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Industrial Safety Application Using Ardunio (UNO R3)

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Abstract: ***The aim of this work is to mitigate the destruction engendered due to fire outbreaks in industries like petroleum, chemicals, oil which leads to loss of life and property. It is very important to have some system that can keep the industry premises secure and also to notify the authorized people within the stipulated time in case of an emergency. The IOT industry The IOT industry protection system using Arduino is a system designed to protect industries from losses due to accidents using Internet of things. Gas leakages may lead to fires leading to huge industrial losses, also instant fire detection is needed in case of furnace blasts or other conditions. Also low lighting in industries may create improper work conditions increasing the probability of accidents. The system makes use of Arduino to achieve this functionality. The system makes use of temperature sensing along with light are gas sensing to detect fire, gas leakage as well as low lighting to avoid any industrial accidents and prevent losses. The system consists of light, gas and temperature sensors interfaced with arduino and LCD screen. The sensor data is constantly scanned to record values.***

I. INTRODUCTION

Internet of Things (IoT) is a network in which all physical objects are connected to internet through network devices or routers and exchange data. IoT allows objects to be controlled remotely across existing network infrastructure. It mollifies human effort and enables easy access to physical devices. It also has autonomous control feature by which any device can control without human interaction. The versatility of IoT has become very popular in recent years because of its low power embedded system, cloud computing, availability of big data networking condition. IoT can be any device with any kind of built-in-sensors with the ability to collect and transfer data. An industrial safety system is a counter measure crucial in any hazardous plants such as oil and gas, nuclear plants. They are used to protect human, plant and environment in case the process goes beyond the control margin. Mechanical Engineering is primarily concerned with industries and their applications. This prototype will benefit the above requirements. The best way of preventing accidents is to be aware of your surroundings. The environmental care has become one of the prime concerns for almost every country in the last decades. Even though the number of industrial accident has been increasing in the last few decades, the current scenarios in the industry have not improved. They tend to be more a dangerous environment rather than a safe one even with a wide range of modern technologies. Recently the current industries have been demanding sophisticated instrumentation for monitoring and control of environmental risk parameters in the danger-prone areas. Human safety and property losses are the essential to maintain a balance between industry and industrial environments.

II. LITERATURE SURVEY

1) Accidents occurring in most Indian industries are a source of concern to everyone. Industries that take worker's safety and health issues into consideration have a long run. Palanivelu Rajmohan [1], in his paper a survey was initiated in different industrial sectors to obtain reliable data for the research. The results show that the main criteria "Human safety acquired a weight of 72.5% while the respective weights of primary criteria machine security and work environment safety fall to 8.9% and 18.4%."
2) It is not only used in industries but also in cold storages. Due to increase in concerns of food safety, supply chain management has been developed to integrate with the refrigeration and environmental monitoring especially in the storage and transportation.
3) Y. P Tsang, K. L. Choy [2] propounded the IoT model to ensure occupational health and safety, the limited duration exposure and monitoring review cycle can be customized according to the personal health status of worker. In order to ensure the occupational health and safety in cold storage facilities, the IoT environment is management with real time information exchange and information.
4) A paper by S. Arun Mozih [3] has demonstrated the feasibility of wireless conditioning monitoring system for application in high voltage electrical substations. This system can be used as a device to measure leakage current and voltage in a variety of equipment.
5) A paper by Kartik Srinivas [4] in which he implemented industrial safety automation using IoT by successfully integrating industry safety to the digital world.

III. DESIGN METHODOLOGY

This method can place at the mountain roads, curve roads, and bends. When vehicles is approaching the IR sensor will sense the vehicle. supported the IR sensor instruction the LED changes its respective colours. to point the motive force coming back from the opposite end. If vehicle moving far from the sensor, the sensor will sense the vehicle and therefore the green LED will glow. If vehicle present at either side the LED turns to red colour which indicates to manoeuvre slowly.

A. Components Used

1) Ardunio uno

The operating voltage is 5V. The recommended input voltage will range from 7v to 12V. The input voltage ranges from 6v to 20V. Digital input/output pins are 14. Analog i/p pins are 6. DC Current for each input/output pin is 40 mA. DC Current for 3.3V Pin is 50 mA. Flash Memory is 32 KB.

2) LED's

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

3) Jumper Wires

Jumper wires are electrical wires with connector pins at each end. They are used to connect ultrasonic sensor & LEDs to arduino .

