International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 8 Aug. 2022, pp: 1711-1714 www.ijaem.net ISSN: 2395-5252

Industrial Plant Environment Surveillance and Safety Assurance System Based on Iot

K. Velusamy[1], K. Saravanakumar[2], P. Erusappan [3]

Date of Submission: 20-08-2022 Date of Acceptance: 31-08-2022

ABSTRACT: Occupational safety and health is a very imperative issue and is defined as the condition of being safe and ensuring that occupational accidents and work-related ill-health is prevented as much as possible and safe working environment is promoted. The foundry industry is the backbone of other industries and the growth of industrialization and industrial prosperity can be measured by the growth of the foundry industry. The working environments in foundries are characterized by a combination of mechanical, chemical, physical and environmental hazards to mankind. Occupational safety is an important aspect of industries, to protect the workers, supervisors, management and staff employed in them apart from improving productivity by reducing the losses that may arise due to occurrence of accidents. Foundry work consists of several specialized, interlocking jobs carried out by heavy labor force such as molding and pattern making, core producing, melting and pouring, shakeout and core knockout, cleaning, chipping, and finishing. All these multitude activities expose the workers to various occupational health hazards. As per International Labor Organization , the responsibility for occupational safety and environment aspects rests with employer, employee and government. All the stakeholders should work jointly for enhancing occupational safety and environmental standards in small-scale foundries to make them meet the global requirements. The aim of the study to enhance the knowledge and awareness among workers, management and staff apart from making the small-scale foundries free from hazards and risks, limited to the extent of foresee ability, thus resulting in safer, healthy and environmentally-friendly small-scale foundries.

Keywords: Safety Assurance, Security, Safety Monitoring.

I. INTRODUCTION:

People's lives have been changed dramatically due to tech-nological advancement in smart and diverse types of consumer electronics. These devices, known as the Internet of Things (IoT), are connected by advanced communication technolo-gies to the Internet to exchange information People's lives have been changed dramatically due to tech-nological advancement in smart and diverse types of consumer electronics. These devices, known as the Internet of Things (IoT), are connected by advanced communication technolo-gies to the Internet to exchange information People's lives have been changed dramatically due to tech-nological advancement in smart and diverse types of consumer electronics. These devices, known as the Internet of Things (IoT), are connected by advanced communication technolo-gies to the Internet to exchange information People's lives have been changed dramatically due to technological advancement in smart and diverse types of consumer electronics. These devices, known as the Internet of Things. Currently, the IoT ind stry has reached its "gold rush" state, where every manufacturer is competing to release their next innovative connected devices before their competitors do without thinking much about the non-functional properties of the system. Under such situations, the functionality of the connected devices becomes the major focus and the issues like safety and security take a back seat. However, safety and security are two imperative requirements to guarantee the availability and functionality of IoT-based applications. It is obscure how many incidents due to the gaseous leakage are occurring annually in industrial plants. Most of such spillages remain unreported when tangible disorders are not caused. To merely lay down industrial gas waste, the crucially protected, environmentally sustainable, and monetized plants present a significant obstacle. Natural gas and LPG consists of a combination of propane, butane, and methane gases. These gases can explode into flames and burn whenever even a little spark causes. When a leak occurs, spilled gases can quickly blow up during the process of development and transportation. Owing to the effects of high industrial temperatures and explosions and incendiaries, the number of deaths has risen. So the spillage should be controlled to protect the workers or staff from risk. Gas spillage recognition isn't simply imperative, yet controlling

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 8 Aug. 2022, pp: 1711-1714 www.ijaem.net ISSN: 2395-5252

the spillage is likewise similarly significant. The project aims to provide a secure and safer working environment for worker thus reducing the number of deaths happening in construction sites. The prototype developed was tested on various conditions and showed high accuracy in the performance [1]. The safety concept to be changed along with the evolution of manufacturing sites, and proposes a new safety concept, which realizes collaboration safety of humans and robots, and an outline of its safety level, for the first time in the world[2]. The paper described the components of the safety control model, the safety theorem and the typical implementation process [3]. the Internet of Things is prominently used to monitor the safety of the construction workers. The IoT has aided in broadening the scope of safety considerations in order to provide a better working atmosphere for employees. As a result, the new structure has the potential to significantly reduce injury rates and make the construction industry a safer place to work [4]. this paper is to develop a framework to use Assurance Case methodology for Industrial IoT systems[5]. The IoT-based industrial valve safety management techniques prevent accidents addressing the risk factors by conducting an analysis of the structural characteristics of valves and review of failure data literature and accident scenarios [6]. This paper describes a system that comprises of control, safety and security subsystem for industries and homes. The entire system is based on the Bolt IoT platform. Using this system, the user can control the devices such as LEDs, speed of the fan or DC motor, monitor the temperature of the premises with an alert sub-system for critical temperatures through SMS and call, monitor the presence of anyone inside the premises with an alert sub-system about any intrusion through SMS and call [7].

