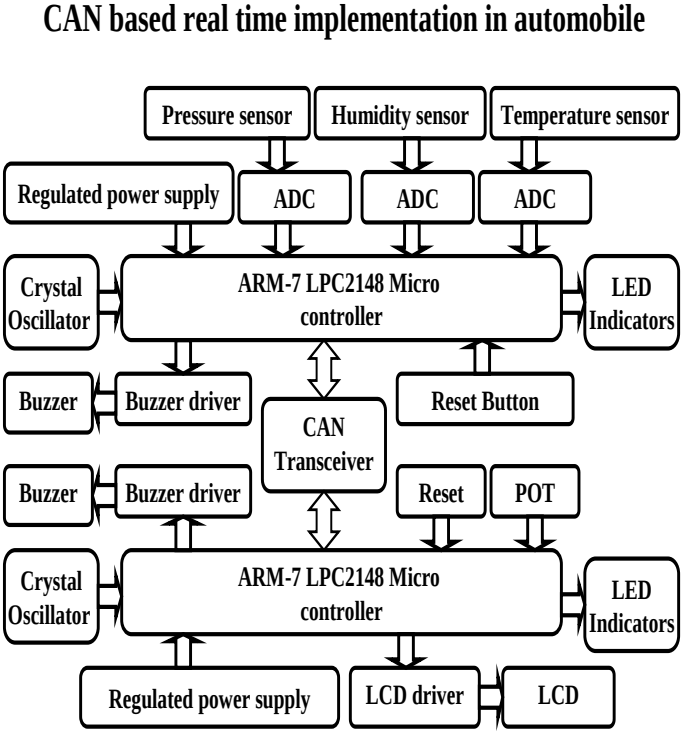

FIG .1 SYSTEM STRUCTURE.

This system makes use of two ARM-7 LPC2148 ARM-7 LPC2148 Microcontrollers which are connected using a CAN bus. One of the ARM-7 LPC2148 ARM-7 LPC2148 Microcontrollers has Temperature sensor, humidity sensor, pressure sensor, LCD and Buzzer are interfaced to it. This

controller gets input from these sensors and continuously monitors them. The controller automatically monitors, if these inputs go beyond threshold level and also alerts through buzzer. These parameters are transferred over CAN bus which is received by the other controller connected to it. This controller makes the parameters to display on LCD connected to it. Also, alerts at this system if parameters go beyond threshold level. The ARM-7 LPC2148 ARM-7 LPC2148 Microcontrollers used in this project are programmed using Embedded C programming.

III.COMUNICATION MODULE DESIGN

A. OPERATION OF CAN BUS.

The CAN protocol is a multi master bus access protocol which interfaces unlimited number of nodes in theory and depends on the chip practically. Normal chips available in the market allow up to 110 nodes and extra nodes can be interfaced The CAN protocol is a MultiMaster bus access protocol which unlimited number of nodes in theory and depends on the chip practically. Normal chips available in the market allow up to 110 nodes and extra nodes can be interfaced using repeaters. A maximum of 8 bytes of data at a maximum baud rate of 1Mbps can be sent at a time which would be sufficient for communications in a car. Higher layer protocols like CAN open etc. can be used if more than 8 bytes of data has to be communicated at a time. Thus the protocol is message oriented and each message has a specific priority according to which it gain access to the bus in the case of simultaneous transmission.

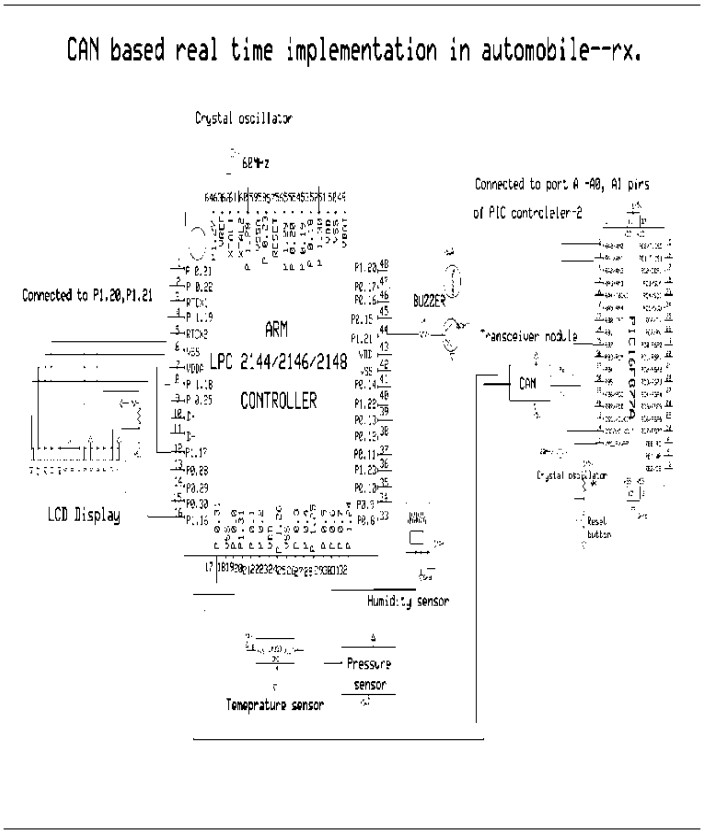

FIG.2 CIRCUIT DIAGRAM OF SYSTEM

C. DATA TRANSMISSION

The host processors LPC 2148 are connected to all three sensors. The output node of pressure sensors, temperature sensors & humidity sensors are in analog form which convert in digital by using ADC in built in ARM LPC 2148 as shown in fig. Then it identifies message information & makes decision of message transmission. The initial analog output carried on the CAN bus through CAN Transceiver to another node of LPC 2148 which are connected to LCD display. It adapts signal level from the bus to level that CAN controller expects. The temperature, pressure & humidity level from node 1 goes beyond threshold value. It indicates to user.
By buzzer & LED glow indication. The actual value
At node 1 display on the LCD display.

