SMART GAS LEVEL MONITORING AND BOOKING SYSTEM

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Abstract—**There are many methods are available for booking a LPG gas in the gas agency. Methods include online booking, telephonic booking etc. But sometimes we may forget to do the booking due to the various reasons. It will be difficult situation for the one who uses LPG gas for cooking regularly. So we have proposed a new system which automatically book a cylinder when the gas is about to empty by sending a SMS by using GSM. In addition to that smoke sensor is used to detect gas leakage in the home. If any gas leakage detected automatically it will send SMS to the fire station. GSM is one of the most cellular networks used in India. In our project we have used load cell to monitor the wait of the LPG gas regularly. The values are next feed to the microcontroller. If the gas level is cross below the threshold level, then a SMS will be sent to gas agency automatically to book the new cylinder. Then a reply SMS will be sending to the customer about the booking status. At the same time application software is developed in the gas agency to inform and record the booking.**
Keywords—**ATMEGA8; Relay; GSM; sensor; cylinder; LPG**

I. INTRODUCTION

This paper is an effective and affirmative way of monitoring the gas quantity in the container, and to intimate as well as to place an refill order in the respective branch office(gas agency), via an message by means of GSM module .

The continuous measure is done using the load cell which intern works on the principle of piezo electric sensor, i.e; when an gas container is placed on the load cell it measures the weight and sends an electric pulse to the mictrocontroller which will compare the pulse with an ideal value in form of digital (the electric pulse is converted into equivalent digital value).

If the compared output is high then it sends a pulse(high) to the ATMEGA which will update the microcontroller but doesn't place an order, but if the compared output is low then it sends a pulse(low) to the ATMEGA which will update it to the microcontroller an even place an gas refill order . And for ease of user there is even buzzer to notify the consumer when an gas order is being placed.

II. COST EFFICIENT SYSTEM

The proposed system consist of: GSM modem will receive incoming calls and automatically answer the call via AT Commands [1]. ATMEGA8 are electronic circuits that can be programmed to carry out a vast range of tasks. They can be programmed to be timers or to control a production line and much more [2]. Load cell(shear beam) are widely used where operators need to measure compressive forces, the core component of a shear beam load cell is spring element, this element is a piece of metal is elastically deformed under load and recovers the moment the load is removed.

III. SYSTEM ARCHITECTURE

We have made the system architecture to be simple in order reduce the cost of this prototype. In case of original device the system design and architecture varies depending on the quality and features of the user requirements and emerging technology. There are different segments present in our system design, each one of them to perform their assigned task through the embedded system program coding techniques.

A. Block Diagram

The block diagram shows the diagrammatic representation of our proposed system effectively for clear cut overview and for understanding purpose.
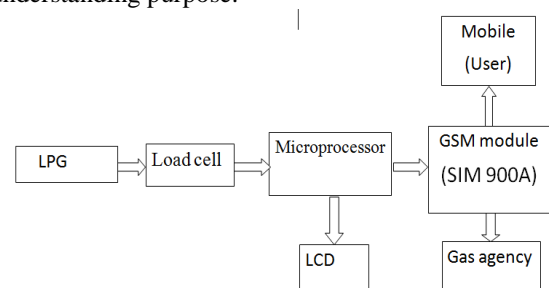

Fig. 1. Block Diagram of the System

Here the input signal is an electrical pulse which is generated by shear beam load cell. And this is converted into

digital form, then given to the micro controller ATMEGA8. If the high pulse is received by the micro controller, no signal is passed to the GSM module. If the low pulse is received by the micro controller, electrical signal is passed to the GSM module then order is being placed. Purpose of the buzzer is to notify the user to give knowledge about the gas booking.

1) ATMEGA8:

AVR Microcontroller was produced by the "Atmel Corporation". The Microcontroller includes the Harvard architecture that works rapidly with the RISC. The features of this Microcontroller include different features compared with other like sleep modes-6, inbuilt ADC (analog to digital converter), internal oscillator and serial data communication, performs the instructions in a single execution cycle.

These Microcontroller were very fast and they utilize low power to work in different power saving modes. There are different configurations of AVR microcontrollers are available to perform various operations like 8-bit, 16-bit, and 32-bit.

USART is one of the most powerful communication solutions. Microcontroller ATmega8 supports both synchronous & asynchronous data transmission schemes. It has three pins allocated for that. In many communication projects, USART module is widely used for communication with PC-Microcontroller.

A monitoring and protection circuit for 1-cell and 2-cell Li-ion applications that require high security and authentication, accurate monitoring, low cost, and high utilization of the cell energy. The microcontroller includes 8KB self-programming flash program memory, 512-Bytes SRAM, 256-Bytes EEPROM, 1 or 2 cells in series, over-current, high-current and short-circuit protection, 12-bit voltage A/D converter, 18-bit coulomb counter current A/D converter, and debug Wire interface for on-chip debug.
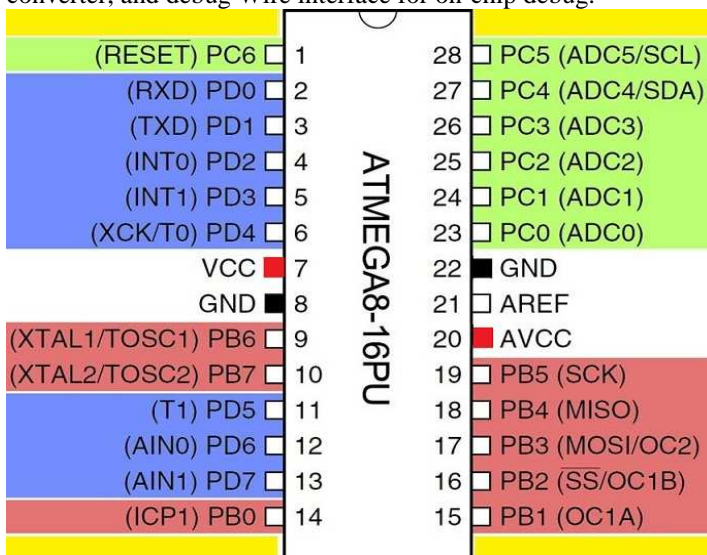

