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RESEARCH ARTICLE

CAN PROTOCOL IMPLEMENTATION FOR INDUSTRIAL PROCESS

Vemula Pallavi[1], N. Raju[2]

[1]M. Tech, JITS, Karimnagar, Andhra Pradesh

[2]Associate Professor, JITS, Karimnagar, Andhra Pradesh

[1] pallavi.vemula2@gmail.com, [2] narmalaraju@gmail.com

ABSTRACT:- The main aim of this project is to implementation for data communication based on CAN protocol by using microcontroller. CAN is a multi-master broadcast serial bus standard for connecting electronic control units (ECUs).Each node is able to send and receive messages, but not simultaneously: a message (consisting primarily of an ID usually chosen to identify the message-type/sender and up to eight message bytes) is transmitted serially onto the bus, one bit after another this signal pattern codes the message (in NRZ) and is sensed by all nodes. The industrial control system deals with all the above-mentioned problems and can effectively control them and letting the industry be in safe mode. It is an embedded project and has the microcontroller as controlling controller. The temperature sensor maintains the temperature at the specified level. Light sensor is used to sense the Light. According to the Sensors the controller will activate through ADC 8080 and gives to the CAN transceiver. It transmits and CAN transceiver receives and gives to microcontroller. It displays the data in the LCD.

I. INTRODUCTION

With rapidly changing computer and information technology and much of the technology finding way into vehicles. They are undergoing dramatic changes in their capabilities and how they interact with the drivers. Although some vehicles have provisions for deciding to either generate warnings for the human driver or controlling the vehicle autonomously, they usually must make these decisions in real time with only incomplete information. So, it is important that human drivers still have some control over the vehicle. Advanced in-vehicle information systems provide vehicles with different types and levels of intelligence to assist the driver. The introduction into the vehicle design has allowed an almost symbiotic relationship between the driver and vehicle by providing a sophisticated & intelligent driver-vehicle interface through an intelligent information network. This paper discusses the development of such a control framework for the vehicle which is called the digital-driving behavior, which consists of a joint mechanism between the driver and vehicle for perception, decision making and control.

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II. FRAME

A CAN network can be configured to work with two different message (or "frame") formats: the standard or base frame format (or CAN 2.0 A), and the extended frame format (or CAN 2.0 B). The only difference between the two formats is that the "CAN base frame" supports a length of 11 bits for the identifier, and the "CAN extended frame" supports a length of 29 bits for the identifier, made up of the 11-bit identifier ("base identifier") and an 18-bit extension ("identifier extension"). The distinction between CAN base frame format and CAN extended frame format is made by using the IDE bit, which is transmitted as dominant in case of an 11-bit frame, and transmitted as recessive in case of a 29-bit frame. CAN controllers that support extended frame format messages are also able to send and receive messages in CAN base frame format. All frames begin with a start-of-frame (SOF) bit that denotes the start of the frame transmission.

CAN have four frame types:

- Data frame: a frame containing node data for transmission.
- Remote frame: a frame requesting the transmission of a specific identifier.
- Error frame: a frame transmitted by any node detecting an error.
- Overload frame: a frame to inject a delay between data and/or remote frame. Semiconductor.

Advantages:

- Easy to implement and extend
- Well-suited for temporary or small networks not requiring high speeds (quick setup), resulting in faster networks.
- Less expensive than other topologies (But in recent years has become less important due to devices like a switch)
- Cost effective; only a single cable is used.
- Easy identification of cable faults. The breakdown of a CAN station has no immediate impact on the CAN bus. All the other stations can communicate unconstrained.

III. SOFTWARE STRUCTURE

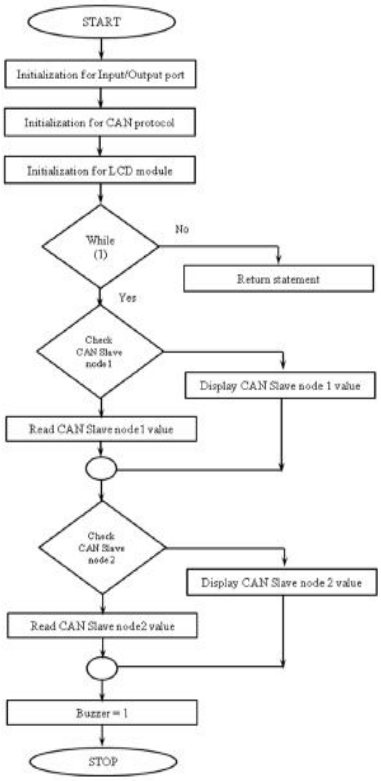

Fig . 1. Flowchart for program

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IV. RESULTS AND DISCUSSION

Figure 2: Demonstration Kit

Figure 2 shows the kit. It consists of three ATMEL AT Mega 16bit microcontrollers, three LCD displays along with drivers, Lm 35 temperature sensor, smoke sensor, 2551 stand alone CAN controller with SPI interface, 2515 standalone CAN Transceiver, Light Dependent Resister (LDR), Relay, Alarm. The temperature, smoke, LDR values displays on the LCD screens.

