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Industrial Safety Parameters Monitoring in IoT Environment

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ABSTRACT: The proposed structure develops a sensor interface contraption essential for sensor data acquiring of mechanical Wireless Sensor Networks (WSN) in Internet of Things (IoT) condition. It is expected to style a re-configurable sensible contraption interface for mechanical WSN in IoT atmosphere, in the midst of which ARDUINO UNO is held onto as the middle controller. Thusly, it will inspect information in parallel and persistently with quick on various absolutely unprecedented contraption information. Shrewd device interface specific is grasped for this style. The contraption is united with the most recent ARDUINO programmable development and savvy device assurance. By recognizing the estimations of sensors it can without quite a bit of a stretch find the Temperature, stickiness, and gas present in the cutting edge locale. What's more, besides it controls the power with abnormalities. With the objective that fundamental situation can be avoided and preventive measures are successfully executed. It is the best and most viable strategies for apparatus security watching. So it has magnificent social prospects.

KEYWORDS: IoT, Sensors, Sensor data acquisition, Arduino Uno

I. INTRODUCTION

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. Industrial safety is one of the main aspects of industry. Working environment hazards include suffocation, gas poisoning and gas explosion, fire hazards etc. Now-a-days, the industrial monitoring field requires more manual power to monitor and control the industrial parameters such as temperature, humidity, gas etc. This is the most upcoming issue in the industrial sectors. If the parameters are not monitored and controlled properly, it leads to a harmful situation. Most of the industries are facing such kind of situations due to some manual mistakes. To overcome manual mistakes, it's better to use industrial automation with internet of things.

Accidents occurring in most Indian industries are a source of concern to everyone. Industries that reflect workers safety and health issues based on mechanical maintenance protection, and other management related issues. Environmental, Health and Safety (EHS or HSE) departments have the top management in Indian industries but fail to put in place adequate safety practices at their workplace to safeguard not only the employees and management but also clients and contractors and sub-contractors who have some importance in the industry. Ineffective safety practices have an adverse impact on the organization as well as the workforce. Some of these include production delay medical and compensation charges, tool and apparatus impairment, construction loss, permitted costs, expenses on alternative materials, loss of commercial concern and moral of employees. Hence security of our fellow human beings working in industries is a major concerned issue.



II. LITERATURE SURVEY

Nowadays, Industries disrupt the environment and conceive the environmental consequences like greenhouse effects and epidemic which are catastrophic to human beings. To neutralize such unsteadiness in nature a pollution monitoring system is necessary in today's world. In [1], various sensors like fire, gas, LDR sense the fire and other parameters, the fire get extinguished with the help of water pump attached in the system. Similarly other actions will to be taken by the system. If the voltage and current go above the threshold value and leakage of gas are detected by gas sensors and the voice module plays an audio note which gives an alert message to the factory workers for the gas and fire detected. IOT and the Android app help us for remote monitoring. The entire mechanism is controlled by Arduino.

Temperature & humidity sensor, the production count circuit, illumination intensity circuit and power consumption circuit are used to percept the environment and object conditions. Analog signals are provided to Arduino device produced by sensors and circuits. The digital equivalent of these signals is transmitted to the database server by virtue of the Wi-Fi module interfaced with the Arduino. The data stored on the database server is transferred to the website time to time and the status of the alarm is checked continuously for any uneven conditions observed by the industry person on the website. Then adequate steps can be taken to solve the problems. This can be possible through past experience and similar previous condition stored in database. In this we use LAN as database for scalability. The industry person who will check the status of the industry through the website will have to login using a user id and password to get access to the website, this ensures security of the data [2].

Internet of Things (IoT) has made great revolutions in industries. IOT is a technology that helps us with controlling of the physical devices over the internet. . Nitin Ahire et al designed a paradigm which can help us control and monitor all the industrial parameters from all over the world. For monitoring of the parameters, we have used different sensors such as fire, temperature, gas, humidity, voltage and current sensor. Also for alerting the workers, we have used a voice module which gives them voice alerts [3].

A precarious environment monitoring and control for this monitoring information concerning safety and security is illustrated. The proposed system uses a combination sensor network with a system architecture and concept implementation, which are described mainly for an industrial safety monitoring scenario. The information is gathered by the deployed sensor network with focus on five main conditions: temperature, fire, gas leakage and mobile detection. This paper also enables an easy to use user interface and the accessibility of data through standards-based web server technologies [4].

