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IoT based Industry Protection System for Labor Safety

Vijay Wase[1], Virendra More[1], Swapnil Dukre[1], Mayur Kawalkar[1], Dhiraj Wankhede[1], Arpit Masram[1], Prof. Firoz Akhtar[2]

[1]Student, Department of Electronics and Telecommunication Engineering, J D College of Engineering and Management, Maharashtra, India

[2]Assistant Professor, Department of Electronics and Telecommunication Engineering, J D College of Engineering and Management, Maharashtra, India

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ABSTRACT

The IOT industry protection system using NodeMCU controller 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 NodeMCU Controller to achieve this functionality. The system makes use of temperature sensing along with light and 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 NodeMCU controller and LCD screen. The sensor data is constantly scanned to record values and check for fire, gas leakage or low light and then this data is transmitted online. The Wifi module is used to achieve internet functionality. The IOT server then displays this information online, to achieve the desired output.

Keywords : NodeMcu, Temperature Sensor, Flame Sensor, Smoke Sensor, IoT, Relay, Industry 4.0

I. INTRODUCTION

As the society is growing with various developments, the outmoded forms of storing various food products in cold store rooms is failing to satisfy human needs. As the society is growing with various developments, the outmoded forms of storing various food products in cold store rooms fails to satisfy human need. Through the monitoring of the temperature and humidity inside cold storage rooms, the goodness of the products can be ensured for a longer time. Recent research has revealed that operations of wireless sensor systems are largely affected by their on-board temperature [1]. We can implement sensors in wide area over the machines and instruments and control and monitor the circumstances by using concept of IoT [2]. In this paper

we have designed a gateway which will be the central part of this whole system.

The function of the gateway is to gather data, process them, upload them and process user control information. If the network connection is not established then the data will be stored and upon reestablishment of the network it will be uploaded. The terms of "things" in the IoT vision is very broad and includes a variety of physical elements. The terms of things include portable personal items such as smart phones, tablets and digital cameras. With the rapid increase in the number of user of and digital cameras. Furthermore, IoT includes elements of our environments (be it home, car or office), and things equipped with RFID tags connected to a gateway device. From those mentioned so far, a huge number of devices and things will be connected to the Internet, each providing data and information and some even services.

II. LITRECTURE SURVEY

[1] H. S. Raju, Sanath Shenoy Siemens Technologies and Services Private Limited in "Real-Time remote monitoring and operation of commercial Devices using IoT and Cloud" 978-1-5090-5256-1/16/31.00-2016 IEEE have explained recent times there has been significant advances in managing differing types of sensors and industrial devices by IoT (Internet of Things) protocol. Alongside the availability of massive amount of processing power provided by the Cloud new opportunities have emerged for complete automation of commercial devices. IoT features a vast application in several sectors and domains which are yet to be explored. In industry domain, industrial automation is need of the hour to extend the time to plug with high grade quality and enhanced productivity. During this paper we explain proven ways to utilize the capabilities of Cloud and IoT to regulate the device and analyze the info generated by them.

[2] "IoT-based Integration of IEC 61131 Industrial Automation Systems: The case of UML4IoT" by Foivos Christoulakis, 22 Page 20-28 © MANTECH PUBLICATIONS 2018. All Rights Reserved, Kleanthis Thramboulidis- 978-1-5090-0873-5/16/$31.00 ©2016 IEEE have explained that Internet of Things (IoT) plays a key role in the new generation of industrial automation systems (IASs).Evolving IoT standards if effectively used may address many challenges in the development of IASs. However, the use of the IoT and the REST architectural paradigm that IoT is based on, is not an easy task for the automation engineer. In this paper, a model driven system engineering process is adopted for IASs and it is extended to exploit IoT standardization efforts in IEC 61131 based system. IoT is considered as an enabling technology for the integration of cyber physical and cyber components of the system and humans, bringing into the industrial automation domain the benefits of this technology. A UML profile for IoT is exploited to automate the generation process of the IoT wrapper, i.e., the software layer that is required on top of the IEC 61131 cyber part of the cyber physical component to expose its functionality to the modern IoT environment. A prototype implementation and performance measurements prove the feasibility of the presented approach

III. SYSTEM ARCHITECTURE

The system consists of light, gas and temperature sensors interfaced with NodeMCU controller and LCD screen. The sensor data is constantly scanned to record values and check for fire, gas leakage or low light and then this data is transmitted online. The Wifi module is used to achieve internet functionality. The IOT server

then displays this information online, to achieve the desired output.

