WIRELESS SAFETY SYSTEM IN CRACKERS FACTORY AND DETECTION GAS USING IOT

Yugadharshini B[1], Bharathi S[2], Sankari S[3], Nivetha M[4], Maheshwari L[5], Madhumathi R M[6]

[1]Mrs. Yugadharshini B Anna University & Dept. of Electrical & Electronic Engineering, Er.Perumal Manimekalai of college of Engineering Hosur, Tamil Nadu ,India

[2]Mrs. Bharathi S Anna University & Dept. of Electrical & Electronic Engineering, Er.Perumal Manimekalai college of Engineering Hosur, Tamil Nadu ,India

[3]Mrs.Sankari S Anna University & Dept. of Electrical & Electronic Engineering, Er.Perumal Manimekalai college of Engineering Hosur, Tamil Nadu ,India

[4]Mrs.Nivetha M Anna University & Dept. of Electrical & Electronic Engineering, Er.Perumal Manimekalai college of Engineering Hosur, Tamil Nadu ,India

[5]Mrs.Maheshwari L : Assistant Professor, Dept. of Electrical & Electronic Engineering, Er.Perumal Manimekalai college of Engineering Hosur, Tamil Nadu ,India

[6]Mrs. Madhumathi R M : Assistant Professor, Dept. of Electrical & Electronic Engineering, Er.Perumal Manimekali college of Engineering Hosur, Tamil Nadu ,India

---***---

ABSTRACT: Safety of a person is primary concern in any industry especially in crackers factory. Today safety of worker is a major challenge. The health and life of the workers are critical due to the environment and its impact. The cracker factory puts the life of the workers in danger through releasing fire and smoke. The life of workers in cracker factory is unstable and day by day the pressure on them increases. The need for an innovative approach rises to safeguard the workers and to increase the productivity. The people in fireworks factory should aware of fire accidents so that they can protect themselves before anything happen. The alarm and surveillance plays an important role in industries to communicate workers if it senses dangerous part. The area should be monitored such as temperature, toxic gas, humidity, etc. If any type of accidents sense by monitor, the immediate action will be taken to avoid the forthcoming hazards. In the project, an innovative approach is designed to sense the environmental parameter in the factory. Different types of sensors are used to design it. The wireless communication protocol, which is used to send data, is called as IOT and it will send data to the control room. The IOT is cost low and effective for wireless transmission of data. This project will reduce the workload of human in security maintenance. This project is proposed based on wireless monitoring system and effective low cost system. The highlights of this system are easy-building up, high-reliability, powerful function and better extendibility. This system is a trendy approach to reduce the loss in the industry and to solve the current problem. The wireless communication distance is limited in the industry and gives great protection to the industry.

Key Words : Micro controller unit (cc3200), Fire Sensor, Smoke sensor, Foam Chemicals, Internet Of Things (IOT), Relay, Liquid Crystal Display

1.1 Introduction

Every human has a crush on fireworks. It doesn't matter whether they are children or adults. The industry of fireworks is one among the profitable and trending business. But the protection of workers is questionable. A lot of accidents happen in the industry which cannot be avoided. Nearly 8,00,000 people are working in the industry and the death ratio is increasing year by year. The absolute data of death rate is about 200 to 300 every year. This project focuses the safety of the workers. The main motive of this project is to safeguard the workers from the fire accidents. This project will alert the industry, if it sensors the smoke and automatically pours water and chemicals on the particular area which should be cleared

Risky acts and perilous condition are essential clarification for these disasters. Here some human mix-ups also lead with the incident of the fireworks as seeks after, individuals candling the engineered creations improperly makes a segment between the substances so setbacks will occur in the sparkler's invention rooms. Sparklers room won't fittingly use flexible tangle in floors. Most of the working people are not trained and they don't have the foggiest idea about the substance reactions and masterminding exercises so they leave the unused engineered substances in without proper moves. Firework workers contradicts for using metal bar, iron shaft. Without tidying up sand materials in readiness room and afterward entering the work sheet. Hardly any individuals hurling cigarette bugs likewise prompts setbacks

2. EXISTING SYSTEM

2.1 BLOCK DIAGRAM EXPLANATION

The block diagram consists of micro controller ,smoke sensor, flame sensor, LCD display, solenoid valve ,extinguisher chemicals, transmitter .The flame sensor sense the flame .Lcd used to display the out put ,chemicals used to stop the fire .once the fire is detected the fire extinguisher is sprayed and controls the spreading of the fire .

