FREIGHTER FUEL LEVEL DETECTION AND OVERLOAD ALARMING SYSTEM USING WIRELESS SENSOR NETWORK USING GSM

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ABSTRACT: The main theme of this application is to detect the fuel level in large scale industries. In this project for detection purpose level sensors are used and it will automatically detect the fuel level and further operation will be implemented. This application is implemented by using embedded technology. In this application total three load levels are implemented .By default, at initial level it remains in no load status, when load increases and still remain in optimal level then the system notify crews to initiate voyage. If the load increases to over load level then the system gives alarm and sends alert message to the main control tower for necessary initiative. The message will be transmitted to the authorized person by using GSM MODEM through ARM7 (LPC 2148) processor and simultaneously the buzzer also gets activated using driver circuit.

Keywords: Microcontroller (LPC2148), Fuel level, Magnetic sensors, Buzzer, GSM Module.

I.   Introduction

The main theme of this application is to detect the fuel level in large scale industries. In this project for detection purpose level sensors are used and it will automatically detect the fuel level and further operation will be implemented. This application is implemented by using embedded technology. In this application total three load levels are implemented .By default, at initial level it remains in no load status, when load increases and still remain in optimal level then the system notify crews to initiate voyage. If the load increases to over load level then the system gives alarm and sends alert message to the main control tower for necessary initiative. The

message will be transmitted to the authorized person by using GSM MODEM through ARM7(LPC 2148) processor and simultaneously the buzzer also gets activated using driver circuit.

The LPC2148 are based on a 16/32 bit ARM7TDMl-S CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB POBT, PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications, interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.

II.   The Hardware System

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.
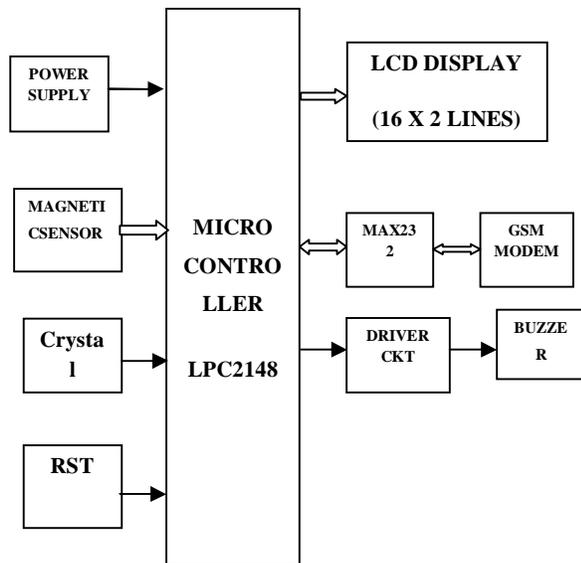
III.   Design of Proposed Hardware System

Fig 1: Block Diagram

In this paper, a water level sensing device has been designed to sense the water level and sends to the microcontroller unit. Depending on the load the water vessel's overload condition is designed. when the water level overloads, microcontroller gives an alarm for safety notification and also to GSM module via MAX 232 for sending information to the freight monitoring unit.

IV.   Board Hardware Resources Features

Magnetic sensor:

MEMSIC offers magnetic sensor components for high performance OEM applications, as well as rugged magnetic modules for applications where a turnkey solution is required. MEMSIC magnetometers are used in millions of cell phones and tablets, due to their exceptional noise, wide dynamic range, and low power consumption.

MEMSIC's family of magnetometer components are available in both dual-axis and three-axis versions. They are based on anisotropic magnetoresistive (AMR) Permalloy technology sensors, which have superior accuracy and response time characteristics, while consuming significantly less power than alternative technologies. The MEMSIC magnetometers are ideal for electronic compass, GPS navigation and magnetic field detection applications.
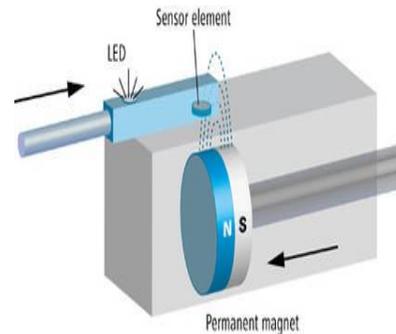

Fig 2: Magnetic Sensor

Buzzer:

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave ovens, & game shows. The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. The "Piezoelectric sound components" introduced herein operate on an innovative principle utilizing natural oscillation of piezoelectric ceramics. These buzzers are offered in lightweight compact sizes from the

smallest diameter of 12mm to large Piezo electric sounders.

