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INTERNET OF THINGS (IOT) BASED REAL TIME GAS LEAKAGE MONITORING AND CONTROLLING

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ABSTRACT : Although the majority of Indians utilize Liquefied Petroleum Gas (LPG) as a cooking fuel, the technology used in this area (security) is extremely limited in India. Liquefied petroleum gas is a combustible gas that poses a risk of explosion. "As a result, it's critical to understand the characteristics of LPG and how to safely handle it in both residential and commercial/industrial settings.''

The goal of the proposed study is to create a prototype that uses electrical sensors to continuously monitor a gas leak. This information is made accessible in real time through real-time internet streams. We plan to transmit real-time sensor data via the internet using Xively (a new platform). When a gas leak or fire break out situation is identified, the sensor monitors, detects, and raises an alert. After then, it sounded an emergency alert. The emergency alarm situation may be managed with appropriate planning and sending an alert message to the rescue team, which might be an in-house team. The user may quickly look at the history of data and precisely identify the time and date at which the emergency situation happened using the real-time data stream linked to Xively. This information helps in determining the underlying cause of the emergency situation. This information aids in quickly identifying the source of the emergency situation. So that the whole extent of the danger may be understood.

Keywords: Internet of Things (IOT), Xively.

I. INTRODUCTION

1.1 InternetofThings (IOT)

In an Internet-like framework, the Internet of Things refers to individually identifiable items and their virtual representations. Kevin Ashton coined the phrase ''Internet of Things'' in 1999. The Auto-ID Center at MIT and associated market analysis journals were the first to popularize the idea of the Internet of Things. Computers could manage and inventory all things and persons in everyday life if they were all supplied with IDs. Near-field communication, barcodes, QR codes, and digital watermarking are all examples of technologies that may be used to tag objects. By 2020, more than 30 billion gadgets will be wirelessly linked to the Internet of Things (Internet of Everything), according to ABI Research. From July 2013 through July 2020, Cisco developed a dynamic connections counter to monitor the anticipated number of linked objects.

The Internet of Things (IoT), often known as the Internet of Objects, is set to transform everything, including ourselves. This may seem to be a bold statement, but consider the Internet's effect on education, communication, business, research, governance, and mankind. Without a doubt, the Internet is one of the most significant and powerful inventions in human history. The Internet of Things (IoT) is the next step in the development of the Internet, allowing us to collect, analyze, and share data that we can convert into information, knowledge, and, eventually, wisdom. In this setting, the Internet of Things (IoT) becomes very essential. IoT initiatives are now underway that promise to enhance the allocation of the world's resources to those who need them the most, as well as aid our understanding of our planet so that we can be more proactive rather than reactive. Despite this, a number of roadblocks remain that threaten to stifle IoT growth, including the move to IPv6, the lack of an uniform set of standards, and the creation of energy sources for millions, if not billions, of tiny sensors.

Currently, the Internet of Things is made up of a jumble of disparate, purpose-built networks. Multiple networks, for example, regulate engine operation, safety features, communications systems, and so on in today's vehicles. Heating, ventilation, and air conditioning, as well as telephone service, security, and lighting, are all controlled by different control systems in commercial and residential buildings. As the Internet of Things progresses, these networks, as well as many others, will be linked with enhanced security, analytics, and management capabilities. As a result, the Internet of Things will be able to help individuals accomplish even more. The Internet of Things may be seen as a network of networks. This scenario is very similar to what the technology sector faced in the early days of networking. Cisco, for example, built itself in the late 1980s and early 1990s by connecting different networks together using multi-protocol routing, ultimately leading to IP as the universal networking standard. With the Internet of Things, history is repeating itself, although on a far larger scale.

The integration of things to create a smart environment will be the next revolution. The number of linked gadgets on the globe only surpassed the actual number of people in 2011. There are now 9 billion linked devices, with the number projected to rise to 24 billion by 2020. The development of the Internet was a major step toward realizing ubicomp's vision of individual gadgets being able to interact with any other device on the planet. The interconnection shows the possibility of an almost infinite number of dispersed computer resources and storage held by different people.