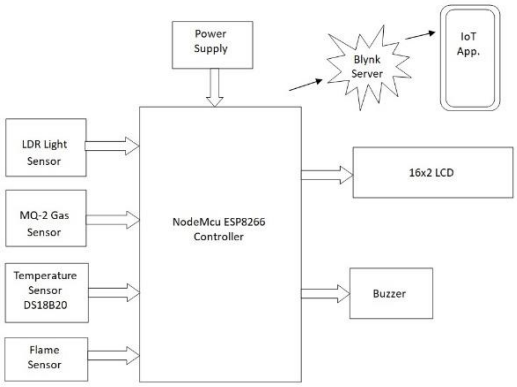

Fig.1 Block Diagram

3.1 Hardware

- NodeMcu Esp8266 Controller
- Flame Sensor
- Temperature Sensor(DS18B20)
- Gas Sensor(MQ-2)
- Adaptor Power Supply
- LDR Sensor
- 16*2 LCD Display

3.2 Flow Chart

In this proposed system, the most concern is to implement and style a multi sensor based IoT platform for air, sound and water quality real-time monitoring. Main focus of this technique is high & fast sensitivity, low cost and low power consumption with two-way power grid. This proposed system provides a special advantage where everyone sensor connected with a input pin within a central unit based microcontroller for sensing quality parameters value .

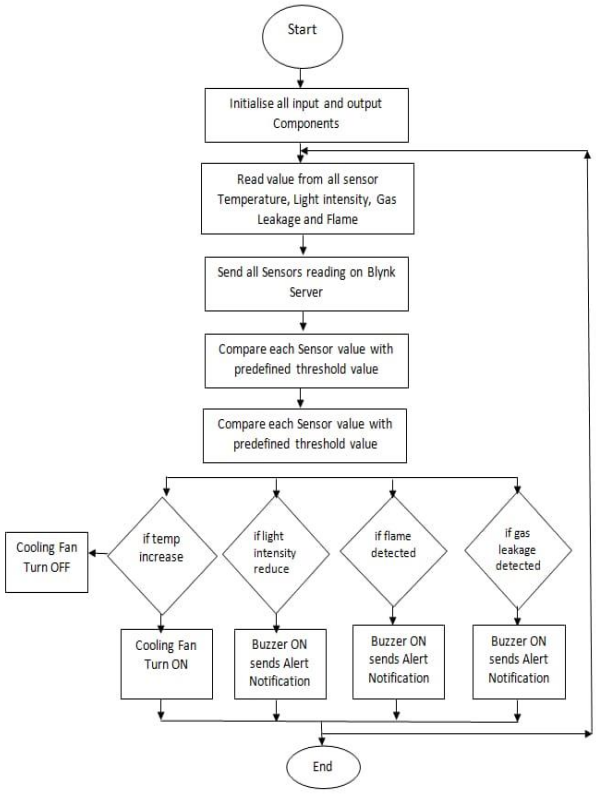

Fig.2. Flow Chart

The proposed central unit based microcontroller system ensures that it are often easily expanded, customization and allows customization options as user requirements, simple, accurate result, easily maintenance and cost-effective, Email alert and SMS alert before the pollution occurs, If the device are disconnected with cloud, user get a Email alert within 5 minutes . The proposed system may be a platform which allows multi-parameters analysis of air, gas, sound and temperature's the proposed system offers better efficient and differentiate with existing system. The pollutants when released from industries or when fire is detected the system gets activated. When carbon di oxide goes above the defined level or threshold value the system gives an alarm to the authority. If the authority doesn't take any actions system automatically stops the motors. Similarly, when fire is detected an alarm is given and if no actions are taken by the authority automatically exhaust fans will get on. The Leaked is detected and after the alarm if no actions are

taken the boilers are switched off. this technique is additionally monitored using IOT the web of things.