After doing the literature survey we have listed some of the features that are existing in the now used fire alarm systems. In the next section of the paper, we will propose a new model taking into account what features are being presently used and how they need to improve. Automatically industry can recognize the fire by sensing the smoke. The fire detector will make the chemical gate valve opened after sensing the fire. Oxygen is the main reason of spreading fire so the foam chemicals stop the widespread of oxygen so that the fire stops its process of spreading. The foam chemicals are used to keep the fire in a particular area by controlling it from spreading. When the sensor observes the normal circumstances, automatically it exists from the critical mode and occupies the normal mode which is routine process.
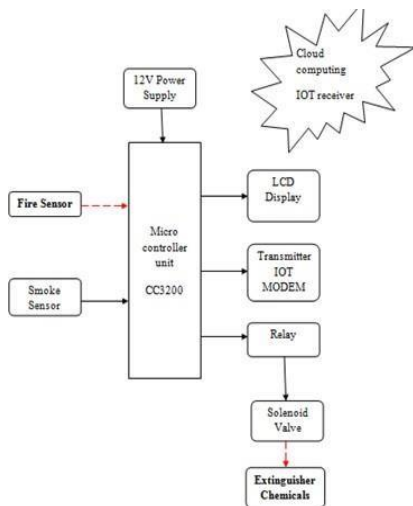

3. PROPOSED SYSTEM

3.1 INTRODUCTION

Taking into account all the features available in the present model we propose a new model for monitoring fire incidences and reporting them. The features of the proposed model are: Effective safety system Systematic approach for monitoring and control Transferring messages through wireless technologies Easy way of sensing structural damage and Health monitoring of buildings

3.2 BLOCK DIAGRAM
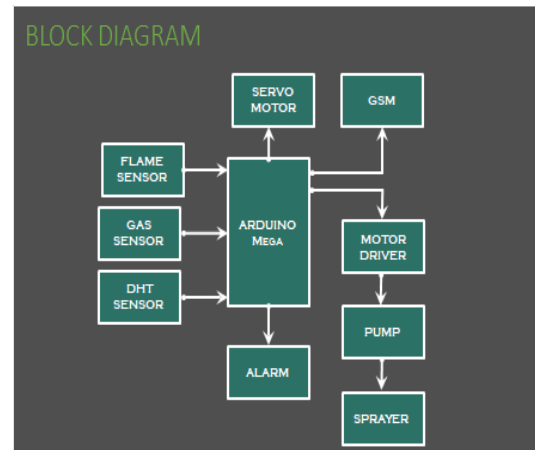
3.3 BLOCK DIAGRAM EXPLANATION

The circuit diagram consists of sensor circuit board and alarm circuit board. The sensor board has temperature sensor, flame sensor, led, Arduino-amp detector. The alarm circuit board consists of signal inverter, relay, buzzer, led alarm**.** To defeat every one of the mishaps that are being occurred in firecracker industry we can actualize a technique called "Robotized Balance Manager", for staying away from the regular mishaps inside the processing plant. In this strategy propelled sensors and action following framework can be outlined to keep away from debacles. Rather than offering preparing to uneducated specialists we can show them by increment in Indicators, Buzzers and Fire Alarm sign to caution them. The AI based calculation used to group hurtful compound and hazardous temperature levels. It's likewise important to do compound extents as indicated by area temperature to maintain a strategic distance from fiascos.

3.4 WORKING

A Multi-Layer Perceptron (MLP) or Multi-Layer Neural Network contains at least one shrouded layers (aside from one info and one yield layer). While a solitary layer perceptron can just learn straight capacities, a multi-layer perceptron can likewise learn non – dire capacities ties. There are three layers present in ANN Multi Layer. They are INPUT Layer, MIDDLE Layer or HIDDEN Layer and OUTPUT Layer. Each of these layers does it's

functionalities when the user gives the input and gives back the output. In our experiment the main idea is to mix the chemicals according to the given threshold value. For a particular variety of cracker combinations of chemicals are used for

Preparing according to the capacity of cracker. In ANN method, we input the chemicals in the INPUT Layer. Initially we need to fix the threshold value. With the help of threshold value. He Middle Layer starts processing the mixing part as required. Once the MIDDEL Layer completes its process it produces the output. In case if the chemical levels are more the system alerts like RISKY. The ANN method gives an accurate value which is nearby or matches the given threshold value