1.2 Xively

Xively is a service platform built for the IoT. According to their website, this includes directory services, data services, a trust engine for security, and web-based management application. A new common cloud platform dubbed Xively cloud services aims to provide a common ground through which any device connected to the internet cloud actually communicates with any other device. Xively is an old fixture within the internet of things ecosystem, as it's actually a new commercial version of the older non-commercial cosm platform, which in turn used to be known as pachube until xively's current owner logmein purchased pachube in 2011.

1.3 LiteratureSurvey

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Peter Hartwell Senior Researcher, from HP Labs, concluded IOT as with a trillion sensors embedded in the environment all connected by computing systems, software, and services. It will be possible to hear the heartbeat of the Earth, impacting human interaction with the globe as profoundly as the Internet has revolutionized communication.

Mark Weiser, the forefather of Ubiquitous Computing (ubicomp), defined a smart environment as the physical world that is richly and invisibly interwoven with sensors, actuators, displays, and computational elements, embedded seamlessly in the everyday objects of our lives, and connected through a continuous network.

M. Zorzi, A. Gluhak, S. Lange, A. Bassi, From Today's Intranet of Things to a Future Internet of Things described as Every element that is already connected and those that are going to be connected, must be identified by their unique identification, location and functionalities. The current IPv4 may support to an extent where a group of cohabiting sensor devices can be identified geographically, but not individually. The Internet Mobility attributes in the IPV6 may alleviate some of the device identification problems. However, the heterogeneous nature of wireless nodes, variable data types, concurrent operations and confluence of data from devices exacerbates the problem further.

According to Cluster of European research projects on the Internet of Things ,'Things' are active participants in business, information and social processes where they are enabled to interact and communicate among themselves and with the environment by exchanging data and information sensed about the environment, while reacting autonomously to the real/physical world events and influencing it by running processes that trigger actions and create services with or without direct human intervention.

According to Forrester, a smart environment uses information and communications technologies to make the critical infrastructure components and services of a city administration, education, healthcare, public safety, real estate, transportation and utilities more aware, interactive and efficient.

Gas leaks can cause major incidents resulting in both human injuries and financial losses. To avoid such situations, a considerable amount of effort has been devoted to the development of reliable techniques for detecting gas leakage. As knowing about the existence of a leak is not always enough to launch a corrective action, some of the leak detection techniques were designed to allow the possibility of locating the leak. The main purpose of this paper is to identify the state-of-the-art in leak detection and localization methods.

The one way to avoid the leaking of LPG is by developing an automatic system, whenever the system detects the increase in the concentration of the LPG it immediately alerts by activating an alarm and simultaneously sending message to the specified mobile phones and the exhaust fan is switched on.

The design of a wireless LPG leakage monitoring system is proposed for home safety. The system detects the leakage of the LPG and alerts the consumer about the leak and as an emergency measure the system will switch on the exhaust fan and also checks the leakage. The system makes use of IOT concept in order to alert about the gas leakage via Twitter. Whenever the system detects

the increase in the concentrationof the LPG it immediately alerts by activating an alarm and simultaneously sending message to the specified mobile phones. The exhaust fan is switched on and an LPG safe solenoid valve fitted to the cylinder is given a signal to close avoiding further leakage. The device ensures safety and prevents suffocation and explosion due to gas leakage. The one of the disadvantages associated with this system its gives alerts only when actually gas leak starts, so if inbox of the mobile is full then this system fails, hence the user not comes to know the Gas leakage whenever they are far away.

Xively is a secure, scalable platform that connects devices and products with applications to provide real-time control and data storage. Based on the real time data feed connected to Xively, user can easily look at the history of data and accurately determine the time and date at which gas leak started. This data helps in easily locating the root cause of the gas leak.