Fig 3: Types Of Buzzers

MAX 232:

MAX232 converts from RS232 voltage levels to TTL voltage levels, and vice versa. One advantage of the MAX232 chip is that it uses a +5V power source which, is the same as the source voltage for the 8051. In the other words, with a single +5V power supply we can power both the 8051 and MAX232, with no need for the power supplies. The MAX232 has two sets of line drivers for transferring and receiving data. The line drivers used for TXD are called T1 and T2, while the line drivers for RXD are designated as R1 and R2. In many applications only one of each is used.
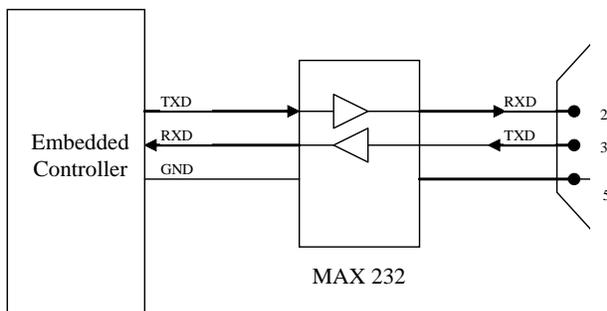

Fig 4: Use Of Max 232

GSM :

An embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few pre-defined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economies of scale. Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service. The standard is used in approx. 85 countries in the world including such locations as Europe, Japan and Australia.

Power supply:

The power supply are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A D.C power supply which maintains the output voltage constant irrespective of A.C mains fluctuations or load variations is known as "Regulated D.C Power Supply"
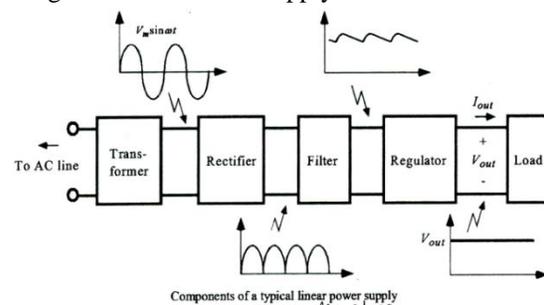
Components of a typical linear power supply

V.   CONCLUSION

The proposed system works very effectively until it is physically damaged within a certain GSM coverage network area. Cheap electronic equipment are used to make the system economical. It works automatically without any sophisticated operating command, so it is very user friendly to freighter worker or crew.

VI.   REFERENCES

[1]Paul F. Thomas, "Recreational boating statistics 2012", United Stated Coast Guard, US, 2012

[2] Iovine, John. PIC microcontroller project book. McGraw-Hill, Inc., 2004.

[3] Kazkaz, Ghaffar, Richard C. Francke, and Bradley S. Beiermann."Resistive fluid level sensing and control system." U.S. Patent No.6,634,229. 21 Oct. 2003.

[4] Yuchun, Ma, Huang Yinghong, Zhang Kun, and Li Zhuang. "General application research on GSM module." In Internet Computing & Information Services (ICICIS), 2011 International Conference on, pp. 525-528.IEEE, 2011

[5] Deep Gupta, Brajesh Kr. Singh and KuldeepPanwar. "A Prototyping Model for Fuel Level Detector and Optimizer." African Journal of Basic& Applied Sciences, ISSN 2079-2034, Volume: 4 (6), 2012

[6] Mahmud, Khizir, MdAlam, and RakeshGhosh. "Design of digital thermometer based on PIC16F77A single chip microcontroller." Consumer Electronics, Communications and Networks (CECNet), 20133rd Internation-al Conference on. IEEE, 2013.

[7] Khizir Mahmud, Md. ShamsulAlam, Ali Jobayer. "Design and Performance Evaluation of PIC16F77A Microcontroller Based Fluid Velocity Meter." 2013 IEEE Global High Tech Congress On Electronics (GHTCE 2013), IEEE, 2013

[8] MA, Shibao, Guoyu Zhang, Xiangyang SUN, Yujun GAO, and Weiwei WANG. "Design of the System of Wireless Alarming Based on GSM Module [J]." Journal of Changchun University of Science and Technology (Natural Science Edition) 1 (2009): 018.

[9] Jayasinghe, Gamini, FarazyFahmy, NuwanGajaweera, and Dileeka Dias. "A GSM alarm device for disaster early warning." In Industrial and Information Systems, First International Conference on, pp. 383-387. IEEE, 2006.

[10] Kwah, ZaiShyong. "Gsm Based Remote Terminal Unit Of The Flood Warning And Control System." Diss. University of Bradford, 2010.