The proposed system develops a sensor interface device essential for sensor data acquisition of industrial Wireless Sensor Networks (WSN) in Internet of Things (IoT) environment. It is planned to style a re-configurable sensible device interface for industrial WSN in IoT atmosphere, during which ARDUINO UNO is adopted as the core controller. Thus, it will scan information in parallel and in real time with high speed on multiple completely different device information. Intelligent device interface specification is adopted for this style. The device is combined with the most recent ARM programmable technology and intelligent device specification. By detecting the values of sensors it can easily find out the Temperature, humidity, and gas present in the industrial area. And also it controls the power with abnormalities. So that critical situation can be avoided and preventive measures are successfully implemented. It is the most effective and most economical means of equipment safety monitoring. So it has very good social prospects [5].

The real time scenario of monitoring temperature and humidity in industries is explained. National Instruments myRIO is used and results are observed on LabVIEW front panel and VI Server. The server VI program and client VI program is developed in block diagram for the two sensor data. This proposed system develops a sensor interface device essential for sensor data acquisition of industrial Wireless Sensor Networks (WSN) in Internet of Things (IoT) environment. By detecting the values of sensors like temperature, humidity present in the industrial area. The results are displayed on the web page. The data can be accessed with admin name and password. After logging into the web page the index of files is displayed. After restarting the myRIO kit and initiate the deploying process the file the excel sheet will appear on the VI Server.



Table .1 Literature Review

Journal	Year	Title	Aim	Technologies	Conclusion
IEEE	2017	Smart Industry Pollution Monitoring and Controlling using LabVIEW based IOT [7]	Aim of this project is to implement a simple IOT system within an industry for pollution monitoring	IoT, LabVIEW	This increases the safety level of workers as well as the working area from any hazards. To keep a real time track of the working area, it has a provision of 360-degree surveillance camera.
IRJET	June 2019	Internet of Things technology for fire monitoring system [8]	To discuss the design concept and construction of firefighting IoT model and the steps to be followed to do fire-fighting safety management IoT design.	IoT	This new approach gives a reliable solution that can permit to detect fires risks, in order to avoid severe damage of this disaster, when it happens.
IEEE	April 2018	Factory Automation and Irrigation Control in an IoT Environment [9]	To send commands from a website to a factory (irrigation process) computer program control via a shared database in IoT environment.	IoT, Web application	This paper investigates the possibility to control working and stopping of machines (composing a factory, an irrigation process and so on) controlled by a website via the internet from any place in the world.
IJARCET	Dec 2017	Internet of Things (IOT) based Gas Leakage Monitoring and Alerting system with MQ-2 sensor [10]	To design a microcontroller based toxic gas detecting and alerting system	IoT	The hazardous gases like LPG and propane are sensed and displayed and notify each and every second in the LCD display. If these gases exceed the normal level then an alarm is generated immediately and also an alert message (Email) is sent to the authorized person through the INTERNET and used ARM development board.

III. PROPOSED SYSTEM

The main parameters of safety that are taken into account are gas leakage, temperature rise, fire hazards, vibration. Arduino controller makes it easy to capture the data of all these sensors and take appropriate decisions. The sensor



data sent to the wi-fi module serially. The real time data is sent to the server via the wi-fi module. To increase the reliability and flexibility an android application is developed.

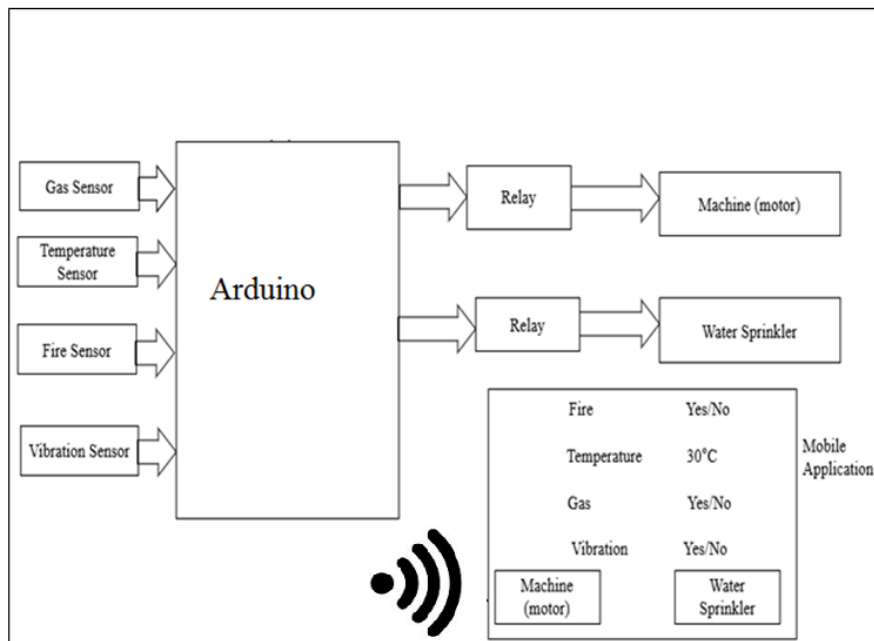


Fig.1. block diagram of proposed system

Four sensors are used to detect the gas, temperature, fire and vibration safety parameters. Arduino capture the sensor data and to take the appropriate decision. Two preventive actions namely, switching off the motor and sprinkling water in case of fire hazards are included in the system. These are connected to the controller through relays. A wi-fi module is also included in the design. Sensor data is sent to the wi-fi module serially. The real time data from the wi-fi module is sent to the server. An android application is also designed to monitor and operate the system from distance. This app also has two switches one to on/off the machine motor and other to sprinkle water in case of emergency.