NodeMcu Controller

NodeMCU is an open-source Lua based firmware and development board specially targeted for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Expressive Systems, and hardware which is based on the ESP-12 module.

Fig. 3. NodeMcu

Flame Sensor

Flame sensor is a device which is used to detect the presence of fire in its surrounding. In this project we will be using **Infrared Flame Sensor** to detect the fire.

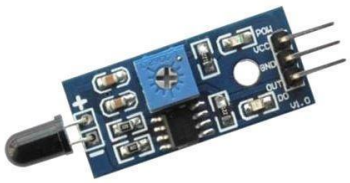

Fig.4 Flame Sensor

Infrared Flame Sensor consists of a photodiode coated with black epoxy which makes it sensitive to the infrared radiations having wavelength between 700nm to 1mm and can detect fire up to distance of 100cm within 60 degrees of angle of detection.

LDR

The Light Dependent Resistor (LDR) is just another special type of Resistor and hence has no polarity. Meaning they can be connected in any direction. They are breadboard friendly and can be easily used on a perf board also. The symbol for LDR is just as similar to Resistor but adds to inward arrows as shown above. The arrows indicate the light signals.

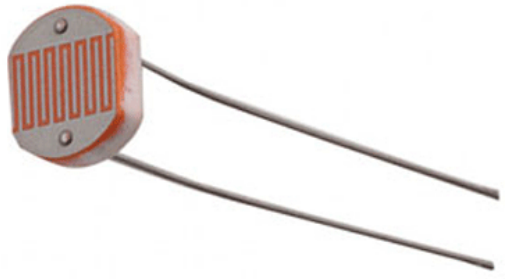

Fig. 5. LDR

Smoke (MQ-2) Sensor

Gas Sensor (MQ-2) module is useful for gas leakage detection (home and industry). It is suitable for detecting Methane, Butane, LPG and Smoke. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible. The sensitivity of the sensor can be adjusted by potentiometer.

Fig.6. Gas Sensor(MQ-2)

Temperature (DS18B20) Sensor

The DS18B20 is a 1-wire programmable Temperature sensor from maxim integrated. It is widely used to measure temperature in hard environments like in chemical solutions, mines or soil etc. The constriction of the sensor is rugged and also can be purchased with a waterproof option making the mounting process easy. It can measure a wide range of temperature from -55°C to +125°C with a decent accuracy of ±5°C.

Fig.7. Temperature Sensor (DS18B20)

IV. RESULTS

We implement three different sensors in our system that are temperature sensor (DS18B20), Smoke sensor and flame sensor all this three sensor sends reading to NodeMcu controller and NodeMcu send all this information real-time on Blynk server we already set all sensor threshold value by studying and checking environmental parameter if any sensor reading exceeds threshold value it sends an alert message to concern person IoT Application and trigger buzzer also it turns on water motor for extinguishing a fire.

Fig. 8. IoT Application

V. CONCLUSION

On our system, we read three different parameters for detecting fire these three parameters are flame, smoke, and temperature this will helps to improve the accuracy of detecting fire. It will help to detect fire detection on any condition more accurately and fast.

As most of the fire detection systems sense any one parameter for detecting fire and there is a chance to take more time for detection of fire until that sensor particular parameter does not exceed above the threshold value. So, we try to overcome this issue by sensing different parameters for this reason we interface different parameters for sensing detection of fire.

Also, this system is based on IoT technologies so real-time sensor data and alert messages send to the concerned person so our system detects fire faster and accurately.

VI. REFERENCES

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