INDUSTRY SAFETY SYSTEM USING IOT

S.Ramu[1], S.Pooja Sen[2], K.Pushpalatha[3]

Department Of Electronics And Communication Engineering,Francis Xavier Engineering College,Tirunelveli,India

ABSTRACT

Nowadays in Industries we make use of large machines and boilers for doing so many works. These machines are operated with the help of the man power. Though these machines bring benefit to us, working with them without proper training or malfunctions will cause harm to workers and even leads to death. Pressure vessels are used in factories to store large amounts of energy in the form of heat. Since it stores enormous amount of energy, If the energy released in the event of rupture , then the higher the extent of damage or disaster or danger it poses will also be high, which will lead to unwanted death of the workers. So in our proposed system we are going to automate the machine to stop when it detects the humans with the help of Internet of Things.

Keywords: Arduino UNO, Thermal sensor, Ultrasonic sensor, LED Display, GSM modem

I. INTRODUCTION

In recent times IoT is all sectors like social and economic significance. Consumer products, durable goods, cars and trucks, industrial and utility components, sensors, internet connectivity and powerful data analytic capabilities that promise to transform the way we work, live and play. Internet of Things is an evolving technology which can be used to automate various works of human and hence can reduce the man power in various sectors. Usage of the machines with improper training or accidental interruption with the machines will lead to loss of life. In recent days a 29 year old Men Thiyagarajan was a junior engineer, working as a maintenance lead at Renault Nissan plant at Oragadam died in a tragic accident on 6th January. He was checking machines at the power train section that assembles the engine. He was crushed by a hydraulic press. So in our proposed system we make use of two sensors for the detection of accidental human intrusion with the machine. The sensors detects the motion of the humans and the Thermal sensor is used to detect the

presence of stationary humans by detecting body heat and Ultrasonic sensor is used to measure the distance between the machine and the humans. With the help of these sensors workers accidental interruptions and detected and the machine will be automatically turned off. If in case of any injury means it will sent the notification to the nearby admin or hospitals.

II.TRADITIONAL WORK

At present in industries sensors are only used to connect the various machines and to achieve operational efficiency and fuel monitoring in the machines. Potential industrial applications include the ability to monitor and predict the potential failures and breakdowns of critical equipment through sensor enablement and predictive analytics. Here IOT is used only to ensure the safety and security of remote equipment and assets through remote monitoring. Internet of Things is used in industries to ensure the safety of the costly machines and equipment and to increase their lifetime and durability.

IV. LITERATURE SURVEY

Here we are taking a recent issue of an industrial accident of Renault Nissan plant at Oragadam in which a Junior Engineer Thiyagarajan was died due to the press caused by the machine in the assembly section of the plant while checking the machine. In our findings most of the industrial accidents are due to improper training of the workers or due to accidental interruption of the workers in to the machine and also no other system is used to ensure safety of the workers in the industries.

Utilizing the different sensors gave in the IOT we can decrease the mechanical mishaps somewhat. In our proposed framework we are going to utilize segments, for example, Thermal sensor, Ultrasonic sensor, Arduino UNO and GSM modem to guarantee the security of the laborers in the businesses.

A safety management service using Internet of Things (IOT) for accidents prevention and management was proposed to prevent safety accidents in chemical laboratories. The service can improved experimenter convenience and safeness for administrator by using sensors [1].

A system which is capable to detect fire and can provide the location of the affected region was proposed. This technology helps to reducing the catastrophic accidents caused by fire evaluated effectiveness as well as scalability. This system becomes more efficient and successfully integrated with every factories [2].

This paper analysis and comparison of some of the existing works on smart vehicle communication and accident avoidance system in IoT. Categorization of the works as accident prediction scheme, accident avoidance scheme, accident prevention scheme, powered IoT and Quality of Service was done [3].

Smart Transportation Systems (ITSs) has developed as an answer that is a favorable position from the one of a kind highlights and capacities of Wireless Sensor Networks (WSNs) and Internet of Things (IOT). WSNs are made out of modest gadgets that work in way to detect the parameters of the vehicle and to maintain a strategic distance from infringement of traffic rules [4].

V. INDUSTRIAL INTERNET

In our Conventional work the sensors has been utilized to be specific ultrasonic sensor, warm sensor, Arduino UNO. Warm sensor to guarantee the security of the laborers. At the point when a laborer inadvertently hindered with a machine implies, the sensors sense the interference of the people into the machine and will consequently turn off the intensity of the engine of the machine.In case of any emergency an automatic alert machine will be sent to the nearby admin or hospital with the location coordinates by using the GSM

modem. Then the hospital can contact the industry to know whether the accident have happened or not and can arrive at the location immediately. Thus the safety of the workers in the industry was ensured.