II. SYSTEM METHODOLOGY

This section deals with the system architecture of Real time gas leakage monitoring and controlling system.

Initially if there is a gas leakage then the electronic sensor i.e. the gas sensor that obeys the principle of LPG sensor that senses any gas leakage from storage, the output of this sensor goes high. This high signal is monitored by the microcontroller and it will identify the gas leakage.

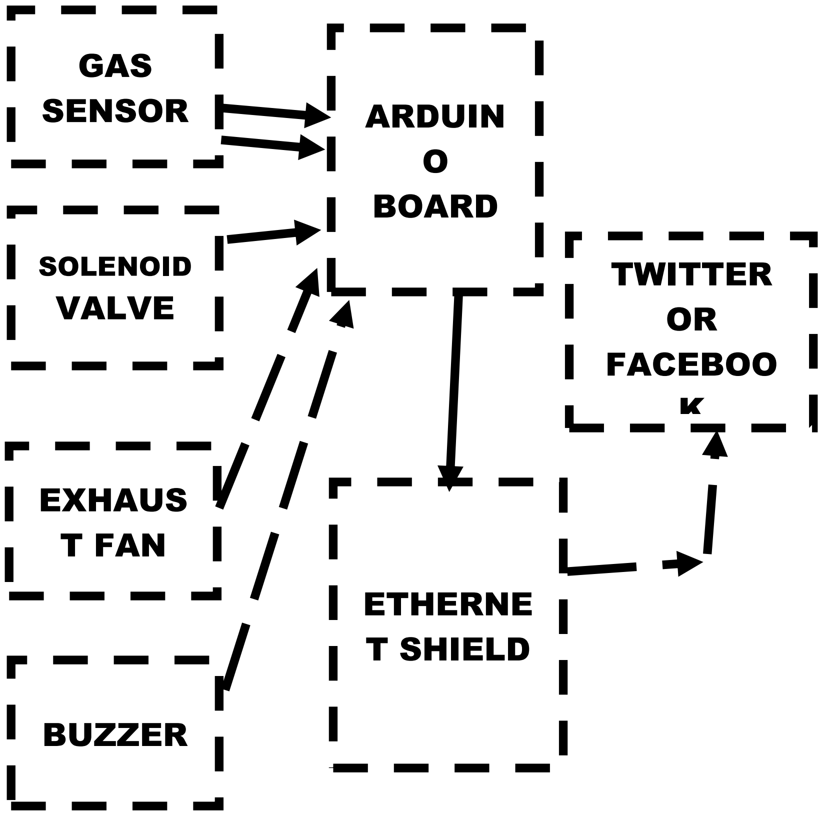

Fig : Block diagram of the Implementation

It raises the emergency alarm that is buzzer (It is an electronic device that makes buzzing noise which is used for signaling. It may be mechanical, electromechanical or piezoelectric), turns on the exhaust fan (The LPG is pushed out into the environment using an exhaust fan which reduces the concentration of LPG near the leakage area) and simultaneously solenoid shuts down (A solenoid valve is an electromechanical device used for controlling liquid or gas flow. The solenoid valve is controlled by electrical current, which is run through a coil. When the coil is energized, a magnetic field is created, causing a plunger inside the coil to move).These are the house rescue teams during the time of hazard, in order to signal and change or replace the interior air.This information will be fed to our account throughXively(Xively aims to provide a common ground through which any device connected to the internet that actually communicates with any other device). The account may be in Twitter or Facebook through internet(i.e. date and time of hazard will be sent).The Ethernet shield connects to an Arduino board using long wire-wrap headers which extend through the shield. This keeps the pin layout intact and allows another shield to be stacked on top. The shield also includes a reset controller, to ensure that the W5100 Ethernet module is properly reset on power-up. Then the system feeds the result to our account.

III. FLOW DIAGRAM

The flow diagram shown in the figure below describes the system methodology. Figure 3 explains the complete overview of the system with its operation. Here the flow diagram is explained step wise below.

