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Gas leakage detector using pressure transducer in PLC

P.KOKILA[1], D.ANURATHA[2], M.S.DINESHKUMAR[3], S.MAYILVEL[4], R.PRASAD[5]

[1]Assistant Professor, [2,3,4,5]UG students

[1,2,3,4,5]DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING,

[1,2,3,4,5]NANDHA ENGINEERING COLLEGE(AUTONOMOUS)ERODE-52

E-mail id:kokila.paramasivam@nandhaengg.org, anuma4131@gmail.com

Abstract:Gas leakage is a major problem with industrial sector, residential premises etc. One of the preventive methods to stop accident associated with the gas leakage is to install a gas leakage detection kit at vulnerable places. Delays in detecting leakage on pipeline may lead to more serious matters such as fire and fatality. The aim of this project is to present such a design that can automatically detect, alert and control gas leakage. The system can also be used for other application in the industry or plant that depends on natural gas in their operation. These project allow a remote facility to detect and to report leakages. Automation in buildings began long before recorded time, with the help of microprocessors. The use of dedicated software for safety and control applications began with the technological advancement in the field of PLC. This project not only detecting the leakage, it also take the control actions to shut of the process. By stopping the process it can avoid the development of crack.

Key words:PLC, Pressure transmitter, Solenoid valve, Indication lamp.

I. Introduction

A programmable logic controller, **PLC** or programmable controller is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. PLCs are used in many industries and machines.

Safety has always been an important criteria while designing home, buildings, industries as well as cities. The increased concentration of certain gases in the atmosphere can prove to be extremely dangerous.These gases might be flammable at certain temperature and humidity conditions, toxic after exceeding the specified concentrations limits or even a contributing factor in the air pollution of an area leading to problems such as smog and reduced visibility which can in turn cause severe accidents and also have adverse effect on the health of people.

In order to have a control over such conditions thispaper proposes a system that uses an pressure transmitter and solenoid valve for gas leakage detection and rectify by shut down the defected valve.

II.LITERATURE REVIEW

LITERATURE SURVEY:

Safety plays a major role in today's world and it is necessary that good safety systems are to be implemented in places of education and work. This work modifies the existing safety model . The main objective of the work is to design in PLC detecting and preventing system. The advantage of this automated detection and alerting system over the manual method is that it offers quick response time and accurate detection of an emergency and in turn leading faster diffusion of the critical situation.

2.1 Related Work

Home automation or smart homes (also known as domestic) can be described as introduction of technology within the home environment to provide convenience, comfort, security and energy efficiency to its occupants. With the introduction of IOT, the research and implementation of home automation are getting more popular. Various wireless technologies that can support some form of remote data transfer, sensing and control such as Bluetooth, wifi, and cellular network have been utilized to embed various levels of intelligence inthe home. The studies have presented Bluetooth based home automation system using android smart phones without the internet controllability. The devices are physically connected to Bluetooth sub controller which is then accessed and controlled by smart phone using built in Bluetooth connectivity. Researchers have also attempted to provide network interoperability and remote access to control devices and appliances at home using home gateways. Lately fewresearchers have also presented the use of Web services, simple object access protocol (SOAP) and representationalstate transfer as an interoperable application layer to remotelyaccess home automation system.

2.2 Existing System

2.2.1 Scope

When things like household appliances are connected to network, they can work together in cooperation to provide theideal service as a whole, not as a collection of independentlyworking devices. This is useful for many of the real-worldapplications and services, and one would for example apply it to build a smart residence; windows can be closed automatically when the air conditioner is turned on, or can beopened for oxygen when the gas oven is turned on. The idea of IOT is especially valuable for persons with disabilities, as IOT technologies can support human activities at larger scalelike building or society, as the devices can mutuallycooperate to act as a total system. So far, much work has been done on realizing.

2.2.2 IOT architecture

There is a existing system which introduces the IOT architecture, a new IOT framework that aims to provide a solution and a new way to let the existing embedded systemsbe integrated into the IOT network.

Technology Used:

The system is proposed of an Android Smartphone usersmobile app will be developed in android. MySQL will be used for maintaining database.

III.DESIGN AND IMPLEMENTATION

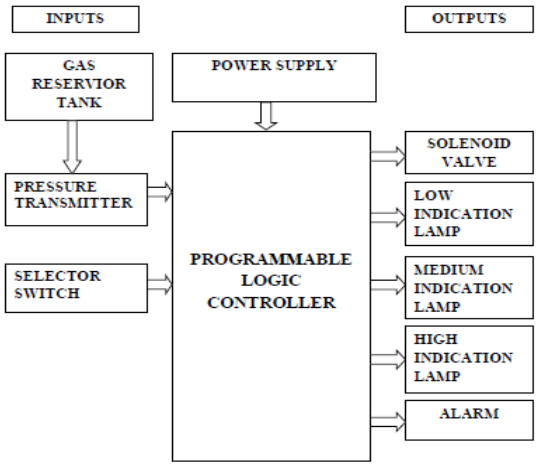

FIG 1: BLOCK DIAGRAM OF PROPOSED SYSTEM

This method consists of pressure Transmitter, PLC (Programmable logic controller), Solenoid Valve and Indication lamp, which are used for detecting and controlling gas leakage in entire pipeline. The main basic PLC requires the power supply ranging can be 10 kHz on a single input. The Main platform we are using to build the project in PLC which gives us the flexibility to write the code more effectively in convenient way. It also provides us features like Inexpensive, Cross platform, Simpler and clear programming environment, Open source and extensible software easy for beginners. PLC is a digital computer used for automation of typically industrial electro mechanical processes. The another main component we are using in our project is use of Pressure transmitter. A Pressure transmitter is a transducer , which is used to measure pressure of a gas in pipeline.It is also called pressure transducer

which changes the physical variable “Pressure” into a quantity that can be processed electronically. It continuously gives the pressure of the gas flow in the pipeline. In this project, Solenoid valve is use to shut off the gas leakage in the entire pipepine. The gas flows through a small orifice which can be closed off by a plunger with a rubber gasket on the bottom. The gas reservoir tank is used to hold the gas and it acts as an input for this project. The indication lamps are used to indicate the level of leakage in pipeline. Three level of indication lamps are used for indicating the gas leakage. Selector switch is used for on/off purpose.

