

## Remote Monitoring of LPG Cylinders

**Shital S. Mohite<sup>1</sup>, Gaytri V.Badgujar<sup>2</sup>, Pooja R.Jadhav<sup>3</sup>, Shruti S. Mohite<sup>4</sup>, Priyanka A. Bidwai<sup>5</sup>**

<sup>1,2,3,5</sup> Lecturer, Information Technology, PimpriChinchwad Polytechnic, India.

<sup>4</sup>Student, Computer Science, Baburavji Gholap College, India.

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Shital S. Mohite<sup>1</sup>, Gaytri V.Badgujar<sup>2</sup>,  
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**Abstract:** Liquefied Petroleum Gas is a source of energy used for cooking, heating and lightning. LPG is a colorless and odorless gas. However, a special odor has been intentionally added so that a potential leak can be detected easily. Cylinder Gas is present in both liquid and gas forms. When the device connected to the bottled gas starts to be used, the gaseous LPG at the top is depleted. The liquid LPG at the bottom evaporates to replace the depleted gas using the thermal energy it draws from its surroundings. Because LPG is a liquefied gas under pressure and has a boiling point of approximately 0 degree Celsius, it is in gaseous state at room temperature. This paper discusses different systems proposed for monitoring of LPG cylinders, using different technologies. Based on this discussion a new approach for monitoring of LPG cylinder is proposed.

**Key Word:** LPG, thermal energy, Remote Monitoring.

### I.INTRODUCTION

Monitoring of LPG cylinders enables remote control of gas level, which significantly improves the process of cylinder replacement on the consumer's side and at the same time increases the efficiency of stocks at the distributor. The concept is based on the IOT module(OKO CXX5 or APULSE Cxx5) integrated into the clesse automatic gas switch housing. The system is compatible with both low and high pressure switches. Cylinder status data and information on the need to replace the cylinder(or the replacement operation already carried out) shall be sent via IOT(LoRa, sigfox,NB-IOT) or GSM network. In addition, each IOT module is equipped with a Bluetooth BLE, which allows for comfortable walk by readout. Also there is a gas cylinder level sensor is attached to the bottom of the gas cylinder by magnets. Gas cylinder level sensor is a non-invasive level sensor. Instead of drilling holes into the gas cylinder, you can easily measure the remaining level height or volume by attaching the sensor to the bottom of the gas cylinder via a magnet. It can be connected with the mobile phone through Bluetooth to check the remaining liquid level in the gas cylinder with app or LED light. Suitable for various types of steel and aluminum LPG gas cylinders and composite gas cylinders. Quickly and precisely measures the gas level in kilograms and percent.

### II.MATERIAL AND METHODS

The concept is based on the IoT module (OKO Cxx5 or APULSE Cxx5) integrated into the Clesse automatic gas switch housing. The system is compatible with both low and high pressure switches. Cylinder status data and information on the need to replace the cylinder (or the replacement operation already carried out) shall be sent via IoT(LoRa, Sigfox, NB-IoT) or GSM network. In addition, each IoT module is equipped with a Bluetooth BLE, which allows for comfortable walk-by readout. Fast and efficient installation and convenient access to data is possible. There are some advantages of these system, remote control of the gas level in the cylinder, convenient access to data from the application, improving the procedure for replacing LPG cylinders for the consumer, increase the efficiency of supply planning, easy click-on installation, IoT wireless communication, GSM,BLE module for comfortable walk-by readouts.

**Gas Cylinder Level Sensor** is a non-invasive level sensor. Instead of drilling holes into the gas cylinder, you can easily measure the remaining level height or volume by attaching the sensor to the bottom of the gas cylinder via a magnet. It can be connected with the mobile phone through Bluetooth to check the remaining liquid level in the gas cylinder with APP or LED light. Non-invasive measurement. It truly realizes external Non-contact level measurement. Suitable for various types of steel and aluminum LPG gas cylinders and composite gas cylinders. Quickly and precisely measures the gas level in kilograms and per cent. The sensor is attached to the bottom of the gas cylinder by magnets. In less than 5 seconds, you can figure out the tank's liquid level or the remaining volume. It can connect to your phone via Bluetooth. Automatic alarm for liquid level. When the gas in the propane bottle is nearly used up, the gas cylinder level sensor will automatically alarm. Gas Cylinder Level Remote Monitoring is a set of hardware and software solutions for the measurement of LPG (Propane) bottle residual liquid level and the wireless transmission of liquid level information.

