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LPG Gas Detector Using 8051 Microcontroller

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ABSTRACT: Nowadays, Gas leakage has turned out to be a major problem with the industrial sector as well as households. The paper has been stipulated in order to ensure that the supervisor of the gas plants or the owner of the household is notified of the gas leakage which has occurred and at the same time an SMS notification is sent to the concerned person. This paper holds even more relevance in the current pandemic situation because industries are facing paucity of workmen due to social distancing norms and such a system would enable them to aware of any mishaps at the industrial site. The research has been implemented on a software basis and the outputs are realized in Proteus software. This gas sensor has high sensitivity for propane and iso-butane and also can sense smoke in industrial scenarios.

KEYWORDS: LPG GAS.

I. INTRODUCTION

We designed a system which essentially detects LPG leakage and emphasis by measures such as SMS, Buzzer sound, LED Blink. This prototype turns out to be price effective and has a high degree of accuracy. In this system we are using 8051 microcontroller as our host. It is connected to five other modules: MQ6 gas sensor, GSM module, exhaust fan, buzzer, LED pins on one side of the gas sensor are connected to the power supply. On the other side one of the pins is connected to the analog input of the microcontroller and the other two pins are connected to the ground. The remaining modules are connected to the output pins of the microcontroller. In recent families, the use of LPG has taken over again and accident cases due to LPG are increasing. From the use of piping cylinders, a serious safety threat as well costs. Our prototype will be a blessing to many homes as it is saving

II. LITERATURE SURVEY

The safest way to detect gas leaks and to remove gas before burning. In this study, a gas leak detection model and a transport system are introduced. The researcher had used a 8051 MC-based system, wherein the system activates buzzer when gas leaks are detected, closes gas supply the solenoid valve stops the further gas leakage and also removes the gas by changing the evacuator fans.(Md. Ashraf et al, 2017) Ensuring that the occupant of the household is informed suitably in case of gas leakage. The gas leakage detection process is programmed in a manner such that it transmits a text message (SMS) to a pre-saved phone number. The user has also been provided with the privilege to remotely monitor the test environment by sending necessary codes. (Aderibigbe I. Adekitan et al, 2018).

III. METHODOLOGY

A] Figure 1 displays our design of gas detection using 8051 MC .It clearly displays all the interfacings that are attached to the central unit(8051 MC) ,which processes all the data it has received and gives the alert feedback in different forms.

B] Here, we have interfaced LCD, led and buzzer for generating the public alert when the gas leakage has been detected by the system. Relay module interfaced with MAIN power had been used as a safety precautionary measure in the case of gas detection because malfunctioning of any circuitry line ,during the event of leakage can cause fire which can worsen the situation more. At times, they may even lead to a wild explosion due to vigorous reaction of gases like LPG Gas (propane, butane) with the fire. In order to hold the situation under control, relay module (acts as a circuit breaker for the main power supply) had been turned off during the gas leakage.(Geeta Loshali et al,2017)

C] Human monitoring may not be always possible in manufacturing industries for example, in nuclear reactors of atomic power plants. In these situations, some form of alert had been dissipated to the workers who may be working at a distant range, or even away from the site. Buzzer and LED feedback, may not serve the purpose of alert in these conditions. So we have used GSM modules for sending alert messages to the responsible pupil and even to the nearest response (rescue) teams like fire services, local police stations, so that the hazard can perfectly be mitigated at least to a safer level. (Shinde et al, 2012).

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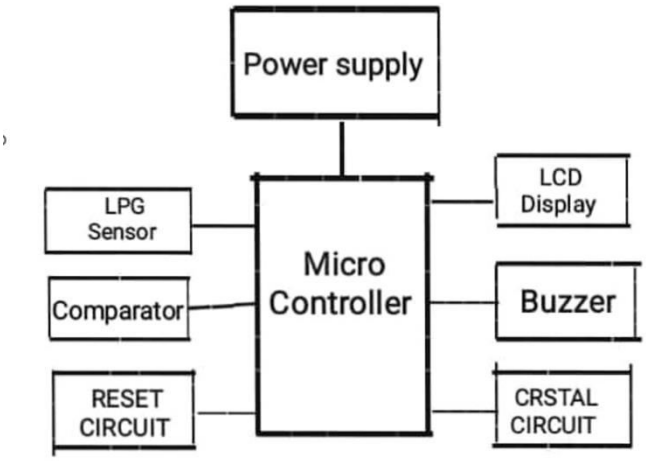
IV. ALGORITHM OF PROPOSED SYSTEM

After initialization of the Setup the LCD displays "sending otp" message then a password is generated and sent to the registered mobile number through GSM and it is also stored in the memory of the microcontroller. Then the LCD displays "Enter ur passkey" message requesting for Password, which is entered through hex keypad. Comparison is done between the Entered Number and Number stored in 8051 Memory.

