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DETECTION AND PREVENTION OF FIRE ACCIDENT IN CRACKER FACTORY USING GSM

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Abstract - *Traditionally Fireworks form an integral part of celebrating Diwali, marriage ceremony and other such happy occasion.Safety of a person is primary concern in any industry especially in crackers factory. Today safety of worker is a major challenge. The cracker manufacturing unit places the life of the people in hazard via liberating hearth and smoke. The existence of people in cracker factory is unstable and every day the pressure on them increases. 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 extend ability. This system is a trendy in 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. Detection and prevention of fire accident is an active device which is based upon arduino UNO and is used to avoid fire accident in cracker industries.The project is based on automatic fire detection. It can sense the temperature which has self defensive ability for early prevention. It is very easy in operation as it is automatically extinguish the fire via chemical or water and a solar panel is used for power supply and it can be used for industrial purposes.GSM(Global System For Mobile Communication) are used for giving alert messages in emergency and for contact purposes.*

***KEY WORDS*: Arduino Uno, Temperature Sensor, Solar Panel, Gsm, Chemical Sprinkler**

1. INTRODUCTION

The Indian firecracker industry is the second largest in the world. India is among the top for a very simple reason – Human resource. Being the second most populous country in the world gives us the single most important resource that supports industries. India also has a festival that requires a large industry. Although firecrackers are used for several occasions around the world, the Indian firecracker industry always did, does and will have Diwali to feed its voracious appetite.

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. Firecrackers are synonymous with Diwali, a major festival for the majority Hindu population.

Occasional accidents in an industry dealing in explosive materials may seem inevitable. But the probability of such mishaps can certainly be reduced by adopting safe work practices this project focuses the safety of the workers. Deaths are quite common in Sivakasi because most of the workforce has no access to safety equipment while manufacturing. Moreover, they often store raw materials in their homes, which lead to accidents and deaths.

Growth of the fireworks industry over the years has contributed to in addition production of dangerous waste inside the town. The quantity of waste generated however, shoots up to through almost 2,000 metric tons at some stage in the month's main as much as most important festivals. Most of those are generated from burnt paper and chemicals like phosphorus, sulphur and potassium.

The principle motive of this venture is to shield the employees from the hearth accidents. This venture will alert the industry, if it sensors the smoke and mechanically pours water and chemicals at the particular area which need to be cleared.

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1.1 *PROJECT SCOPE*

The main objective is to provide high reliable security system and to reduce fire accident in cracker factory. It can also be used in rescue operation where service men cannot enter. It is based on Automatic prevention of fire through pipes and to serve as an eco- friendly device. It is also used to act as a Chemical sprinkler system which acts as a self-defending mechanism.

The purpose of our advanced system is alerting the far off assets owner correctly also rapidly via sending short Message (SMS) through GSM community and transmitter values to the valuable server the use of GPRS.

Findings: An integrated linear temperature sensor detects temperatures far beyond a pre-set standard, although the semiconductor sorting sensor does recognize smoke or even gasoline coming from stove hazards.Upon successful fire detection, the device transmits data to the central server using GPS coordinates that help us determine the exact location using the maps app in the android phone, based on the link received through SMS.

2. RELATED WORK

The Pokey the Fire-Fighting Robot (USA) is a fire fighting robot that has made its way out of competition, and is becoming more "serious" than other systems. There is a detailed description of the equipment used and the basic operating algorithms. The robotics operating environment is a building, so the robot is equipped with necessary sensors, for example, with a line sensor, it can be useless in thick smoke conditions.

The main advantages of robot are:

- The main advantages of the robot are:
- The use of two types of fire sensors that work in different ways.
- Use of complex firefighting tools.

The main disadvantages are:

- Short distance to operate the sensor. The fire can be recognized at a distance of no more than 1.5 meters. Ad developers say the sensors perform poorly at longer distances
- Low efficiency of the on-board computer, capable of carrying out only major tasks, without extension and complexity
- Absence of visual means to perceive the environment.

The device is described as an independent means of fighting fires in homes and any civilian buildings. Fire Protection Robot (USA) - Another competition project developed for Trinity College's 15th Annual Fire Robot Competition. ” The robot has a more complex organization than one as shown above and it is aimed at solving a variety of tasks.

The main advantages of the system are:

- More sophisticated algorithms are used in fire detection.
- Some additional navigation sensors are present.

The main disadvantages are:

- Low efficiency computer.
- Low power structure.
- Lack of a homecoming algorithm.
- The absence of maps.

Firefighting Robot is a Trinity College American project that was only in the prototype stage (in 2008). This robot was supposed to be a standalone device, with a limited working time of 15 minutes, after which it would return to the supply station.