4) Temperture Sensor

A temperature sensor is a device that detects and measures hotness and coolness and converts it into an electrical signal. At TE Connectivity (TE), we design and manufacture a broad portfolio of temperature sensors – including our NTC thermistors, RTDs, thermocouples, and thermopiles – designed for efficiency and easy installation, with capacity to reliably integrate technology that responds to human behavior,

5) Gas Sensor

Gas sensors (also known as gas detectors) are electronic devices that detect and identify different types of gasses. They are commonly used to detect toxic or explosive gasses and measure gas concentration. Gas sensors are employed in factories and manufacturing facilities to identify gas leaks, and to detect smoke and carbon monoxide in homes. Gas sensors vary widely in size (portable and fixed), range, and sensing ability.

6) LCD 16x2

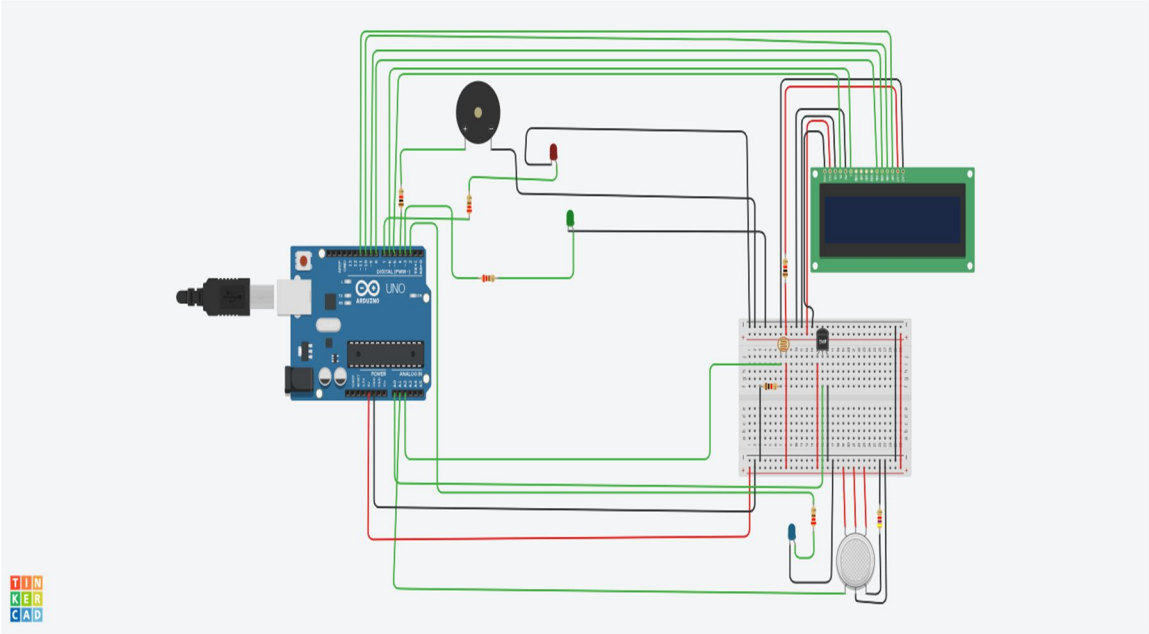
The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

IV. WORKING

The Arduino UNO is the main component of the system as it is the microcontroller which takes input from the gas sensor and gives corresponding output on the other components. When gas leakage of a detectable quantity of 200ppm to 1000ppm capable of causing explosion which corresponds to 10KΩ to 47KΩ (20 KΩ is ideal) is sensed by the MQ 5 sensor which is capable of detecting natural gas in addition to LPG, an analogue signal is sent to the microcontroller from the sensor. An in-built ADC in the microcontroller converts the analogue gas signals into digital signals. For a detectable gas leakage quantity, a digital high (1) is transmitted while a digital low (0) is transmitted for a non-detectable quantity. In this way the transfer of data from the signal to Arduino and from there to the buzzer, GSM module and LCD display happens. If the Gas leakage is found, buzzer makes noise and with help of GSM Module the owner gets a message on his phone about the incident and further safety procedure can be carried out. This leads to less accidents as the user is alert way before the chances of accident to happen. In this way our system works, which is more capable and easy to implement in household and industries compared to traditional ways available. A fully functional system can save a lot of lives if managed properly and carefully.

Block Diagram

Simulation



V. FUTURE SCOPE

Among recent technologies, the smart sensor technology has been in the spotlight because of its potential, significance, and wide range of application areas. These new systems represent a potentially new generation of detection capability and self-awareness, which are key components of future intelligent systems. Smart sensors, which work as part of micro electro-mechanical systems, work with an increasingly diverse and highly accurate input. Complex multilayered operations such as collecting raw data, adjusting sensitivity and filtering, motion detection, analysis, and communication are the main functions expected of intelligent sensors. They are used in all areas of life, from HVAC systems to traffic management, air conditioning systems, and agriculture.