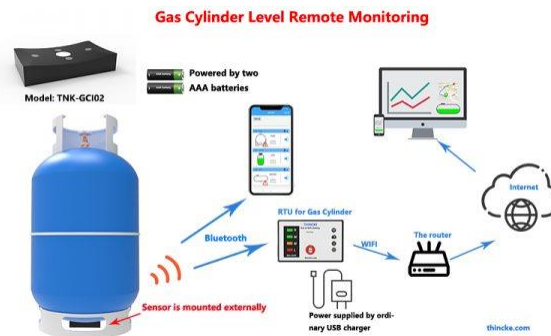


Figure1.System Architecture



OKO Cxx5/APULSE Cxx5 - AIUT

## Main advantages:

- Easy to assemble - click on
- Long battery life (up to 10 years)
- Bluetooth Low Energy
- Suitable for outdoor work
- ACO compatible with high and low pressure
- ATEX certificate



*TNK-GCi03 Integrated Type Gas Cylinder Level Sensor*

## Procedure methodology

Gas Cylinder Level Sensor is a device for measuring the residual liquid level of the gas cylinder propane bottle. Gas Cylinder Level Sensor is a non-invasive level sensor. Instead of drilling holes into the gas cylinder, you can easily measure the remaining level height or volume by attaching the sensor to the bottom of the gas cylinder via a magnet. It can be connected with the mobile phone through Bluetooth to check the remaining liquid level in the gas cylinder with APP or LED light. Non-invasive measurement. It truly realizes external Non-contact level measurement. Suitable for various types of steel and aluminum LPG gas cylinders and composite gas cylinders. Quickly and precisely measures the gas level in kilograms and per cent. The sensor is attached to the bottom of the gas cylinder by magnets. Gas Cylinder Level Sensor solves the problem of how to measure the remaining liquid level in a Propane Bottle. In less than 5 seconds, you can figure out the tank's liquid level or the remaining volume. It can connect to your phone via Bluetooth. Automatic alarm for liquid level. When the gas in the propane bottle is nearly used up, the gas cylinder level sensor will automatically alarm. It can also upload liquid level information to the Internet. Convenient management of LPG operators, increase user stickiness. Gas Cylinder Level Remote Monitoring is a set of hardware and software solutions for the measurement of LPG (Propane) bottle residual liquid level and the wireless transmission of liquid level information. Properly monitoring and managing levels inside these tanks can help owners and asset managers increase productivity and profitability. It can increase user stickiness and improve the service level of LPG operation. The Remote Terminal Unit for gas cylinder is an advanced wireless transmission module, which connects with the Gas Cylinder Level Sensor through Bluetooth and transmits the level data to the Internet, so as to realize the data transmission of Propane Bottle usage data.



*RTU for Gas Cylinder*

## Remote Monitoring of LPG Cylinders

The Remote Terminal Unit for gas cylinder is an advanced wireless transmission Gateway(WIFI+Bluetooth Gateway). It connects with the cylinder level sensor through Bluetooth and transmits the liquid level data to the internet through WIFI, so as to realize the remote data transmission of propane cylinder usage data.

- WIFI+Bluetooth Gateway
- Easy to use
- It can be used at no extra cost and is transmitted via a home router.
- Real-time display of liquid level information
- Power supplied by ordinary USB charger.

### Gas Cylinder Level Sensor(TNK-GCi03)

- Clean the bottom of the gas cylinder to ensure there are no impurities and keep the surface flat.
- The sensor is attached to the bottom of the gas cylinder.
- Turn on the switch to start the operation, you can choose to connect the phone through Bluetooth.

## III.ADVANTAGES OF THE SYSTEM

- Remote control of the gas level in the cylinder
- Convenient access to data from the application
- Improving the procedure for replacing LPG cylinders for the consumer
- increase the efficiency of supply planning
- higher stock performance on the distributor side
- compatibility with ACO cylinder switch for high and low pressures
- easy click-on installation
- IOT wireless communication,GSM
- BLE module for comfortable walk-by readouts

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