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Fuel Level Detection and Overload Protecting System VIA GSM & GPS

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ABSTRACT-
The system we have proposed is an extended approach to monitor a control industrial system. We can monitor the industrial system from any location, due to this it will save lots of time in this busy era. In this project, we have designed GSM based fuel level and over load monitoring and detection system.. We detect the level of the tank which is connected in the industry. We also monitor the load on the tank. For this purpose, we used sensor which defines the parameters of the sensor. Analogue output of sensors amplified through a process of signal conditioning, where OP-741 is used to amplify the signal. Amplified signal is fed into an ADC for the sake of digital data. This digital data is transferred to an LCD for displaying result. ARM is used for this procedure. Modem is also connected to this controller for the wireless communication of the data through GSM technology by receiving an alert through SMS along with location.

INTRODUCTION
Hughes et al. 2006 introduced a flood monitoring and warning system with the help of intelligent technique. This paper represents the wireless sensor network for flood warning which can be used in many programs like it can work with remote fixed network and in flood purpose and also capable to perform on flood site. Local computations are available to provide warnings to local stakeholders but combination of local and remote computation gives the opportunity of adaptation of the sensor network to maintain its optimal skills in further environmental conditions. By developing sensors on sites of flood we can manually collect data through GSM telemetry method and can be used in flood prediction. If more intelligence is required than Grid Stix sensor used as powerful embedded hardware [1]. Tseng et al. 2006 described a feasibility study on application of GSM–SMS technology to field data acquisition. This paper represents a study on GSM-SMS technology application to the data acquisition. This is a prototype system which is composed of field monitoring and host control platforms. Data transmission and communication are performed by GSM-SMS methodology. Most of the overloading cases indicate that the vessels were loaded as many as 3-5 times of their capacity. On the other hand, maximum boat sailors are not concerned about freighter loading condition and fuel level. Most of these level sensing are analogue or a personnel is engaged to monitor loading and fuel level. Besides, it's a boring and difficult task to check the fuel level frequently in running condition. Sometimes if the bilge pump seems to be working overtime it may result vessel to be filling with water and seems to feel heavy.

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So in this research, the soul idea and motivation is to design a system to avoid freighter hazard due to overloading and lacking fuel
level surveillance. Since the system is digital, it requires no personnel to monitor fuel level and water level again and again on running condition. The system will work automatically according to the load and in any hazard condition it will give alert alarm and send notification message and call to the central ship monitoring unit for necessary initiative. Moreover, for overloading, high pressure falls on engine which may cause degradation of engine performance. Overloading alert can save this degradation. When optimal loading occurs it generates sound to inform the passengers that the vessel is secured with loading and ready for voyage and signal lights gives notification in sailor room to start the freighter. By this system, freighter fuel level can be monitored in both analogue and digital scale with greatest flexibility to take necessary steps in any condition. So, if for any reason digital system fails, the mechanical niddle and pointer system shows the fuel level on display. In most of the luxurious freighters, different system like this is integrated, but for the low cost freighter for developing countries such device is not commercially available as separate device to use in all kinds of boat. The system has a scope to implement solar power as auxiliary power supply if main supply fails. The proposed system is implemented by the economic electronic circuitry and based on GSM so that easily can retain reliable communication between the freighter and the central monitoring unit from far distance.

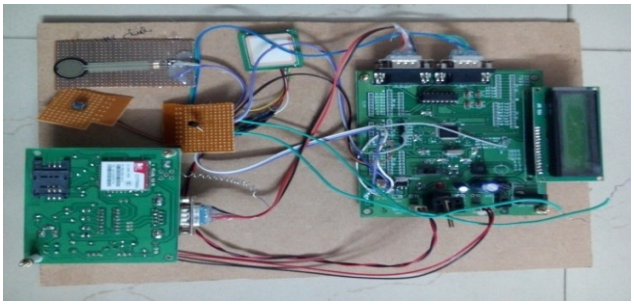
II. SYSTEM DESIGN

The system is designed with the ARM microcontroller and the GSM module. Microcontroller based electronic system monitors the total amount of load on the vessel and sends safety notification and alarm to the concerned authority for necessary initiative. At normal loading condition the system sends the safety notification to the concerned crew to initiate voyage. In case of any hazardous conditions like over loading or over flooding, the system turns to alarming mode and notifies the captain and the other concerned crews of the ship by alert alarm. If the fault is made clear by the crews and the ship become out of danger then the system automatically turns back to monitoring mode. But if the fault is not cleared and the danger level rises, the system generates a massive caution alarm and notifies the control tower by sending an alert message and making phone call to the control tower. A serial GSM MODEM serves as the communication channel between the electronic system and the control tower. Side by side the freighter load surveillance, fuel level is also monitored. A specially designed sensor is placed in the fuel tank to detect the fuel level. This sensor is connected with an analog indicator as well as with the microprocessor unit to get the fuel level indication in digital scale. Overall, the design of the system may be divided in three parts. Firstly, basic model has been designed with block diagram, secondly corresponding circuitry has been analyzed and finally necessary firmware with software.

