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Protection from Leakages of Gas from LPG Cylinders

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***Abstract*- Every year accidents due to gas leak from LPG cylinders used in our household claims thousands of life and a huge amount of financial loss also takes place. A system which can help us to avoid such a disaster should be thought of and brought to the use of every common man. Thus our aim is to develop such a system which not only detects the leakage of gas from cylinder, or from any other source, but simultaneously takes the precautionary measures to avoid further major losses.**

INSPIRATION:

Given below are the stats published by National Crime Records Bureau (NCRB) of casualties happened due LPG cylinder blasts in India on 5th July 2012 edition of
The Times of India,

- **586 people died in Tamil Nadu**
- **735 in Gujarat**
- **386 in Karnataka**
- **52 in Kerala**

Overall, 632 such accidents involving LPG cylinder blast occurred in year 2011 claiming tens of thousands of life.
Thus LPG cylinder is a ticking bomb living in our home, precautions related to it should be our at most priority.

OBJECTIVES

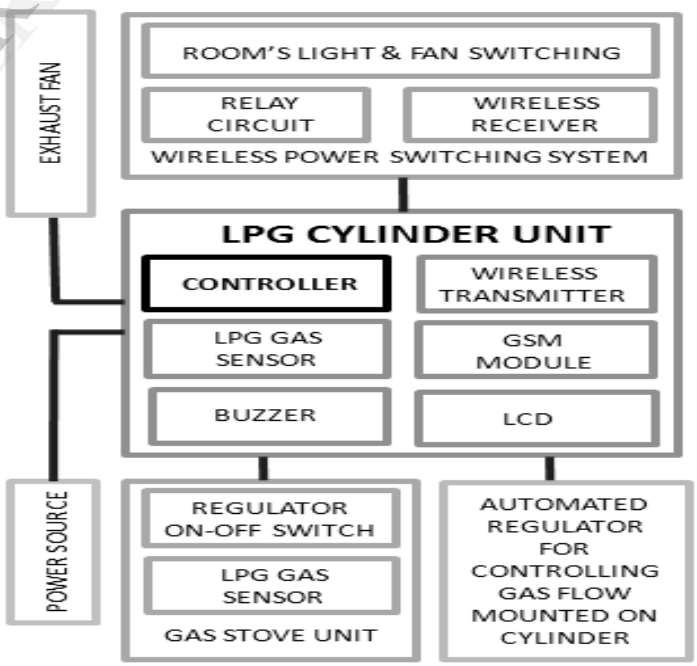
The primary aim of this project is to provide a good means for safely detecting any malfunction of a pressurized gas system, such as LPG cylinder, in order to prevent any accumulation of combustible gases so that damage or explosion due to such an accumulation of gases is avoided. Another object of this project is to provide accurate gas detection and monitoring system which is economical to manufacture and which can be installed with future LPG connections as well as with residing or old connections. Typical installation areas of this project are in user's production and utility areas like kitchens, gas banks, and gas yards with multi cylinders in storage, and automobiles running on gases.

OPERATION

As the gas leaks from the LPG cylinder under any circumstance, whether from cylinder hoze area, through gas pipeline or from the gas stove, the detection circuit mounted with gas detector sensor detects the gas leakage. We have provided two sets of gas sensors one on cylinder and other near the gas stove so as to get higher probability of gas leakage detection. As the gas leakage is detected through sensors, it conveys the signal to a controller placed near cylinder. Controller is used to absorb further actions such as;

- Automatic switching of the kitchen's power supply. As switching the plug on and off causes spark which in turns can help LPG to catch fire. For this controller communicates with any wireless module, e.g. Zigbee, ASK, CC2500, to operate relay circuit for switching off the power supply.
- Apart from switching off the lights, this protection circuit is equipped with a automatic mechanical regulator, which simultaneously blocks the gas flow from the cylinder so as to avoid further gas leakage.
- It is also equipped with a LCD display and a Buzzer which conveys audio and video warning as well.
- User will receive an alert message if any gas leakage is detected, as we have also configured a GSM module with the controller.
- Exhaust fan gets automatically turned on taking out the leaked gas.

