Integration of wireless sensor network with virtual Instrumentation In Hazardous environment

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ABSTRACT: *This paper was explained hazardous environment monitoring and management for observing details regarding protection and security, utilizing Wireless Sensor Network (WSN) techniques with using virtual instrumentation, the architecture of arrangements and conception implementation were explained in the circumstances of an industrial protection monitoring situation. Data acquisition performed via the deployed wireless sensor network with a clear cut on four parameters which are fire, humidity, temperature, and gas discharge. The data enter, observing, and control performance are understand from virtual instrumentation techniques. This also provide an easy-to-use user network and the convenience of data through standards-based web server techniques*

KEYWORDS: *Virtual instrumentation, LAB View, Wireless sensor networks, Safety monitoring*.

1. INTRODUCTION:

Environmental maintenancehad a one of the most important contacts for nearly all the countries within the previous couple of years. Albeit the economic incident range had become a greater with none managementwithin the last 10 years, in this present condition within the industry with regards to the more dangerous surroundings. Recently, the fashionable constructions we are challenging the highly developed instrumentation for observing and management of environmental threatenable variables of the dangerous background. Worker protection and instrument losses were essential to take care of the balance between the constructions and areas[1] there are five parameters create the idea factors of a risk incident that are, the health, Smoke, gas discharge, and heat origin, environmental components and flammable device. An industrial commonly disaster happens because the outcome of their integrated effects. During this, the paper proposes a combination of wireless sensornetwork technique with use of hazardous risk control together, a wireless multi-sensory observing the system of hazardous site areas. The working of real time dangerous parameter details display, data analysis, monitoring, control, and storage is from this system [2].

2. EXISTING AND PROPOSD SYSTEM

In this system, the economic growth acutely increasing, environmental pollution related issuesquicklycomesintoexistence. Internet of Things may be a technology that

attach thesensors with embedded system and permit the info from these sensors to travel over anonline.The proposed system aims in designing a powerful system. It can be monitors the real time discharge level sand temperature of all the Industries and required areas, store all the data which is collected from internet and analyze them in cloud using Internet of Things. The data can be viewed in any browser includingsmartphonesbyloggingin using the evidence. Using Relay driver the whole EB power will be stopped and give some alarm and information toworkers[18].
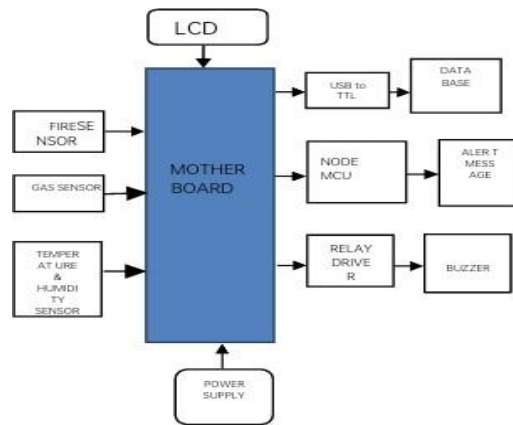

Figure 1: Block Diagram of Proposed System
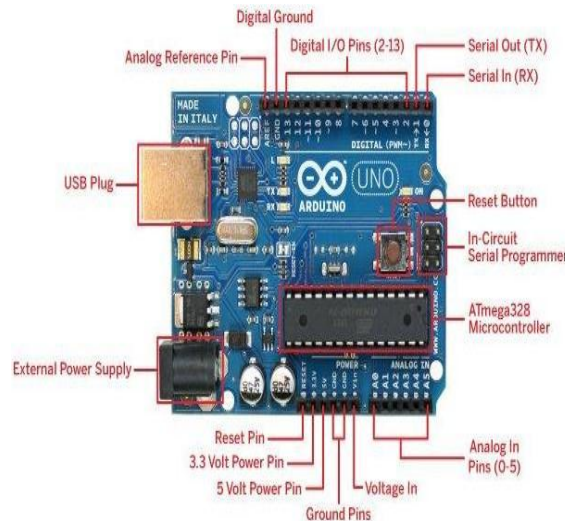
a. ARDUINO MICROCONTROLLER