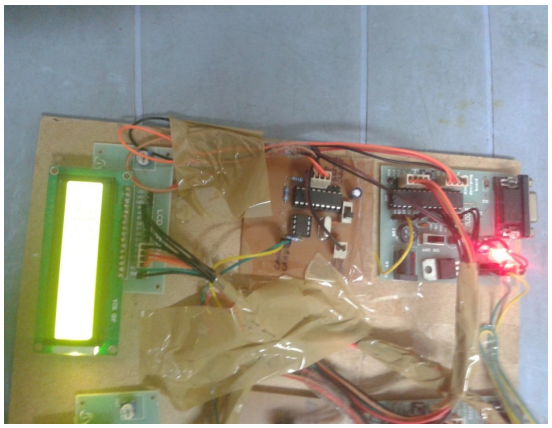

Figure 3: ATMEL AT Mega 16 bit Microcontroller

ATMEL AT Mega 16 bit Microcontroller is a slightly more powerful microcontroller, sporting a number of additional features which the developer may make use of:256 bytes of Internal RAM (compared to 128 in the standard 8051). A third 16-bit timer, capable of number of new operation modes and 18-bit reloads. Additional SFRs to support the functionality offered by the third timer.

That's really about all there is to the difference between the 8051 and 8052. The remainder of this tutorial will explain these additional features offered by the 8052, and how they are used within user programs.

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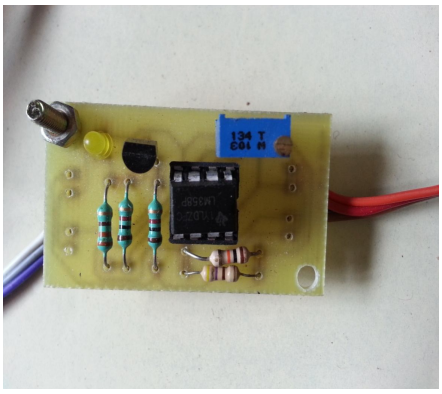

Figure 4 : Signal Conditioning Unit

Figure 4 shows Signal Conditioning Unit. A signal conditioner is a device that converts one type of electronic signal into another type of signal. Its primary use is to convert a signal that may be difficult to read by conventional instrumentation into a more easily read format. Variable resistor is also used for adjusting the voltage to the required level.

In performing this conversion a number of functions may take place such as Amplification, Electrical Isolation and Linearization. When a signal is amplified, the overall magnitude of the signal is increased. Electrical isolation breaks the galvanic path between the input and output signal. Converting a non-linear input signal to a linear output signal is called Linearization.

Figure 5: Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

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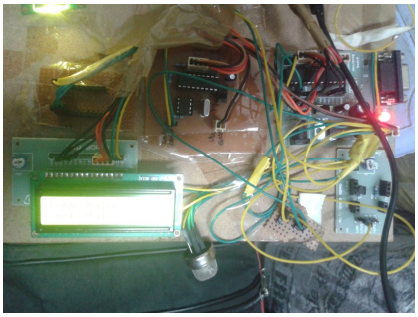

Figure 6 Smoke sensor

Figure 6 shows smoke sensor which offers a unique optional sensing chamber that is engineered to sense smoke produced by a wide range of combustion sources.

In this project smoke sensor capable of detecting smoke, temperature sensor to get the temperature, buzzer to give alerts, Relay to which controlling devices are connected. CAN Transceiver is to establish communication between two microcontrollers, LCD to display the parameters.

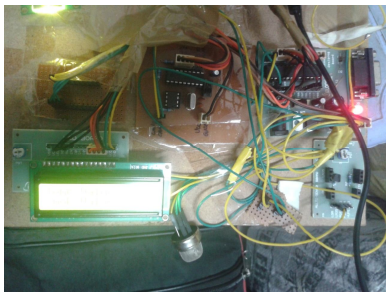

Figure 7 LDR Sensor

Light-dependent resistor alternatively called an LDR, photo resistor, photoconductor, or photocell, is a variable resistor whose value decreases with increasing incident light intensity. An LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. A photoelectric device can be either intrinsic or extrinsic. In intrinsic devices, the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire band gap.

Figure 8.5: LCD display

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Figure 8.5 The Liquid Crystal Display (LCD) is a display on the MB5 that is capable of displaying 4 lines of 20 characters. This document describes the operation of the particular LCD used on the MB5. As one might expect, to display a sequence of characters, a character code must be written to the LCD. The basic character set is the standard ASCII encoding. There are also some additional characters defined. The complete The LCD has other capabilities, such as a way to position the cursor at any location on the display.

Figure 8.6: Screen shot showing LDR Reading

Figure 8.6 shows the LDR value on the Lcd screen. The resistance of the Light Dependent Resistor (LDR) varies according to the amount of light that falls on it. The relationship between the resistance R_L and light intensity Lux for a typical LDR is

R_L = 500 / Lux Kohm

With the LDR connected to 5V through a 3.3K resistor, the output voltage of the LDR is

Vo = 5*R_L / (R_L+3.3)

Reworking the equation, we obtain the light intensity

Lux = (2500/Vo - 500)/3.3

Figure 8.7: Screen Shot Showing sensors readings

Figure 8.7 shows the values of LDR, Lm35 temperature sensor reading and smoke sensor reading. Each row consists of maximum 16 characters.

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V. CONCLUSION

This project introduces an embedded system with a combination of CAN bus systems. Digital control of the industrial is an important criterion of modern technology. With the rapid development of embedded technology, high-performance embedded processor is penetrated into the auto industry, which is low cost, high reliability and other features to meet the needs of the modern automobile industry. The proposed high-speed CAN bus system solves the problem of automotive system applications, also has a certain practical value and significance. With ARM as the main controller and it makes full use of the high-performance of ARM, high-speed reduction of CAN bus communication control

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