4. Methodology

When Comparing to other industries, crackers industry faces more risk factors. The position of workers in the industry is more dangerous. There is only hope in the industry is that the fire extinguisher. Even in other places except fireworks industry, there are only alarms to alert the accident by using GSM and ZigBee technology but it fails to clear the fire. This project overcomes with the 2 International Journal of Pure and Applied Mathematics Special Issue 10606 old technologies and gives centum percent protection to the workers for sure. Here, the micro controller unit (cc3200) is used and it is interconnected to internet of things (IOT). First, this project should be monitored to know the exact condition. If it finds a fault in the system, it will not give the accurate response. The smoke sensor watches the whole industry continuously and finds if it senses smoke. The smoke sensor will alert the industry if it detects the smoke. And the result will be monitored by IOT. The fact is that the smoke reflects the sense of fire. Automatically industry can recognize the fire by sensing the smoke. The fire detector will make the chemical gate valve opened after sensing the fire. Oxygen is the main reason of spreading fire so the foam chemicals stop the widespread of oxygen so that the fire stops its process of spreading. The foam chemicals are used to keep the fire in a particular area by controlling it from spreading. When the sensor observes the normal circumstances, automatically it exists from the critical mode and occupies the normal mode which is routine process. This project portrays the safety of workers. It assures the complete safety of the workers by sensing the fire and stops it from spreading. This project is a

boon for the cracker industry to save the life of workers. Workers are the backbone of industry. So, the industry is in the need to keep the workers safely.

4.1 ARDUINO MEGA

The Arduino Mega 2560 is a microcontroller board based on the atmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 quarts (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Demilune or Decimal. The Arduino Mega is the addition to the Arduino family. This board is physically larger than all the other boards and offers significantly more digital and analog pins. The MEGA uses a different processor allowing greater program size and more. The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the atmega16u2 programmed as a USB-to-serial converter. The Mega has four hardware serial ports, which means maximum speed if you need a second or third (or fourth) port..

4.2 MOTOR DRIVER L293D

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge *Motor Driver integrated circuit (IC).* It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor. In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller

4.3 DHT SENSOR

Humidity Sensors are very important devices that help in measuring the environmental humidity. Technically,

the device used to measure the humidity of the atmosphere is called Hygrometer. Humidity Sensors or Hygrometers can be classified based on the type of humidity it is used for measuring i.e.

Absolute Humidity (AH) sensors or Relative Humidity (RH) sensors. Humidity Sensors can also be classified based on the parameter used for measuring Humidity i.e. Capacitive Humidity Sensors, Electrical Conductivity (or Resistive) Humidity Sensors and Thermal Conductivity Humidity Sensors. There are other types of Humidity Sensors or Hygrometers like Optical Hygrometer, Oscillating Hygrometer and Gravimetric Hygromete**r**

4.3.1 WORKING

A simple Capacitive RH Sensor can be made from an air filled capacitor as the moisture in the atmosphere changes its permittivity. But for practical applications, air as a dielectric is not feasible. Hence, the space between the capacitor plates is usually filled with an appropriate dielectric material (isolator), whose dielectric constant varies when it is subjected to change in humidity. The common method of constructing a capacitive RH sensor is to use a hygroscopic polymer film as dielectric and depositing two layers of electrodes on the either side. Another way to use the capacitive RH sensors is to observe the changes in the frequency of the oscillator constructed using a capacitor with RH sensitive test subject as dielectric. This setup is often employed in pharmaceutical products Another way to use the capacitive RH sensors is to observe the changes in the frequency of the oscillator constructed using a capacitor with RH sensitive test subject as dielectric. This setup is often employed in pharmaceutical products

4.4 INFRARED SENSOR

An infrared sensor circuit is one of the basic and popular sensor module in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common applications in real time. This circuit comprises of the following components When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the inverting input goes low. Thus the output of the

comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are used to ensure that minimum 10 ma current passes through the IR LED Devices like Photodiode and normal lads respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram. Read more about IR sensors. The transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit.