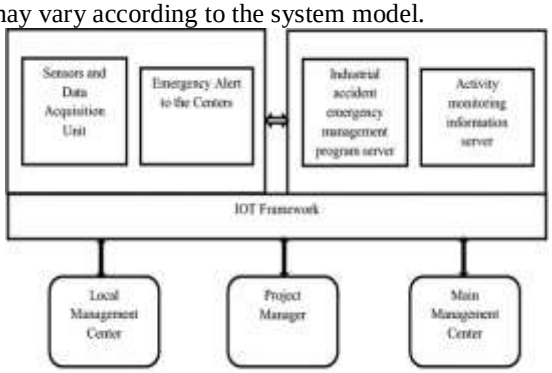
II. SOFTWARE DESIGN

- **Internet of Thinks:**

The internet of things is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Organizations in a variety of industries are using IoT to operate more efficiently, better understand customers to deliver enhanced customer service, improve decision-making and increase the value of the business.

- **IoT Security And Privacy Issues:**

The internet of things connects billions of devices to the internet and involves the use of billions of data points, all of which need to be secured. Due to its expanded attack surface, IoT security and IoT privacy are cited as major concerns. Security requirements in an IoT application should be considered through the following three aspects: hardware, communication, and system model. Here, hardware security means the physical security of IoT devices, while communication security of IoT applications means confidentiality and integrity of communications between IoT entities and application data in storage. The security of each IoT application may vary according to the system model.



III. PROPOSED SYSTEM

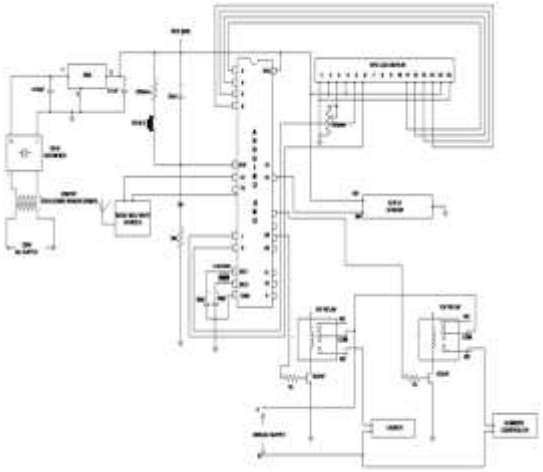
The foundry industry is the backbone of other industries and the growth of industrialization and industrial prosperity can be measured by the growth of the industry. The working environments in foundries are characterized by a combination of mechanical, chemical, physical and environmental hazards to mankind. There are numerous real-world applications of the internet of things, ranging from consumer IoT and enterprise IoT to manufacturing and industrial IoT. IoT applications span numerous verticals, including automotive, telco, energy and more. In the consumer segment, for example, smart homes that are equipped with smart thermostats, smart appliances and connected heating, lighting and electronic devices can be controlled remotely via computers, smart phones or other mobile devices.

- **DH11 sensor:** The DHT-11 Digital Temperature And Humidity Sensor is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin. he DHT11 is a commonly used Temperature and humidity sensor for prototypes monitoring the ambient temperature and humidity of a given area.
- **ER11 Rectifier:** A rectifier is an electronic device that converts an alternating current into a direct current by using one or more P-N junction diodes. A diode behaves as a one-way valve that allows current to flow in a single direction. This

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 8 Aug. 2022, pp: 1711-1714 www.ijaem.net ISSN: 2395-5252

process is known as rectification.

- **AC Supply:** AC stands for 'alternating current' which means the current constantly changes direction.