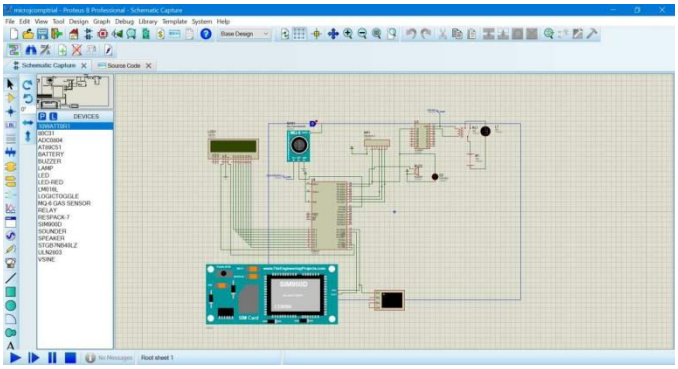
If the Passwords found matched the LCD displays message “ACCEPTED” and the Digital Locker Door Opens and Closes with specified delay. In case if the Passwords found mismatched the LCD displays the

Message “ACCESS DENIED” and along with it an Alert SMS of“ACCESS DENIED” is sent to the Registered Mobile Number

Block Diagram:



Circuitry and Functionality



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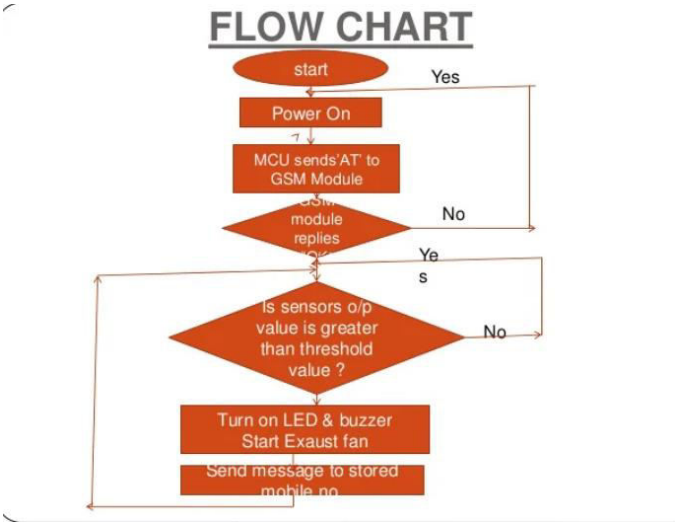
FLOWCHART



Required components

LCD(16*2)display
MQ6(GAS)sensor
GSMmodule
BUZZER
ULN2803withrelaycircuitry
LED
RESPACK-7
LOGICANALYSER

V. SIMULATION RESULTS

Figure 4 represents the active state-1 of the circuitry, which means the entire circuit had been turned on with the supply from 8051 MC. Once, the circuitry is on module has been pushed to the initial state (i.e. No gas detected). The display of lcd shows the initial state along with the condition ("SAFE") Relay circuitry is turned on and that can be witnessed from the LED output attached with the relay circuitry. If the implementation of this idea is done in real time, the configuration of the system can be extended to a much higher level. If this is going to be an hardware implementation, we will be able to detect the exact level or amount(in PPM) of gas present in the surroundings. We can also set a threshold and compare the obtained values from the sensor with these threshold values in order to increase the accuracy of the system to a higher level. Because the vulnerability of accidents depends on the significant amount of gas detected. As we have made our design with a simulation-based platform, sensors can only output the digital values (either '0' (not detected) or '1'(detected).

In that context we have attached the logic analyzer to the output pin of the MQ6 gas sensor. By default, the logic toggle is off.