VI. SENSORS

- Thermal sensor
- Ultrasonic sensor
- Arduino UNO
- GSM Modem
- LCD Display(16*2)

Fig.2 Thermal sensor

Thermal sensors are used to detect the presence of stationary humans by detecting the body heat and can therefore automatically turn off unnecessary lighting or air. Here we are using this sensor to differentiate a static worker from a worker in motion, hence avoiding the confusions.

Fig.3 Ultrasonic sensor

Ultrasonic sensor is used to measure the distance between the objects using sound waves. It is used because, humans can present at a distance from the machine. If the worker is far from the machine means then there is no use of sensing them and switching the power off of the machine. In such case turning off the motor is of no use. Hence the Ultrasonic sensor is programmed with a certain distance (i.e., very close to the machine), then only the sensor detect the human motion and turns the machine off.

Fig.4 Arduino UNO

The Arduino UNO is a main microcontroller board and has 14 digits input or output pins, a USB connection, power jack and reset button. It is simply connect to computer with a USB cable or it with a adaptor or battery to get started. Here, UNO is the latest version series of USB Arduino boards and to the reference model for Arduino platform. The UNO differs from all preceding boards and not in use of FTDI USB-to-serial driver chip. [6] discussed about a project, in this project an automatic meter reading system is designed using GSM Technology. The embedded

micro controller is interfaced with the GSM Module. This setup is fitted in home. The energy meter is attached to the micro controller. This controller reads the data from the meter output and transfers that data to GSM Module through the serial port. The embedded micro controller has the knowledge of sending message to the system through the GSM module. Another system is placed in EB office, which is the authority office. When they send "unit request" to the microcontroller which is placed in home. Then the unit value is sent to the EB office PC through GSM module. According to the readings, the authority officer will send the information about the bill to the customer. If the customer doesn't pay bill on-time, the power supply to the corresponding home power unit is cut, by sending the command through to the microcontroller. Once the payment of bill is done the power supply is given to the customer. Power management concept is introduced, in which during the restriction mode only limited amount of power supply can be used by the customer.

Fig.5 GSM Modem

Wireless communication can be achieved using many devices. Those devices are Zigbee, GSM, etc. In this paper GSM is used. Zigbee can also be used but the disadvantage with it is its short range, less complexity and the speed of data is less. Hence compared to Zigbee, GSM has more advantage because it is simple to use and because of its less cost. [2] proposed a novel method for secure transportation of railway systems has been proposed in this project. In existing methods, most of the methods are manual resulting in a lot of human errors. This project proposes a system which can be controlled automatically without any outside help. This project has a model concerning two train sections and a gate section. The railway sections are used to show the movement of trains and a gate section is used to show the happenings in the railway crossings. The scope of this project is to monitor the train sections to prevent collisions between two trains or between humans and trains and to avoid accidents in the railway crossings. Also an additional approach towards effective power utilization has been discussed. Five topics are discussed in this project : 1) Detection of obstacles in front of the train;2) Detection of cracks and movements in the tracks;3) Detection of human presence inside the train and controlling the electrical devices accordingly 4) Updating the location of train and sharing it with other trains automatically 5) Controlling the gate section during railway crossing. This project can be used to avoid accidents in the railway tracks.

GSM modem is a unique type of wireless modem, accepts a SIM card and it operates similar to mobile phone with its own specific mobile number. GSM modem mainly consists of antenna for wireless communication, SIM holder, communication port, ON or OFF switches and power supply. It is used for forwarding the alert messages to the hospital in case of any emergency.

VII.METHODOLOGY

At the point when people coincidentally associate with the machine, the engine of the machine is killed with the assistance of the Arduino UNO microcontroller and the sensors. The Ultrasonic sensor and the

warm sensor is utilized to identify the people. The ultrasonic sensor is modified with explicit separation. Sensors produce the simple yield voltage somewhere in the range of 0 and 5V.An LED is present on the sensor board. It is used to indicate the presence or absence of humans. Hence the machine is turned off. The GSM modem sends the location coordinates to the nearby hospital through the SIM card which provides wireless connectivity. The GSM modem is programmed with the phone number of the nearby hospital. Then the hospital can contact with the industry to know about whether the accident have occurred or not and arrive at there in time. Four modules are used in the proposed system;

- Intruder detection using sonic sensor
- Monitoring the room temperature using thermal sensor
- Machine Automation
- Safety Alert using GSM

(i)Intruder detection using sonic sensor:

- It uses to measure the distance of target objects or materials through the air using "non-contact" technology
- They measure the distance without damage from machines to workers