Fig. 2. ATMEGA8- 16PU

2) GSM MODEM:

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

Due to some compatibility issues that can exist with mobile phones, using a dedicated GSM modem is usually preferable to a GSM mobile phone. This is more of an issue with MMS messaging, where if you wish to be able to receive inbound MMS messages with the gateway, the modem interface on most GSM phones will only allow you to send MMS messages. This is because the mobile phone automatically processes received MMS message notifications without forwarding them via the modem interface.

It should also be noted that not all phones support the modem interface for sending and receiving SMS messages.

3) LCD:

A **liquid-crystal display** (**LCD**) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome.] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, 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.

LCDs are used in a wide range of applications including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smart phones.

4) LOAD CELL:

The (single ended) shear beam is designed for low profile scale and process applications. The shear beam capacities are from 100kg to 50t. One end of the shear beam contains the mounting holes while the opposite end is where the cell is loaded. The load cell should be mounted on a flat smooth surface with high strength hardened bolts. The larger shear beam cells have more than two mounting holes to accommodate extra bolts to keep the hardware from stretching under stress load.
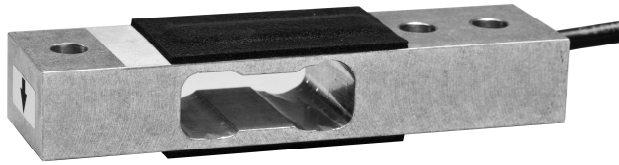
Fig. 3. Shear Beam Type Load Cell

B. Softtware

In our proposed system, we have used µVision IDE which combines project management, run-time environment, build facilities, source code editing, and program debugging in a single powerful environment. µVision is easy-to-use and accelerates your embedded software development. µVision supports multiple screens and allows you to create individual window layouts anywhere on the visual surface.

The µVision Debugger provides a single environment in which you may test, verify, and optimize your application code. The debugger includes traditional features like simple and complex breakpoints, watch windows, and execution control and provides full visibility to device peripherals.

C. Hardware

In our proposed system, we have implemented a simple hardware structure to ensure low cost and efficiency since, it acts as a prototype model. The overall hardware module of our proposed system is given as follows:

Fig. 4. Hardware Module of our System

IV. WORKING PRINCIPLE

The measured weight from load cell is given to micro controller Input output capture. It produces electrical signal in form of pulses either low or high. Crystal oscillator is used to generate the digital pulses. Maximum voltage given to microcontroller is 5V. Once the signal is received from the load cell the weight of the LPG is displays the weight to the user with the help of the LCD display. Output of the microcontroller provides the signal in order to book the gas. Buzzer denotes the consumer whether the order is being placed   or   not.
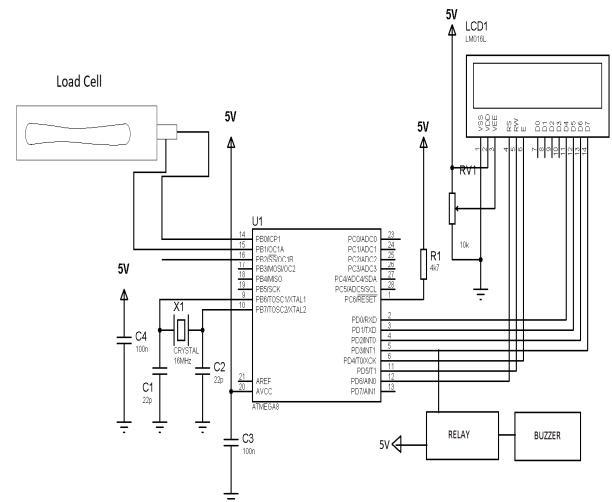

Fig.5. Schematic Diagram

Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port C is a 7-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port C output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running. If the RSTDISBL Fuse is programmed, PC6 is used as an I/O pin. Note that the electrical characteristics of PC6 differ from those of the other pins of Port C. If the RSTDISBL Fuse is

unprogrammed, PC6 is used as a Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, even if the clock is not running.

Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Reset input. A low level on this pin for longer than the minimum pulse length will generate a reset, even if the clock is not running. Shorter pulses are not guaranteed to generate a reset

Vcc is the supply voltage pin for the A/D Converter, Port C (3…0), and ADC (7…6). It should be externally connected to Vcc, even if the ADC is not used. If the ADC is used, it should be connected to Vcc through a low-pass filter. Note that Port C (5…4) use digital supply voltage, Vcc.

ARef is the analog reference pin for the A/D Converter. ADC(7..6) (TQFP and QFN/MLF Package Only) In the TQFP and QFN/MLF package, ADC7…6 serve as analog inputs to the A/D converter. These pins are powered from the analog supply and serve as 10-bit ADC channels.

V. CONCLUSION

Hence from the above discussion we can conclude that the paper(smart gas level monitoring) is absolutely ethical for the application of the users to consume(use) gas in their daily life. It also helps in leading a easy life.

VI. FUTURE SCOPE

Since it is a wired module in future it can be developed as a wireless module, later we can also reduce this size of the system. In future it could be mandatory for all consumers in order to save time.

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