Fig.1.Ad Hoc Network of 5 Nodes

Fig. 2. Energy Consumption by Each Node

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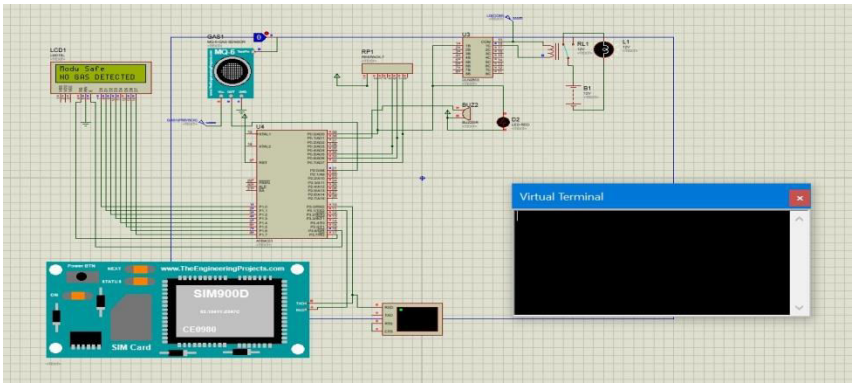
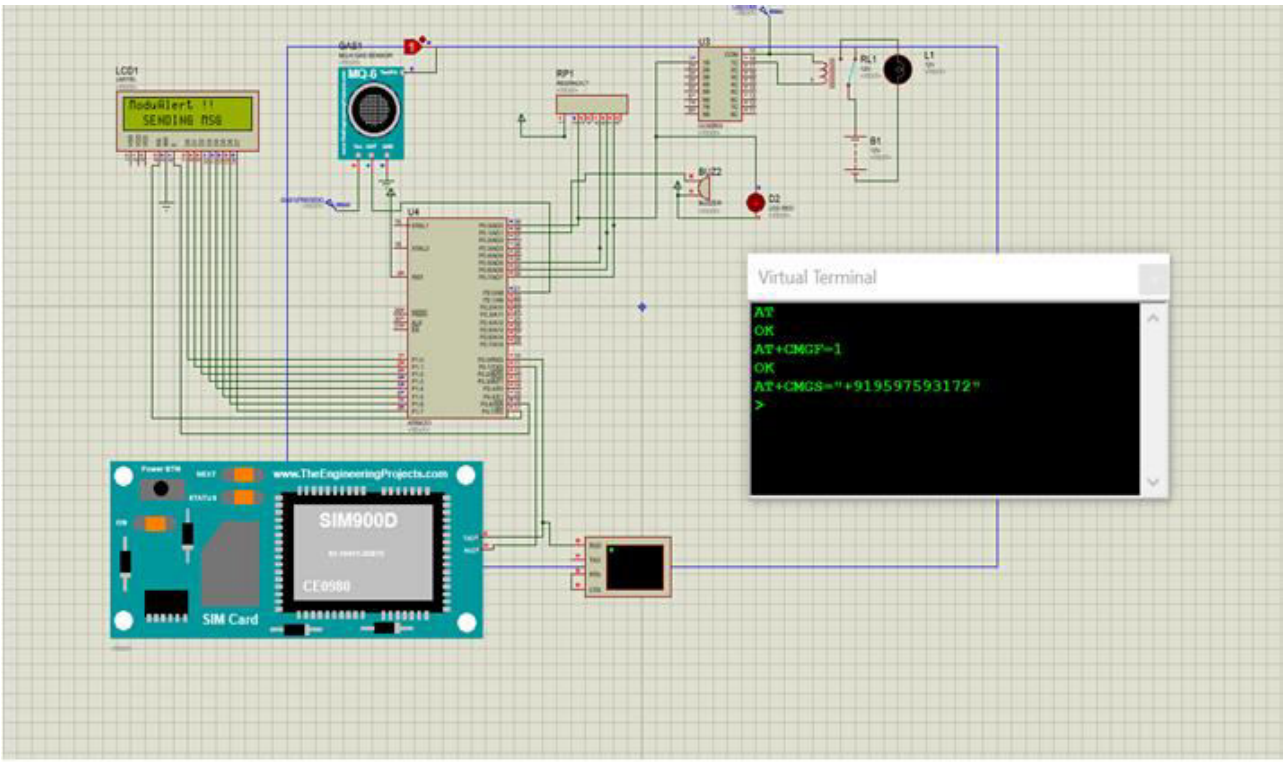


Fig. 3. OTP Entered Through Hex Keypad



The above figure displays the simulation result of our design in proteus, when a gas had been detected. When the logic is turned on manually by the user, the design gets excited and the entire module starts with the process as per the flow process diagram.

So, whenever the logic toggle is activated, it means that the gas has been detected. In that case, LED and buzzer is enabled as the instant form of output sensed. Led attached to the relay circuitry changes the state from, on to off which shows that the main supply had been turned off when the gas had been detected. It can be observed from the above screen that the virtual terminal outputs the message that has to be sent, with the mobile number of the desired person along with acknowledgement received from GSM module that the message had been successfully reached the other end.

VI. CONCLUSION AND FUTURE WORK

The theme of the paper when merged with certain established embedded technologies can be quite effective in a number of industries which possess a large working population in their manufacturing industries. Finally, we conclude in recent households and industries the use of LPG is taking a big troll. From the use of cylinders to the use of petroleum pipelines in industries. The biggest threat in using this technology is security. And our prototype will prove to be a blessing for numerous production sectors.

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A wide variety of gas leakage detections are available in the real time for surety implementation but all these methods come up with their own advantages and disadvantages. A wide variety of gas leakage detections are available in the real time for surety implementation but all this method comes up with their own advantages and disadvantages. Most are system are operational in external implementation through visual detection or portable based leakage detection but the detection time is very long. But the design that we have proposed using 8051 proved reliable, accurate as well as delay efficient in terms of detection, which will be a suitable choice for real time implementation.

This work is limited to the design of an efficient system for monitoring LPG leakage in a susceptible area, alerting the user and shutting down the gas supply using a microcontroller-based detection system. Future work can be a weighing scale (or its equivalent) be incorporated into the design to measure the amount of gas used or left in the gas tank or cylinder. Digital signal processing concepts can also be applied to the existing paper to extend the methodology further and be of extrinsic use to the industrial sector (gas plants)

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