- It is easy to use and reliable, whether it is used in an indoors or out, tough sonic sensors can take abuse

(ii)Monitoring the room temperature using thermal sensor:

- The most commonly used in this type of sensor to which detect the heat or temperature
- It can be used to detect solids, liquids or gases over a wide range of temperature
- These sensor uses to convection and radiation to monitor the changes in temperature

(iii)Machine Automation:

- It is the uses of control systems such as machines or motors and information technologies
- It handles the different processes and machineries in an industry to replace a human being
- This is the step for beyond mechanization in the scope of industrialization

(iv)Safety Alert Using GSM:

- GSM modem is a unique type of wireless modem, accepts a SIM card

- It operates similar to mobile phone with its own specific mobile number

- GSM modem mainly consists of antenna for wireless communication, SIM holder, communication port, ON or OFF switch and power supply

- It is used for forwarding the alert messages to the hospital in case of any emergency
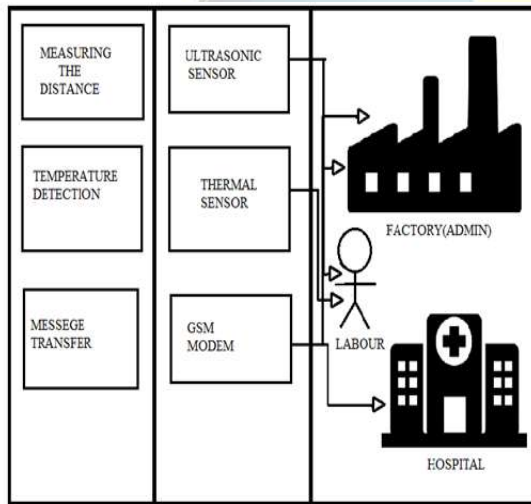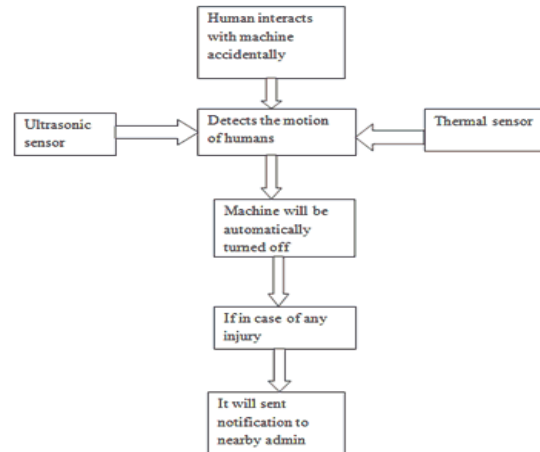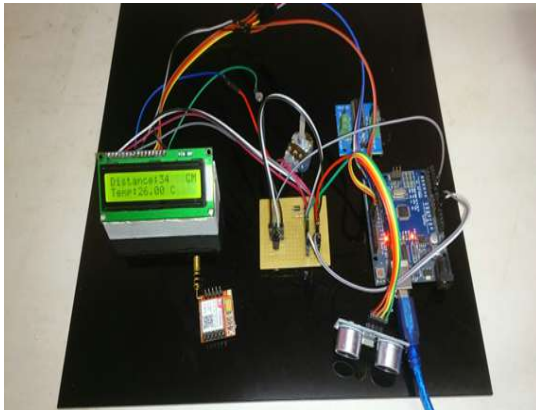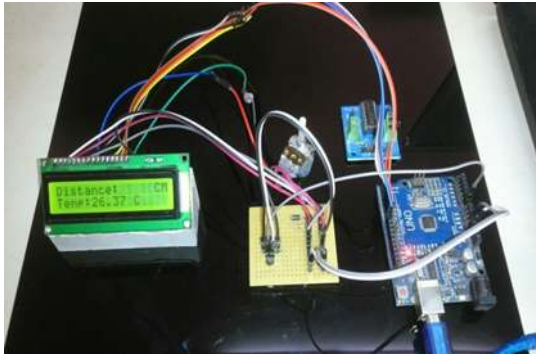

Fig.7.1. System Architecture

Fig.7.2.Flowchart for Prevention of accidents

VIII. EXPERIMENTAL RESULTS

The sensors were conveyed in the specific situations in the machines and they are associated with the Arduino UNO microcontroller. The GSM modem is likewise associated the microcontroller.The power supply of the motor of the machine was also connected to the microcontroller. All the sensors work properly and detect the humans correctly when they are very close to the machine and turn the motor off. Alert message was properly delivered to the respective hospital with the location coordinates.