Our system is such a system which will In the future, smart sensor technologies will have a profound impact on applications such as food safety and biological hazard detection, safety hazard detection and warning, environmental monitoring, health monitoring and medical diagnostics, industrial and aerospace applications, smart antennas, automobiles, and smart highways.

VI. CONCLUSION

Industrial Safety Automation using IOT has been implemented successfully. The project is cost effective and can be easily implemented for other real time applications. It can be realized with the usage of less power. This project is secure and user friendly and can be employed by the government in large scale to help industries too. By automating an industry, a safe working environment can be created with the available advanced mechanism and the entire system integrated into one network. The industry is substantially safe from fire accidents, voltage fluctuations and gas leakage.

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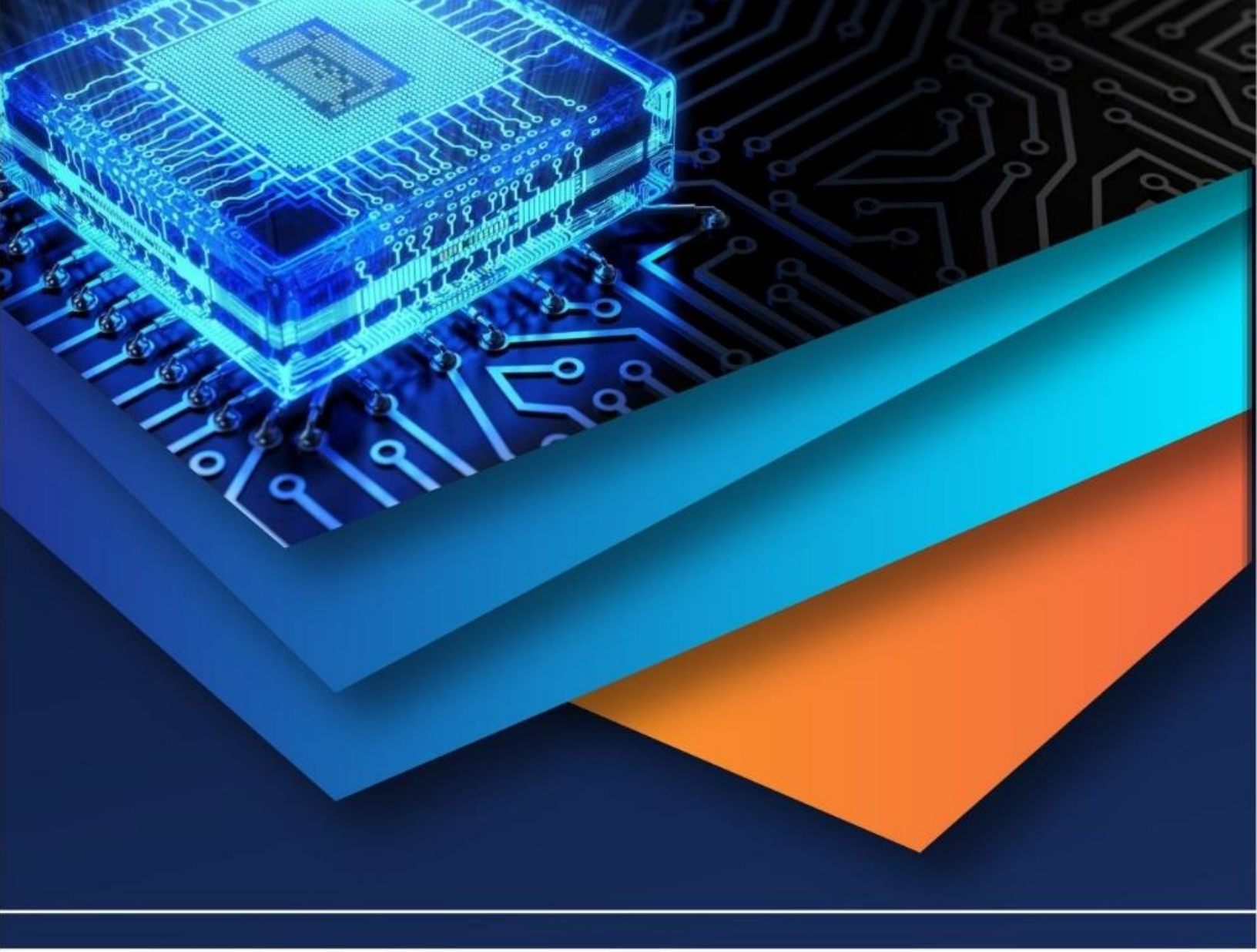

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