3.1 PLC

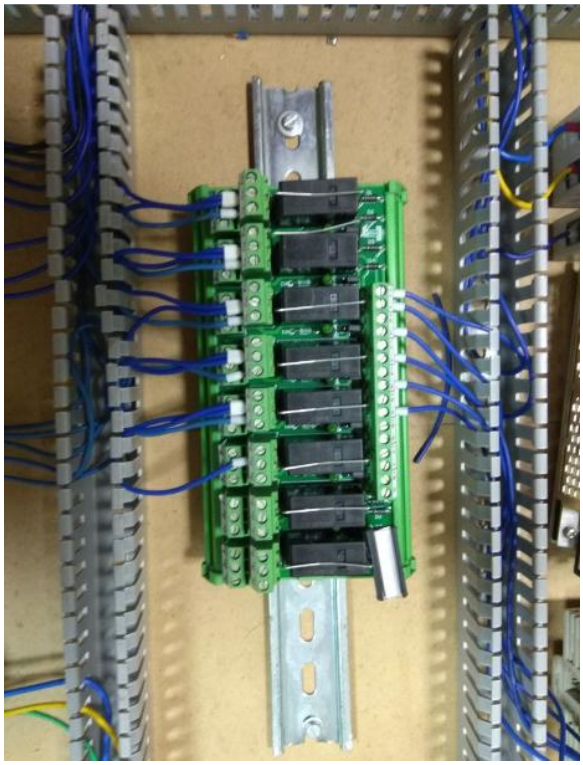

FIG 2 : PROGRAMMABLE LOGIC CONTROLLER

PLCs are designed for multiple analogue and digital inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operation are typically stored in battery backed-up or non-volatile memory. A PLC is an example of a "hard" realtime system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result. The Power Supply is a module located in the PLC system module rack. The DC power (voltage and current) it provides power the other modules in the rack, such as the CPU, Co-processor Modules, and I/O Modules. The processor makes decisions based on a "ladder logic" program written by the user.

3.2 Pressure Transmitter

Pressure transducers are an advanced form of the pressure sensor element. The simplest form of an electronic pressure measurement system is the pressure sensor. It is the pressure sensor which changes the physical variable “pressure” into a quantity that can be processed electronically. A pressure transducer is the next level of sophistication. In a pressure transducer, the sensor element and housing are in electrical contact and have a pressure connection. Typical output signals from pressure transducers [WJ2] are between 10 mV and around 100mV, depending on the sensor type. These signals are not standardized, however, nor are they compensated. With thin-film type pressure transducers it is customary for just the sensor element to be welded to the pressure connection and then bonded electrically. Piezoresistive pressure transducers, on the other hand, require far more production steps since the semiconductor sensor element has to be protected from the effects of various media by a chemical seal.

3.3Solenoid valve

Solenoid is the generic term for a coil of wire used as an electromagnet. It also refers to any device that converts electrical energy to mechanical energy using a solenoid.

The valve is usually connected in the process flow pipeline to control the flow of certain fluid like liquid or air. Ordinarily the flow from the valve is controlled by the handle, but in case of the automatic valve the solenoid valve is connected to the valve.

3.4 Indication Lamp

Indication lamp are used for level of gas leakage in the pipeline. It has a three level of indication low level, medium level, high level.

3.5 Alarm

A alarm is a mechanical, electro mechanical, magnetic, electromagnetic, electro-acoustic or piezoelectric audio signaling device. A piezo electric buzzer can be driven by an oscillating electronic circuit or other audio signal source. A click, beep or ring can indicate that a button has been pressed.

3.6 Power supply

power-supply modules are designed and rated to operate with their inputs connected to lines delivering 105 to 125 Vac. Most 115-Vac power systems maintain line voltage within that range. However, line voltage for heavily loaded systems can drop below 105 V, and line voltage for lightly loaded systems or for systems close to utility substations may rise appreciably above 125 V. When connected to a low-voltage line, a regulated power supply may not produce rated dc output voltage and power supplies tend to overheat when subjected to high line voltage.

IV. RESULT AND CONCLUSION

In this paper we have used gas leakage and detection with alert system without human intervention. Our system helps customers to upgrade their safety and protect life and property from reputed accidents.The main aim is used to detecting the gas leakage in the entire pipeline by using pressure transducer to identifying the leakage surface by holding the gas flow under the pipeline in leaking area . The gas agency gets the order of new cylinder and owner received the messages regarding the status .Thus the system developed by us will somehow help the industry consumer to lead a safety life and comfortable life.

V. FUTURE SCOPE

Voice feedback system can be included in PLC based and leakage detection system. User will get intimation through pre-recorded voice messages like “Gas leakage is deteced”.

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