\

- **Thingworx:** The renowned avenue provides app developers with advanced and powerful tools to market their products. Industrialists can go for Gartner Magic Quadrant for assistance in market research and trends. Another top platform is the Forester Wave Report for viable IoT Strategies.
- **Relay :**In 12-volt automotive circuits, even small resistance amounts can cause significant voltage drop. Relays provide a solution by shortening the required length of the heavy-gauge, power-delivery wire from the battery or alternator to the load.
- **Humidity controllers:** Humidity controllers monitor and maintain proper humidity levels in environmental test applications, food storage areas, and electronic equipment rooms. They often include rate indication features and totalizer, data logger, and chart recorder capabilities.
- **Reset:** In a computer or data transmission system, a reset clears any pending errors or events and brings a system to normal condition or an initial state, usually in a controlled manner.

IV. CONCLUSION

The system will be highly effective for measuring toxic and flammable gases in the industrial environment where the workers' life can be vulnerable at any time. Moreover, as it is a cloud-based real-time monitoring system, the risk of serious injuries and death can be minimized by its application. This system is highly suitable for heavy industrial plants where the probability of the presence of toxic and flammable gases is high and hence the risk of blasts or fire-breakouts is high. The implementation of the proposed system is quite easy and costeffective. There are options for improvising the system by more and more research in this field to make it more efficient.

REFERENCES

[1]. H. Zhu, J. Chen, X. Cai, Z. Ma, R. Jin and L. Yang, "A Security Control Model Based on Petri Net for Industrial IoT," 2019 IEEE International Conference on Industrial Internet (ICII), 2019, pp. 156-159, doi: 10.1109/ICII.2019.00040.

[2]. M. Dohi, K. Okada, I. Maeda, S. Fujitani and T. Fujita, "Proposal of Collaboration Safety in a Coexistence Environment of Human and Robots," 2018 IEEE International Conference on Robotics and Automation (ICRA), 2018, pp. 1924-1930, doi: 10.1109/ICRA.2018.8460869.

[3]. K. M. Mehata, S. K. Shankar, N. Karthikeyan, K. Nandhinee and P. R. Hedwig, "IoT Based Safety and Health Monitoring for Construction Workers," 2019 1st International Conference on Innovations in Information and Communication Technology (ICIICT), 2019, pp. 1-7, doi: 10.1109/ICIICT1.2019.8741478.

[4]. K. M. Mehata, S. K. Shankar, N. Karthikeyan, K. Nandhinee and P. R. Hedwig, "IoT Based Safety and Health Monitoring for Construction Workers," 2019 1st International Conference on Innovations in Information and Communication Technology (ICIICT), 2019, pp. 1-7, doi: 10.1109/ICIICT1.2019.8741478.

[5]. V. Sklyar and V. Kharchenko, "Challenges in assurance case application for industrial IoT," 2017 9th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), 2017, pp. 736-739, doi: 10.1109/IDAACS.2017.8095187.

[6]. J. -H. Kim, K. -S. Lee and Y. -G. Kim, "Development of IoT-based Safety Management Method through an Analysis of Structural Characteristics and Risk Factors for Industrial Valves," 2019 International Conference on Machine Learning and Data Engineering (iCMLDE), 2019, pp. 30-35, doi: 10.1109/iCMLDE49015.2019.00017.

[7]. S. Rehan and R. Singh, "Industrial and Home Automation, Control, Safety and Security System using Bolt IoT Platform," 2020 International Conference on Smart Electronics and Communication (ICOSEC), 2020, pp. 787-793, doi: 10.1109/ICOSEC49089.2020.9215345.

[8]. M. Frey et al., "Security for the Industrial IoT: The Case for Information-Centric Networking," 2019 IEEE 5th World Forum on Internet of Things (WF-IoT), 2019, pp. 424-429, doi: 10.1109/WF-IoT.2019.8767183.
[9]. F. Wu, T. Wu and M. R. Yuce, "Design and Implementation of a Wearable Sensor Network System for IoT-Connected Safety and Health Applications," 2019 IEEE 5th World Forum on Internet of Things (WF-IoT), 2019, pp. 87-90, doi: 10.1109/WF-IoT.2019.8767280.
[10]. M. Zubaľ, T. Lojka and I. Zolotová, "IoT gateway and industrial safety with computer vision," 2016 IEEE 14th International Symposium on Applied Machine Intelligence and Informatics (SAMI), 2016, pp. 183-186, doi: 10.1109/SAMI.2016.7423004.