Figure 2: Arduino Microcontroller

Arduinoisa one types ofopensourceelectronics platform companied with a hardware and software to work with all types of instruments. The hardware contains of a microcontroller with some electronic things which can be programmed using the software to do all types of task. It can be easy or hard. But, Arduino will give an appropriate solution to the user for easy and communication with instruments. Arduino was meantfora thinker,designer or anyone who is interested in technologies, curious about twiddling with electronics without the know-how of complex electronics and programming. Since it's an Open Source paper, all the files

is out there for private or commercial use. The Arduino micro controller doesn't need any permission to develop, use and maintained maybe sell the merchandise. A user can form the papermoreversatileandimproveits capabilities. This provides a robust online community of support.[13]

b. GAS DETECTOR:

Figure 3:Gas detector

In this condition, we need to monitor the gas leakage in industries. A gas detector is the device which detects the appearance of concentration of gases in the surroundings and it will shows an output value. Its findings into a particular electrical signal. The output of the detectors is digital values which makes them easy to interface and display for monitoring. In industries if any gas leakage occurs then the gas sensor detects that and it will show in the LCD display[16]. If it detects any toxic gases in the surroundings it detects that gases and gives this information to the Arduino. It will activate the buzzer to sound and display the alerting message. And also this result will displayed to the system where we placed by the use of Wireless Sensor Networks. This changes the resistance of the detector which alters the worth of the present going out of it.[4]

c. FIRE DETECTOR

   This is sensitive to radiation and flame. It can   also expose ordinary light within the range of a wavelength 760nm-1100 nm. The foremost area is up to 100 cm. The output of flame sensor is either analog or digital signal. It is often used as a flame alarm or in firefighting robots.
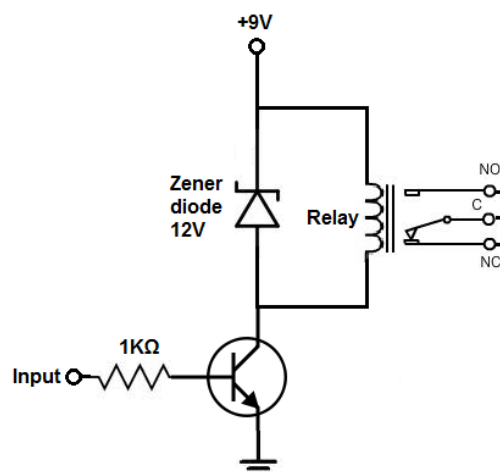
d. RELAY DRIVER

Figure 4: Relay driver

Relay driver is a magnetic switch and also it a integrated circuit. It is act as a switch controller. When we need a low voltage circuit here the relay driver is the main switch which is connected with power supply. This relay driver required the battery or power supply,6-9V relay, zener diode, resister and transistor. In Market Relay module can purchased bytelling what percentage Channel Relay is required andoperating voltage.[15].

2.5 HUMIDITYSENSOR:

A humidity sensor is a one which is measures the humidity range in the industrial surroundings and change it's into a particular electrical output. These humidity sensors output makes them easy to interface with the Instruments and display it to the LCD display for monitoring and maintaining the surroundings in safely [11]. It detected the temperature range between -40 degree Celsius to 185 degree Celsius.