Step 1: Initially we have to set all the hardware components initially to 0.

Step 2: If there is a gas leakage then the gas sensor sense the leakage the simultaneously sends the message to Arduino. This sends information to hardware system that is buzzer,solenoid valve and the exhaust fan. Where all gets activated.

Step 3: This precaution and real time information is send to xively. So that the owner comes to know the exact cause and value of leakage.

Step 4: For more secure, the message is send to owner's tweeter and facebook account. so that he can access the data any corner of the world.

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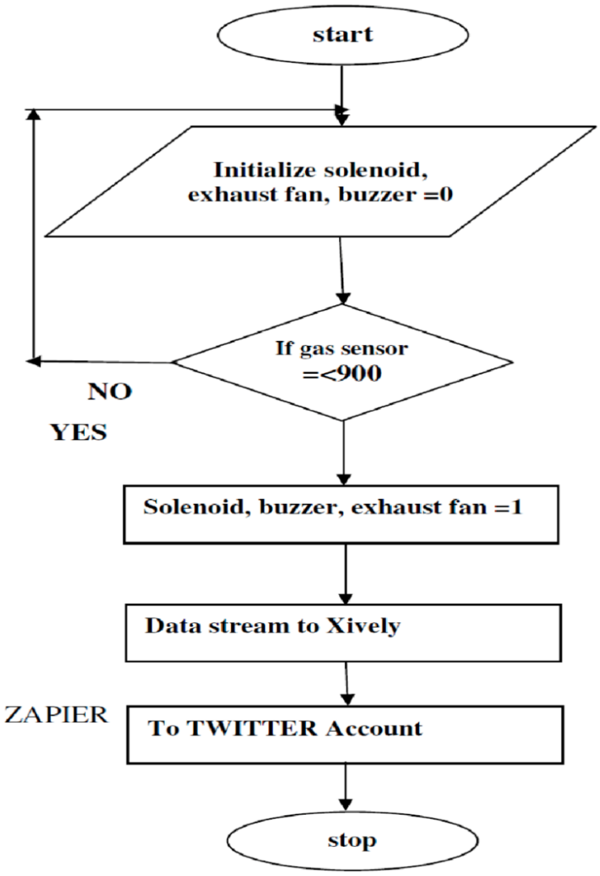

Fig: Flow diagram of system methodology

IV. CONCLUSION

Liquefied petroleum gas is a flammable gas, which has the potential to create a hazard. Therefore it is important that the properties and safe handling of LPG are understood and applied in the domestic and commercial/industrial situations. So we developed a prototype of an automatic embedded system that constantly monitors the gas leak status with the help of the electronic sensors. This data is made available real time through real time feed over the internet.

The Internet of Things refers to uniquely identifiable objects and their virtual representations in an Internet-like structure. Internet of Things also referred as Internet of Objects which connects Any Thing, Any Time from Any Place which will be very popular in the coming years.

Xively is a secured scalable platform which includes directory services, data services, a trust engine for security, and web-based management application. It is aimed to provide a common ground through which any device connected to the internet cloud actually communicates with any other device. Xively is an old fixture within the internet of things ecosystem.Gas sensor senses the gas leakage and alerts the house rescue team which are buzzer and exhaust fan. From this the gas will be changed and replaced from the interior.

A solenoid valve is an electromechanical device used for controlling liquid or gas flow. When the coil is energized, a magnetic field is created, causing a plunger inside the coil to move. When electrical current is removed from the coil, the valve will return to its de-energized state. Here using this concept one can easily know the exact date and time of the hazard.

Future Work

The Internet of Things (IoT), often known as the Internet of Objects, is set to transform everything, including ourselves. This may seem to be a bold statement, but consider the Internet's effect on education, communication, business, research, governance, and mankind. Without a doubt, the Internet is one of the most significant and powerful inventions in human history.

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