CIRCUIT DIAGRAM:

GSM Module

A GSM modem has been used to send message from the vessel to the main monitoring unit. It sends and receives data through radio waves so that easily can communicate from far distance vessel to the main monitoring room. Generally, AT



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commands are used to control modems. Reading of message from the SIM card inserted into the modem is done by sending the appropriate AT command to the modem. In addition to the standard AT commands, GSM modems support an extended set of AT commands

Microprocessor Unit and GSM Module Interface

To interface between the microprocessor unit and the GSM module of the system, RS 232 and MAX 232 has been used. MAX 232 converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits [9]. In the system MAX 232 is a dual driver/receiver and converts the RX, TX, CTS and RTS signals. It includes a capacitive voltage generator to supply EIA 232 voltage levels from a single 5 volts supply. Each receiver converts EIA 232 inputs to 5 volts TTL or CMOS logic levels. Each driver converts TTL or CMOS input levels into EIA 232 levels [10]. GSM Modem, which works at RS 232 voltage levels, logic 1 varies from -3 to -15 volts and logic 0 from +3 to +15 volts. The microcontroller which works on TTL logic levels, logic 1 is +5 volts and logic 0 is 0 volts. Therefore to interface the two, a MAX 232 driver IC has been used [10]. These parts are especially useful in battery-powered systems, since their low power shutdown mode reduces power dissipation to less than 5 micro watts. In this system, RS 232 data is bi-polar +3 to +12 volts indicates an "ON" or 0 state (SPACE) condition, while -3 to -12 volts indicates an "OFF" or 1 state (MARK)condition [11] [14]. The output signal level usually swings between +12 to -12 volts. The dead area between +3 to -3 volts is designed to absorb line noise.

MAX232

MAX232 is actually an IC. It is serial interface RS232 for PC uses and its voltage range in between -12v and +12v. For the signal use voltage range is -3v to-12v and it stand for a logic one (1) and +3v to +12v then it stand for logic zero (0). It which converts the signals from an RS- 232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 work as driver and receiver and converts the RX, CTS, TX and RTS signals. Its drivers provide an RS-232 voltage level output which is approximately.± 7.5 V from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it possible and useful for implementing RS-232 in devices. otherwise they do not need any voltages outside the 0 V to + 5 V range, as design of power supply which is not require to be more complicated to provide just driving the RS-232 in this case. To adjust to signal to voltage levels which are available on microcontroller pins it is compulsory to use voltage level converter

Hitachi HD44780 LCD

Hitachi HD44780 LCD (liquid crystal display) controller. Hitachi organized the microcontroller to drive LCD display with interface which is connected to micro processor or microcontroller. The screens of LCD are limited to text and are generally used in laser printers, copiers and fax machines and in networking equipment such as data storage and in routers. The screens are in small number of configuration, mostly 16*2, 20*2 and 20*4. HD44780 chip can show address up to 80 characters. Character of LCD display with backlight which can be fluorescent and LED. With a standard use of 16 pins interface generally using pins on 0.1 inch / 2.54mm centres. Those LCD they do not have backlights used 14 pins, basically two pins used for to power the lights. The HD44870 defines two modes of interfacing one for 4 bits and other one is 8 bits. By using the 4 bit mode is complex, but it reduces the number of active connections that we needed. In 8 bit mode instruction set are designed to allow switching without requiring the lower four data pins. If it is in4 bit mode, character and control data is transferred as pairs of 4 bit

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"nibbles" on the upper data pins, D4-D7. The generator ROM of HD44870 contains 32 characters in a 5×10 dot matrix, and 208 characters in a 5×8 dot matrix. European version which include Cyrillic and a Japanese version of the ROM which display kana characters. The 7 bit ASCII is non standard for Japanese mostly we found YEN blackish character.

GPS:

The Global Positioning System (GPS) is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

The US began the GPS project in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. The U.S. Department of Defense (DoD) developed the system, which originally used 24 satellites. It became fully operational in 1995. Bradford Parkinson, Roger L. Easton, and Ivan A. Getting are credited with inventing it.

Advances in technology and new demands on the existing system have now led to efforts to modernize the GPS system and implement the next generation of GPS Block IIIA satellites and Next Generation Operational Control System (OCX).[3] Announcements from Vice President Al Gore and the White House in 1998 initiated these changes. In 2000, the U.S. Congress authorized the modernization effort, GPS III. In addition to GPS, other systems are in use or under development. The Russian Global Navigation Satellite System (GLONASS) was developed contemporaneously with GPS, but suffered from incomplete coverage of the globe until the mid-2000s. There are also the planned European Union Galileo positioning system, India's Indian Regional Navigation Satellite System, and the Chinese BeiDou Navigation Satellite System.

CONCLUSION

This project has achieved its objectives and provides solution in the form a system that can monitor level and sensing and load protection via SMS by using GSM technology. This system has capability to detect oil of the tank and sense the temperature of the tank. It notifies GSM modem to send SMS to intended user phone or you can say person in charge. The PIC microcontroller used as central processor which is connected to the modem by using MAX 232 to interface to check the microcontroller operation. A series of tests are organized and we found system is working properly. But delay in receiving SMS can occur

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