2.6 BUZZER

Figure 5: Buzzer

Buzzer is a device commonly wont to produce sound .The buzzer has a light weight low price and simple in construction. It is used to alerting the workers whose are in dangerous situation.This buzzer works with the principle of inversion of Piezo electric principle. This rule introduced by the scientists Curie and Jacques. By this principle when the pressure is occurs in the particular device then the electricity will generates.These kind of device are known as piezo electric devices. The buzzer can gets the information from the Arduino and it will makes the sound to alert the workers in hazardous industries.[9]
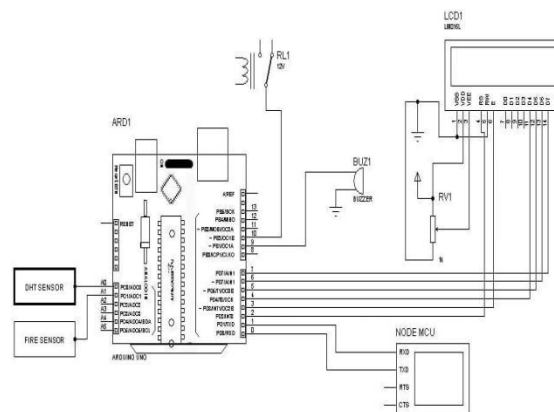
3. RESULTS AND DISCUSSION

Figure 6: Hardware Circuit Diagram

3.1 VIRTUAL INSTRUMENTATION

Virtual Instrumentation is a technique which is combination of software and measurement hardware to make easy understand for users andcontrol the systems. These controlling instruments are called as Virtual Instruments[12]. Virtual Instrumentation software is used to reduce the system occupied place and replace the large amount of hardware Instruments. It gives the accurate digital and analogmeasurements. By using Virtual Instrumentation can control the hardware devices which is placed at external fromcomputer. LabVIEWisagraphicalprogramming languagewhich isaintegralpartsof VirtualInstrumentation.[9]

3.2 LAB VIEW

LabVIEW was a graphical programming language. Its roots in data acquisition and automation control. Its graphical representation is a parallel to a process flow diagram. It was created to gives an internal programming area for engineers and workers. This language had matured before the last twenty years to become a one of the best general use programming language environment. The LabVIEW had many features which can help an automation environment[12]. It will be include simple network, communication, powerful toolsets for data fitting and process control. It was fast and also easy to user interface, and an efficient code to execute the correct solution to the environment. We had discussed the advantages of the language and provide an example application which is used incontrolling the automation platforms.
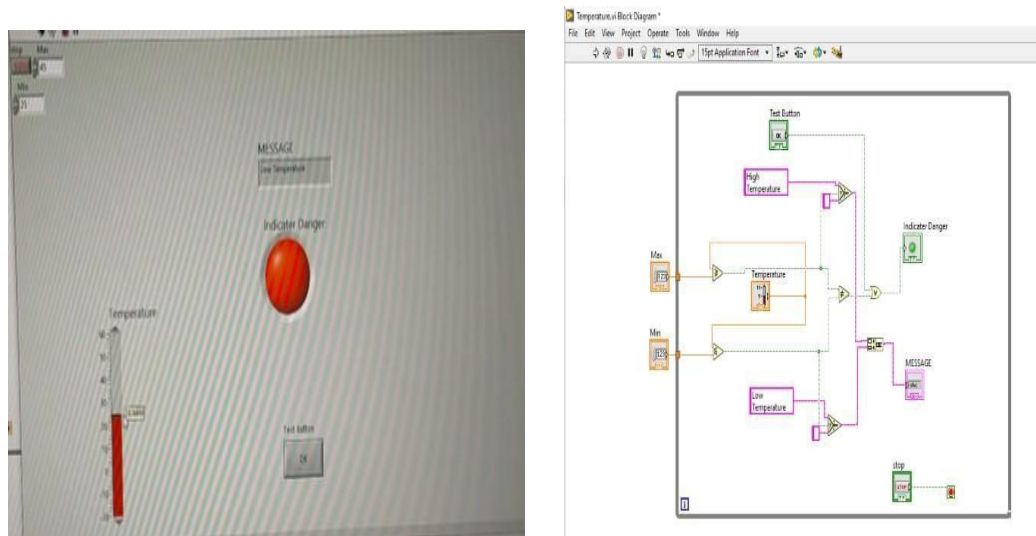
3.3 SIMULATION RESULTS

Figure 7: Simulation results

In future,this may able to monitoring and store the data to system. And also able to recollect the stored data forlater use[21]. The main advantages are man power will reduced, cost is low[14], and data willsecured.