4.5 GAS SENSOR

The Grove - Gas Sensor(MQ2) module is useful for gas leakage detection (home and industry). It is suitable for detecting H2, LPG, CH4, CO, Alcohol, Smoke or Propane. 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 The **MQ-2 Gas sensor** can detect or measure gasses like LPG, Alcohol, Propane, Hydrogen, CO and even methane. The module version of this sensor comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. When it comes to measuring the gas in ppm the analog pin has to be used, the analog pin also TTL driven and works on 5V and hence can be used with most common microcontrollers.

4.6 FLAME SENSOR:

Flame sensor is the most sensitive to ordinary light that is why its reaction is generally used as flame alarm purposes. This module can detect flame or wavelength in 760 nm to 1100 nm range of light source. The sensor and flame should keep a certain distance to avoid high temperature damage to the sensor. If the flame is bigger, test it with farther distance. The detection distance is up to 100 cm. The detection angle is 60 degrees so the flame spectrum is especially sensitive. The Flame sensor can output digital or analog signal. It can be used as a flame alarm or in firefighting robots.

4.7 PUMP:

Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, and come in many sizes, from microscopic for use in medical applications, to large industrial pumps. Mechanical pumps serve in a wide range of applications such as pumping water from wells, aquarium filtering, pond filtering and aeration, in the car industry for water-cooling and fuel injection, in the energy industry for pumping oil and natural gas or for operating cooling towers and other components of heating, ventilation and air conditioning systems. In the medical industry, pumps are used for biochemical processes in developing and manufacturing medicine, and as artificial replacements for body parts, in particular the artificial heart and penile prosthesis

5. ALGORITHM

Step1: Start and initialize the circuit.

Step2: Microcontroller unit will send the signal to the Internet of things (IOT).

Step3: IOT receiver receives the signal value and gives the respond to the MCU.

Step4: If IOT doesn't respond then the control moves to the Step

Step5: If the IOT is receives the signal, then the smoke sensor starts to detect the presence of smoke.

Step6: If the smoke is detected, immediately the buzzer gives the alarm.

Step7: The fire sensor detects the fire.

Step8: The Solenoid activates the Fire extinguisher chemicals.

6. CONCLUSION

The accidents can be controlled through precautions but not be stopped. Especially, the ratio of accidents in fireworks industry increased year by year. There is no chance to decide as closing the industry. For the reason that 8, 00,000 workers depend on the industry to survive and the government gets a beneficial source from these industries. These industries are one the most profitable source of money. This project attempts to save the life of the workers and to prevent the industry from fire accidents. This project is friendly to the environment and will not harm any healthy environmental 11 International Journal of Pure and Applied Mathematics Special Issue 10615 sources. I am in pleasure to inform you that my project will serve the best to the fireworks industry

6.1 FUTURE SCOPE

The further extension of this project is real time and internet of things .The workers in the factory should aware of fire accidents so that they can reduce the loss in industry and to solve current problems .Iot has emerged as a leading technology around the world and expanded its area of application in various sectors .

References

[1] Turgayelik, Hseyinzkaramanli, Hasan Demi, "Fire And Smoke Detection Without Sensors: Image Processing Based Approach," in 15th European Signal Processing Conference, Ponzan, 2007.

[2] M. Siswanto, G. Witjaksono, M. Soeheila, Z. Hamdan, "Study on the effects of characteristicpolynomial in LFSR for randomness quality", Proceeding of the International Conference on Advanced Science Engineering and Information Technology (ICASEIT 2011), 1415 Jan 2011.

[3] Gabriel Deak "iots (Internet of Things) and dfpl (Device-free Passive Localisation) in a disaster management scenario", Simulation Modelling Practice and Theory, No.35, 2013, pp.8696.

[4] Ibrahim Korpeoglu et al., "A framework for use of wireless sensor networks in forest fire detection and monitoring", Computers, Environment and Urban Systems, No.36, 2012, pp.614625.

[5] Son, B, "A design and implementation of [6] forest fires surveillance system based on wireless sensor networks for south korea mountains", International Journal of Computer Science and Network Security, Vol.6, No.9B, pp.124130, 2006.

[7] Ilker Korkmaz et al.," A cloud based and Android supported scalable home automation system",

Computers and Electrical Engineering, No.43, 2015, pp. 112128.

[8] Vladimir Vujovic et al.," Raspberry Pi as a Sensor Web node for home automation", Computers and Electrical Engineering, No.44 , 2015, pp.153171.

[9] M. Morin et al.,"Computer-supported visualization of rescue operations", Safety Science, No.35, 2010, pp.3- 27.