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# *A Study on Smart Trolley with Internet of Things for LPG Gas Monitoring and Leakage System*

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***Abstract***

*In recent decades, Android and IoT app development has become a source of concern. IoT is a continuous platform for every new technology in the IT sector. With the new entrance of technology in the sphere of Science and Technology, mankind is becoming smarter. Security-related appliances are becoming an important consideration. The Internet of Things (IoT) is a server-client ecosystem that enables data transmission across all networked objects. Leaks of natural gas can be detrimental to one's health and the environment. Natural gas leaks into the atmosphere are extremely dangerous since they have the potential to cause global warming. As a result, high-level detection and prevention mechanisms for methane are required, particularly for household applications. The Smart Trolley for LPG gas monitoring and leakage detection system is the ideal solution for detecting methane leakage in a fraction of a second. The trolley is also used for data reading, in addition to fire detection.*

***Keywords:*** *Firebase Database, Security, Arduino, HX711, Flame Sensor, Gas Sensor, ESP8266*

## INTRODUCTION

The IoT-based Smart Trolley for LPG Gas Monitoring and Leakage System detects and prevents methane gas and its causes. The gas sensor for LPG gas leakage and the flame sensor for fire and smoke detection are the two main sensors in the smart trolley. Both sensors will be

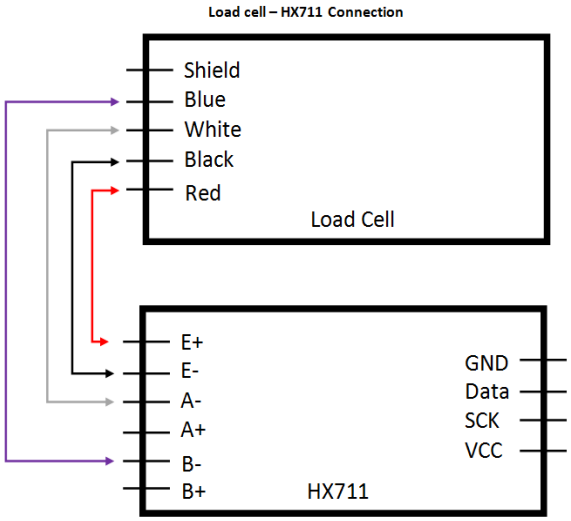
connected to an LCD display, which will show the weight of the LPG gas cylinder. The data will be sent from the ESP8266 to a Firebase database server, where it will be retrieved and displayed via an Android mobile app. If an unprotected action, such as a fire, occurs, the system will notify both the server and client side applications. The smart trolley is a portable device that houses all of the hardware. In the case of manual LPG gas cylinder delivery; there is a high risk of fraud because the cylinder's weight may differ from the stated reading. In such circumstances, clients are unaware of the importance of checking the reading, therefore IoT-based applications can assist them.

## LITERATURE REVIEW

Because the system is built on IoT sensors, data reading is critical. There are numerous sensors on the market. This project will make use of several sensors, including a gas sensor and a flame sensor. The HC05 and ESP8266 were used to connect to the database. Because the ESP8266 is always connected to WIFI, portability is possible in the case of the ESP8266 wife Module. There are many LCDs available for data display, such as 16X2, 8X2, 4X4, 2X2. The weight measurement is done using the load cell. All of the hardware and sensors have a 5V operating voltage and a 9600 operational frequency.

## ARDUINO Connectivity

Various boards are available for hardware and software communication. The greatest board for communicating with hardware and software is Arduino. Sensor pins are divided into two categories. 1. Analog 2. Digital.

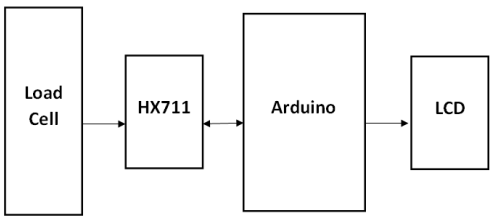



## ALGORITHM

1. start

2. maxfs=0
3. maxld=100
4. minld=10
5. do
6. read data : fs=Flame Sensor
7. read data : ld=HX711
8. lcd: 1
9. out:lcd<- fs,fd
10. if fs>max(fs)
11. do
12. alert buzzer:fs
13. end
14. if ld<min(ld)
15. do
16. alert lcd display:HX711
17. end
18. out:fs.firebase
19. out:ld.firebase
20. end:loop
21. stop

## BLOCK DIAGRAM




## LIMITATION

For data reading, the sensor's accuracy requires extra attention. Internet access must be necessary for both the mobile application and the ESP8266. The ESP8266 only works with the wifi module, which requires data connectivity. The load cell operates with a little amount of weight.

## FUTURE SCOPE

Mobile applications with database connectivity are the way of the future. Using various methodologies and techniques, further capabilities such as data analysis and maintenance are achievable. Advance sensors will improve data reading as well as data traversal on the internet. By connecting HX711 to high voltage and frequency, load cell performance can be increased.

## CONCLUSION

Fire detection and prevention are critical components for both home appliances and industrial businesses. LPG powered by Arduino Sensors such as the flame sensor and gas sensor are used to detect gas levels. The data readout can be shown on the LCD. The connection of Firebase to the server enables data transformation between the database and the mobile application. Mankind can check the system's reading from anywhere on the planet.

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