3.4 HARDWARE RESULT

The implementation of Results are based on Range of temperature, Humidity and Presence of gas, fire. From this result we can prevent the incident which going to occur in future.

RESULT OF TEMPERATURE SENSOR:

This is a simple component that measures the value of hotness either coolness and converts it into a readable unit[24][25][26]. It measure the amount of temperature in an industrial surroundings and detect physical changeto that temperature producing an output [22-23].
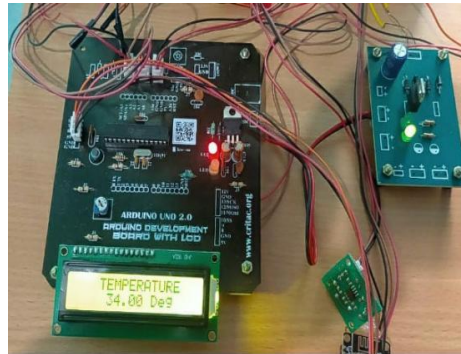

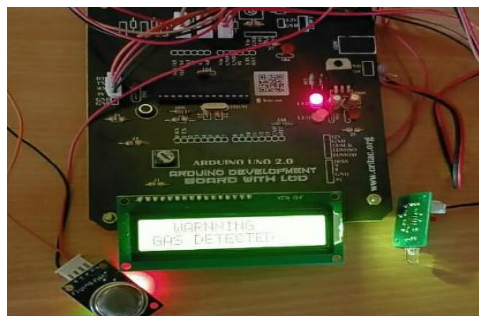Figure 8: Result of Temperature sensor

RESULT OF GAS DETECTOR

Figure 9: Result of gas Detector

This is a device which detects the appearance of gases in the surroundings[29-32]. In Industries if any gas leakage occurs then the gas sensor detects that and it will shows an output value. Its findings into a particular electrical outcome. These sensors output the digital values which makes them easy to interface and display for monitoring.
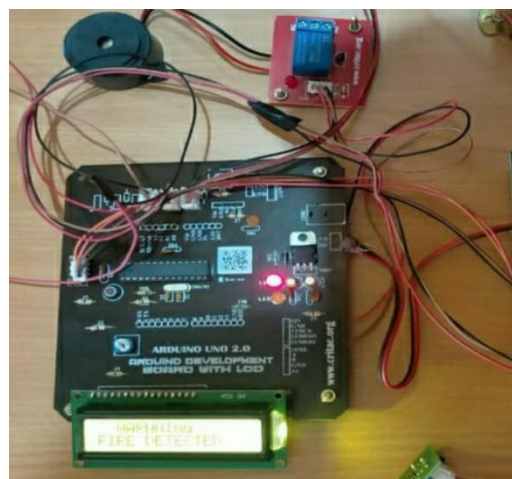
RESULT OF FIRE DETECTOR:

Figure 10: Result of Fire detector

It is the result of fire detector.If it detects the fire it gives logic 1 otherwise it gives logic 0.The Arduino reads this value and activate the buzzer and display the result in LCD display[27][28].

RESULT OF HUMIDITY SENSOR:

Figure 11: Result of Humidity Detector

A humidity sensor is an electronic device that calculates the moisture level in its environment and changing its findings into a corresponding electrical outcome. Sensors output the digital values which makes them easy to interface and display for monitoring.

4. CONCLUSION

This paper shows the implementation of a integration of wireless sensor network in hazardous environment and safety monitoring system. Many of the disasters are occurs due to the less monitoring. From this system we prevent and reduce these kind of problems .It is protect the workers from dangerous situation. From the alerting message and buzzer sound the workers can able to escape from the hazardous industry where the disaster occurs in future. This system saves the human life reduce the man power in industries, prevent the problems and also safely maintain the instruments.

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