IX. CONCLUSION

The capability of major mechanical mishaps has gotten increasingly huge underway of capacity and utilization of risky substances expanded. In the consistently expanding automation, charge, chemicalization and advancement have made mechanical employments increasingly unpredictable and complicated. This has prompted expanded perils to human life in businesses through mishaps and wounds.To protect employees/workers from the danger or risk of industrial accidents, we have introduced this concept of "IOT based automated prevention of industrial accidents". By using this we can prevent the loss of life and many injuries. The recent industrial practices have provided many safety measures to workers, even though many accidents will occur due to the technical causes and human causes. These industrial accidents can be prevented using the "IOT based automated prevention of industrial accidents".

X. REFERENCES

[1] Hyeonwoo Kim, Eunggi Lee, Dongwoo Kwon, and Hongtaek Ju,"Chemical Laboratory Safety Management Service Using IoT Sensors and Open APIs" in proceeding International Conference on Wireless Communications, 2017.

[2] Christo Ananth, K.Nagarajan, Vinod Kumar.V., "A SMART APPROACH FOR SECURE CONTROL OF RAILWAY TRANSPORTATION SYSTEMS", International Journal of Pure and Applied Mathematics, Volume 117, Issue 15, 2017, (1215-1221).

[3]Ramya Mary.E , P.B. Pankajavalli, "Survey of accident avoidance, prevention and detection scheme using Internet of Things, 2016.

[4]R.Srinivasan,A.Sharmili,Dr.S.Saravanan,
D.Jayaprakash," Vehicles with smart Everything", 2015.

[5] Aishwarya S.R, Ashish Rai, Charitha, Prasanth M.A, Savitha S.C., "An IoT Based Accident Prevention & Tracking System for Night Drivers," International Journal

of Innovative Research in Computer and Communication Engineering, vol3, issue 4, pp.19441946,2015.

[6] Christo Ananth, Kanthimathi, Krishnammal, Jeyabala, Jothi Monika, Muthu Veni, "GSM Based Automatic Electricity Billing System", International Journal Of Advanced Research Trends In Engineering And Technology (IJARTET), Volume 2, Issue 7, July 2015, pp:16-21

[7] Ethirajan Anbarasan, "Dhaka Bangladesh clothes factory fire kills more than 100," in BBC, 25 November 2012.

[8] Oxfam, "31 die in Bangladesh factory fire as brands do too little, too late," in press.

[9] Sowah, Robert, et al., "Design and implementation of a fire detection and control system for automobiles using fuzzy logic," in Proceedings of Industry Applications Society Annual Meeting, 2016.

[10] Yu, Liyang, Neng Wang, and Xiaoqiao Meng "Real-time forest fire detection with wireless sensor networks," in Proceedings of International Conference on Wireless Communications, Networking and Mobile Computing, Vol. 2, 2005.

[11] Chen, Thou-Ho, et al. "The smoke detection for early fire-alarming system base on video processing," in Proceedings of International Conference on Intelligent Information Hiding and Multimedia, 2006.

[12] Gaikwad, K. M., et al., "Fire Monitoring and Control System," in Proceedings of International Research Journal of Engineering and Technology (IRJET), 2016.

[13] Fuzi, Mohd Faris Mohd, et al., "HOME FADS: A dedicated fire alert detection system using ZigBee wireless network," in Proceedings of Control and System Graduate Research Colloquium (ICSGRC), 2014.

[14] Kwon, Oh-Hyun, Sung-Min Cho, and Sun-Myung Hwang, "Design and implementation of fire detection system," in Proceedings of Advanced Software Engineering and Its Applications, 2008.

[15] Islam, Taoufikul, Hafiz Abdur Rahman, and Minhaz Ahmed Syrus, "Fire detection system with indoor localization using ZigBee based wireless sensor network," in Proceedings of International Conference on Informatics, Electronics & Vision (ICIEV), 2015.

[16] Trivedi, Kartik, and Ashish Kumar Srivastava, "An energy efficient framework for detection and monitoring of forest fire using mobile agent in wireless sensor networks," in Proceedings of International Conference on Computational Intelligence and Computing Research (ICCIC), 2014.

[17] Dong, Wen-hui, Li Wang, Guang-zhi Yu, and Zhi-bin Mei, "Design of Wireless Automatic Fire Alarm System," in Proceedings of Procedia Engineering 135, 412-416, 2016.

[18] Sun, Xiao-qian, and Ming-chun Luo, "Fire risk assessment for super high-rise buildings," in Proceedings of Procedia engineering 71, 492501, 2014. [13] Jing, Chen, and Fu Jingqi, "Fire Alarm System Based on Multi-Sensor Bayes Network," in Proceedings of Procedia Engineering 29, pp. 25512555, 2012.