IV. RESULTS

Circuit Diagram

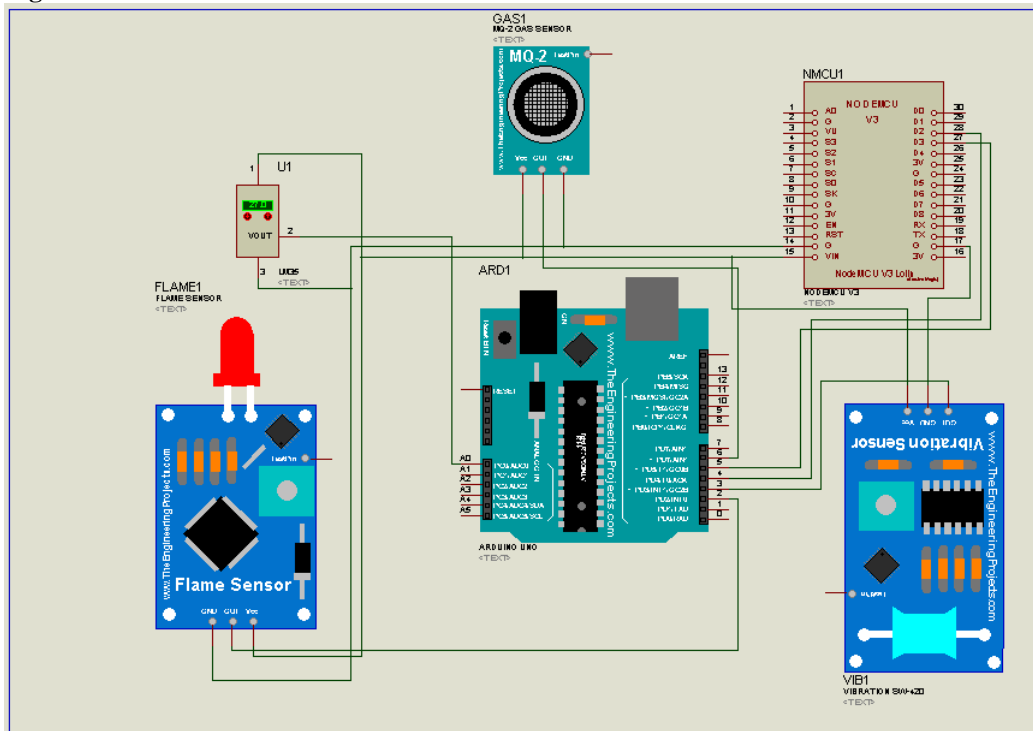


Fig.2. Circuit Diagram

Flow Chart

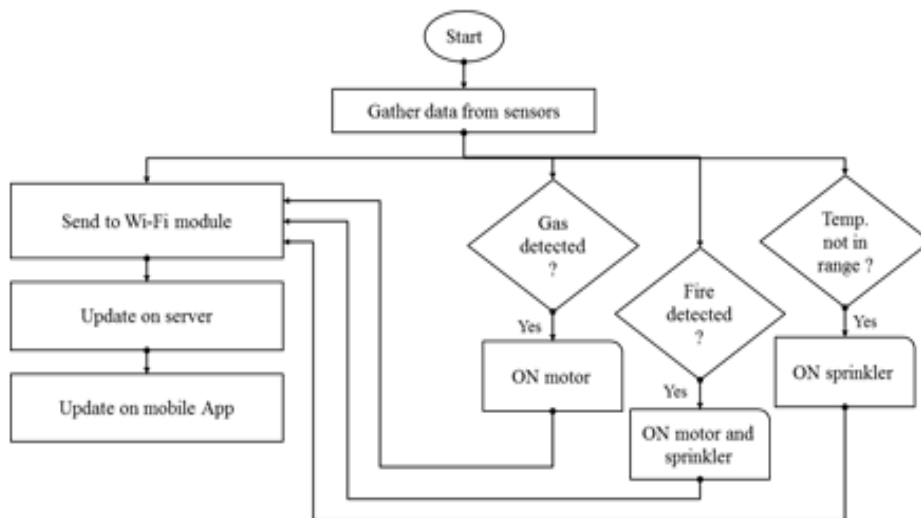


Fig. 3 Flow Chart

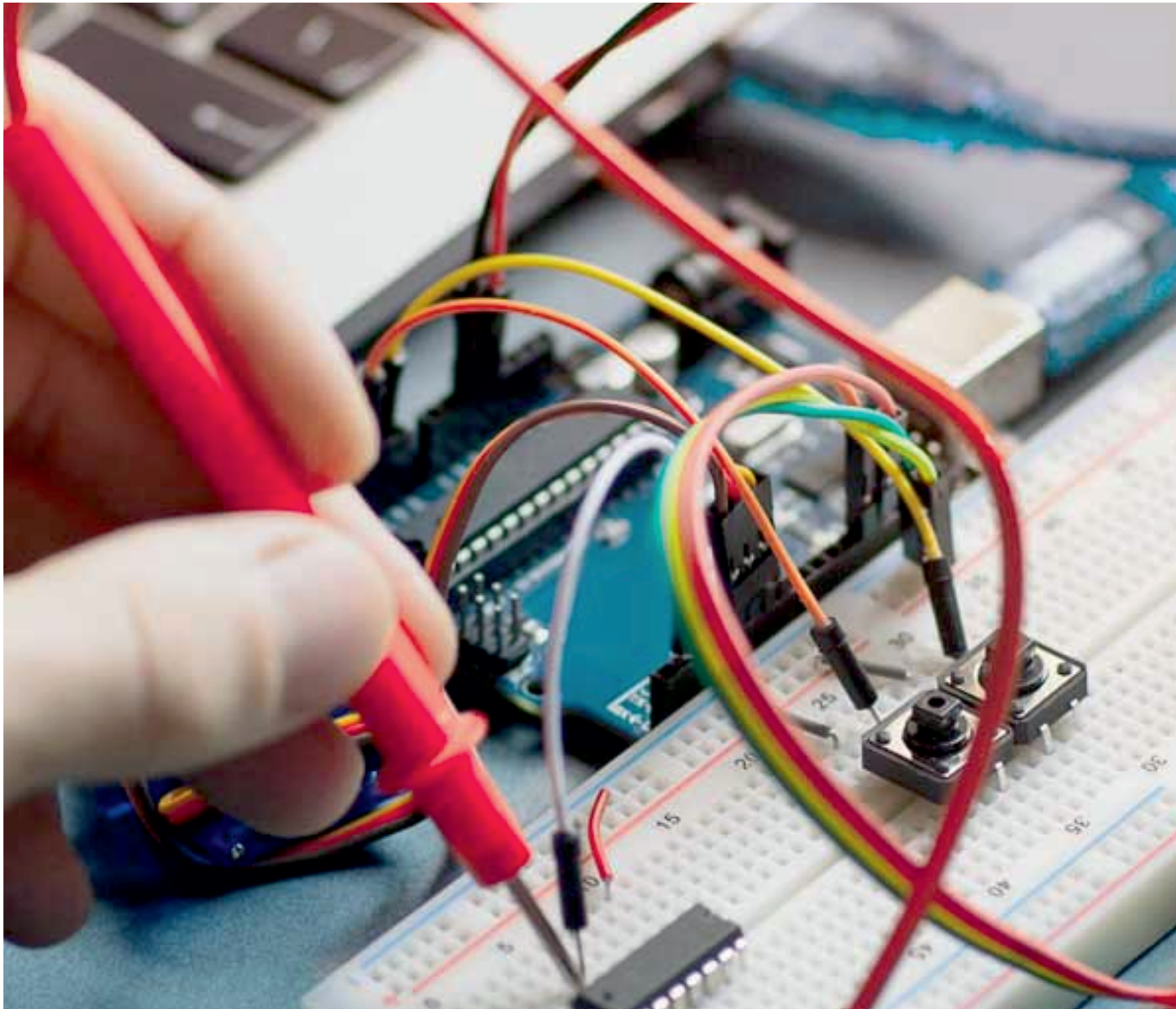


V. CONCLUSION

This paper describes a IOT Based Reconfigurable smart WSN unit for industrial safety parameters monitoring. The system can collect sensor data intelligently. It was designed based on application of wireless communication. It is very suitable for real-time and effective requirements of the high-speed data acquisition system in IoT environment. Different types of sensors are connected to the system. Main design method of the reconfigurable smart sensor interface device is described in this paper. Finally, by taking industrial safety parameters monitoring in IoT environment as an example, we verified that the system achieved good effects in practical application. Nevertheless, many interesting directions are remaining for further researches in the area of WSN in IoT environment.

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