BLOCK DIAGRAM



AUTOMATIC CYLINDER REGULATOR

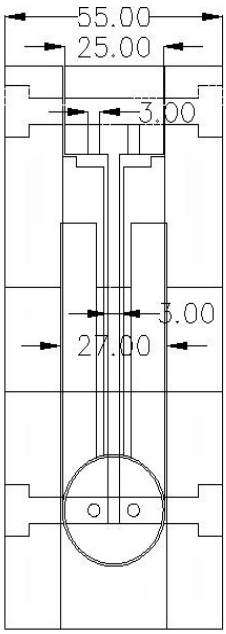


Fig.1

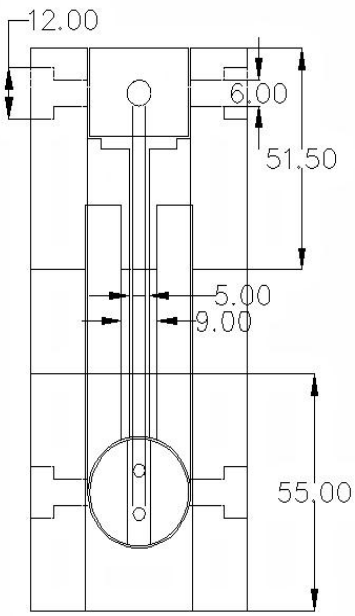
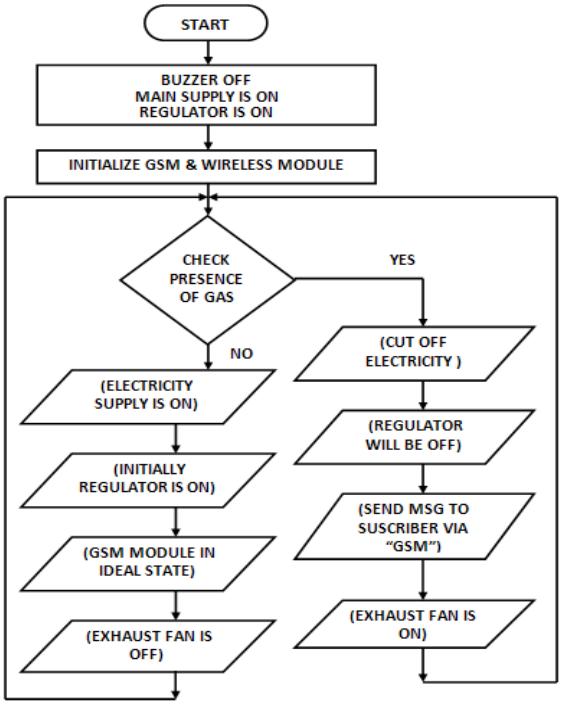


Fig.2

Above shown figures are the sketches of automatic cylinder regulator drawn using AutoCAD tools. As per the projects vision is considered, it will regulate the gas flow by turning the regulator nozzle to complete 90 degree rotation using a motor\. Fig.1 depicts the gas flow from the cylinder as the regulator nozzle is in the direction of gas pipeline. Fig.2 shows the nozzle of regulator turned to 90 degree, thus stopping gas flow towards gas pipeline. This regulator will be mounted directly on cylinder mouth, thus replacing conventionally used manual LPG regulators.

FLOW CHART

Various operation of the project is subjected through the flow chart drawn below.



ADVANTAGES

Since our main emphasis is on the protection regarding LPG leakages, thus this project can be implemented in any area where LPG usage is there. It can be used in homes, automobiles working on LPG cylinders, LPG manufacturing units, hotels, restaurants etc. Maintenance cost of such a system is very less. User is warned by the means of audio, visual and message signals. Switches OFF the power supply of the room as soon as gas leakage is detected. With automatic cylinder regulator, complete gas flow is stopped to avoid further accidents.

LIMITATIONS

Every electronic system requires power, so does our project. Every sensor's sensitivity depends on humidity and temperature hence gas sensors are also affected.

FUTURE SCOPE

We can make a network of this project which can be installed in educational premises, multi-storey buildings, factories etc. Also with the advancement in technology this project can be made more reliable as far as sensor choice is considered.

CONCLUSION

This system helps us to upgrade our safety standards and most important being the prevention from accidents and protection of life and property from disaster. A gas leak might take place wherever there are gas cylinders, causing a large explosion if the accumulation of combustible gas is not quickly noticed. There are some sophisticated detector available, but it is required that apart from the detection a system should be able to apply precautionary measure itself. Our project is capable of both detecting and preventing leakage of gas from cylinders. Thus it is a working prototype which can be optimized and made into a generic model. Such system can be installed with every existing and new connection of LPG cylinders.

ACKNOWLEDGEMENT

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