3. METHODOLOGY

Microcontroller is the main controlling part of the system. Sensors are connected .The robot is designed to move as per the command given through voice. The hardware is tested for accuracy and is used for extinguishing the fire.
So this proposed system consist of a fire detection module to perform certain functions assigned to it
Fire detection Module:

- If the temperature at certain place is more than the threshold set then start the water sprinkler.
- If the temperature at certain place is more than the set threshold then start throwing fire ball.
- Else detect the fire inside the room.
- For industry purpose it will detect smoke and gas particles.
- The solar panel is used for giving additional light facilities.
- The power for the whole kit is given by two sources one is from 6v battery and domestic supply 230v.

The main advantage of this proposed project is that

- It is more ecofriendly.
- It is multidimensional.
- It has quicker response.
- There is minimization of financial and human loss
- This proposed design is of low cost.
- It is more reliable system
- It is insensitive to environment

4. BLOCK DIAGRAM

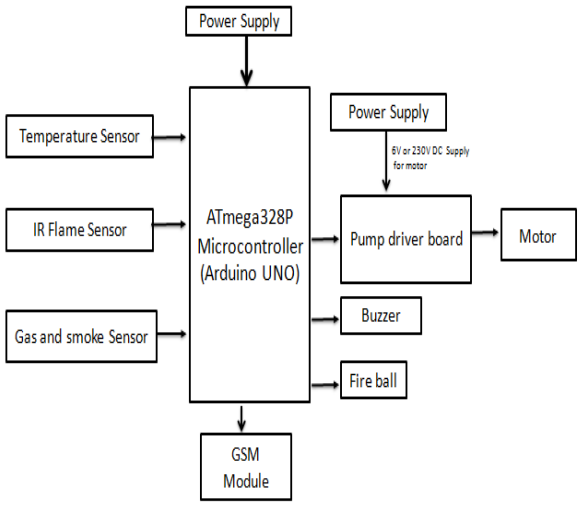

Figure 4.1 Block Diagram

5. CIRCUIT DIAGRAM

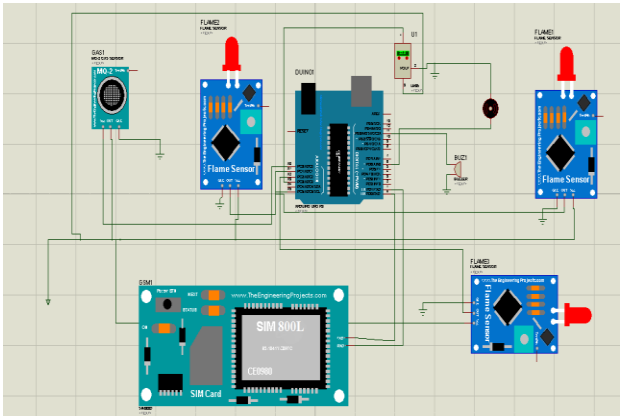

Figure 5.1 CIRCUIT DIAGRAM

6. OUTPUTS

FIGURE 6.1 HARDWARE SETUP

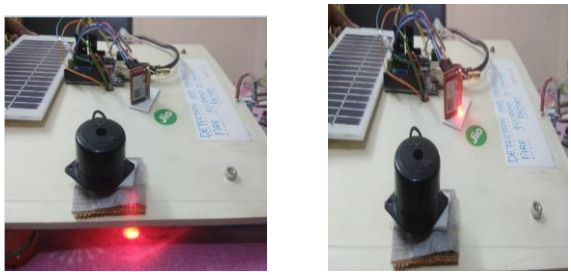

Figure 6.2 Side View

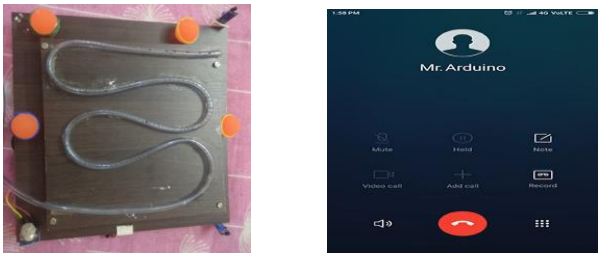

Figure 6.3 sprinkler initialization and GSM Calling

7. CONCLUSIONS

- In order to improve the working conditions in cracker factory and to save human life and also to reduce the damage in case of danger.
- The proposed system consist of flame sensor, heat sensor, buzzer for giving alarm when the fire or temperature of the room increases.
- GSM is used for automatic message sender to the control room of the fire department.
- When the fire is detected through flame sensor, then the sprinkler system will sprinkle CO_2 gas through the PVC pipe connected in the roof top to prevent the fire.
- Chances of risk cannot be completely ruled out, although it can be successfully managed.

8. FUTURE ENHANCEMENTS

- To create an app which will be used for updating information based on infrared camera.
- To add features like message and calling facilities.
- To have a voice controlled command giving mechanism .
- To replace existing facilities with modern version of sensors.

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