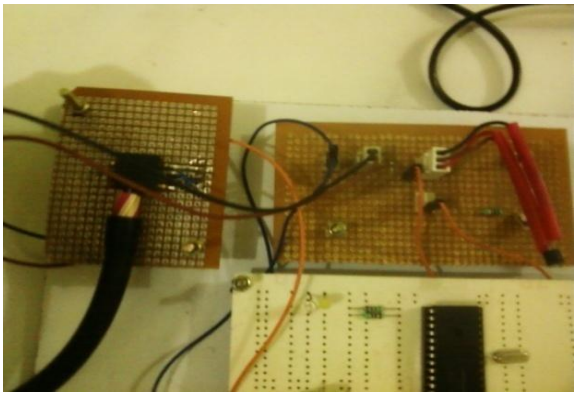

FIG .3 OUTPUT SENSORS DEVICE

IV. SOFTWARE DESIGN

1. ARM .C Transplanting
   For the transplanting of Embedded C code, its main task is to re-write the codes which are associated with the processor and compiler the codes include the following: redefinition of compiler-related data type, interrupt-switching code, stack, the initialization functions for task stack, task-switching function and so on. All the code is design for project we are used Kiel IDE Tools.
2. Proteus: The coding is design in Embedded C code is simulation by Proteus is software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller and this is done by the Proteus. Proteus is a programmer which itself contains a microcontroller in it other than the one which is to be programmed. . The program which is to be dumped in to the microcontroller is edited in proteus and is compiled and executed to check any errors.

V. SYSTEM TESTING RESULT

After the software and hardware designs have been completed, the ultimate generated codes are compiled and downloaded in microcontroller for testing. The codes include hardware system startup code, In the testing, Sensors are connected to host controller ARM LPC 2148 through CAN MCP2551bus unit and shown in fig 1.2.After connecting all hardware of unit. we taking some reading of Parameters temperature, pressure and relative humidity which display on LCD unit at the receiver section also. The system also alerts the user through CAN communication using buzzer and glow the LED on the main board when the actual parameters value goes beyond threshold value.

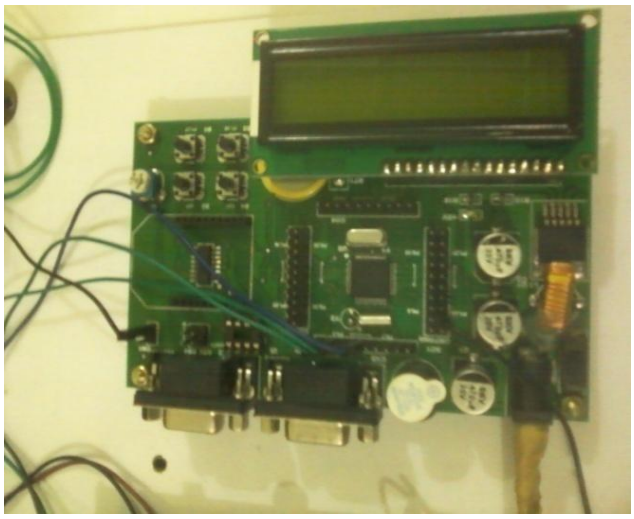

FIG. 4 LPC 2148 WITH LCD

As shown in Fig. 1.3 Temperature sensors, Pressure Sensors, & relative humidity sensors are interface through controller CAN transceiver (MCP 2551) to ARM 7 (LPC 2148).The correspond measuring different parameters is display on LCD as shown in fig 1.4

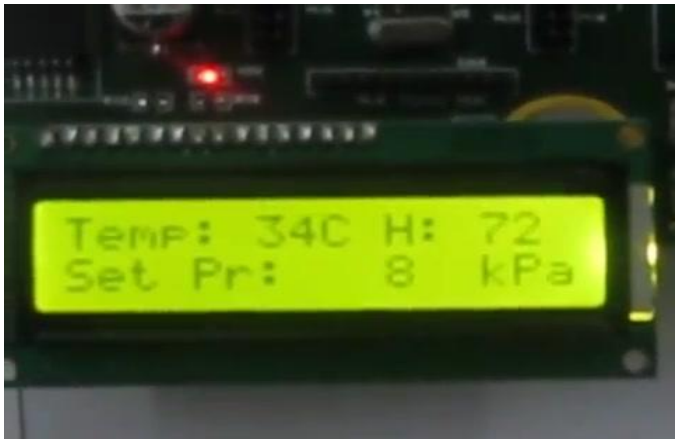

FIG. 5 OUTPUT PARAMETERS.

VI CONCLUSION

Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested. This project can be extended by using IR sensor, GPRS and 3G technologies. Fire sensor alerts in case of fire accidents. IR module helps in alerting if any window or door is open. Through GPRS, we can monitor the vehicle from anywhere in the world and 3G technologies can be used to view using video calling option. This helps in finding out the emergency times and fast responding to the situation.

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