**Literature Survey**

**1)** **Hemlata Yadav, Naomi Oyiza, Sarfaraz Hassan,Dr. Suman Lata, K. Jaya Chitra. "IOT BASED INDUSTRIAL MONITORING SYSTEM."(2022)**

Modernization and automation are sweeping the globe, with IoT-based industrial monitoring solutions at the forefront. The importance of assessing the state of the industry is vital to the safety and efficiency of the products. The goal of this study is to create an IoT-based industrial monitoring system with intelligent sensors. A web controller, often known as an Econtroller, is a set of embedded systems and software stacks that is the most extensively used method of web development in the world. Instead of employing large server systems for monitoring, administering, and handling data, remote login and monitoring using a distributed web control system produced using web pages generated in web applications are increasingly used instead of big server systems for monitoring, administering, and processing data. The main objective is to adapt the Internet control system to the Internet of Things, allowing users to access the application over the Internet from anywhere in the globe. IoT monitoring allows you to analyze dynamic systems and analyze billions of events and alerts. IoT monitoring also enables you to bridge the gap between devices and businesses by collecting and analyzing a wide range of IoT data at a web scale across connected devices, consumers, and apps. Arduino is used to control various sensors (using smoke and temperature sensors) providing complete control over the industry. The Internet of Things (IoT) is used in this project to deliver data to the user. The system feeds signals from several sensors, such as the smoke, temperature, and humidity sensors, to the Arduino Mega microcontroller. The data is subsequently sent to the IoT module via the microcontroller (ESP8266). The ESP8266 is a chip that allows microcontrollers to connect to a Wi-Fi network, establish TCP/IP connections, and deliver data. The implementation is not only for safety reasons, but it also has the potential to increase industry yields.

**2) Wejie-Okachi, Ugwechi et al. “Embedded IoT-based Monitoring Utility for Safety Management and Access Control.” (2021).**

In an industrial workplace, the safety of human lives and properties are key functions of the Health, Safety and Environment (HSE) department. In this work, an industrial automation monitoring system based on IoT was designed and implemented to assist in access control and safety management in a storage facility of an Industrial plant. The monitoring utility detects the alcohol levels of employees before they enter the facility. It further continuously checks the environment for Liquefied Petroleum Gas (LPG) leakage and any possibilities for a fire outbreak, then sends out real-time alert/alarm notifications to the HSE department, fire office, security units and other authorized personnel through the industry’s website and a dedicated GSM line. The system’s sensor modules, consisting of alcohol, LPG and fire sensors, measure the parameters and sends the relevant data to the microcontrollers for processing. The NodeMCU activates the IoT-based alert mode by sending the processed data. While sending out the alert, it also activates the fire suppression system via the sprinkler circuit. With this the industrial storage facility urgently carried out necessary actions that prevented and minimized workplace hazards. However, in this research, three parameters were monitored with sensors modules, and then status reports are sent to authorized departments for necessary actions. The various reports were used as data to conduct safety measures, facility’s access control, employees’ training schools and for the improvement of the entire facility. Due to this monitoring agent and associated utility, the HSE department reported a 90% drop in injuries and other safety issues related to LPG leakage, fire, and intoxicated employees showing up at work. The industry was able to improve its safety management and access control in its storage facility.

**3) Gnoni, Maria Grazia, Paolo Angelo Bragatto, Maria Francesca Milazzo, and Roberto Setola. "Integrating IoT technologies for an “intelligent” safety management in the process industry." *Procedia manufacturing* 42 (2020).**

IoT (Internet of Things) technologies are wide spreading in several industrial sector due to a combination of increasing technical performance together with decreasing purchase prices: thus, new tools are been evaluated for adoption in new fields of application, like safety at work. In recent years, several projects and prototypes as well as industrial solutions have been developed using IOT technologies especially to dynamically managing safety levels at complex workplaces. The aim of this study is to describe a prototype system where the so called Smart Objects (SOs) - integrating different IoT technologies- interact in a working environment through a digital platform for managing different type of hazards – e.g. involving safety of plants as well as workers - usually influencing safety levels especially in process industry. The fields of application of the proposed system vary from tracking periodic mandatory maintenance and analyzing aging of equipment, processing or containing hazardous materials, to remote tracking of hazardous conditions of workers.

**4) Zong-Yi Yang, Chih-Wei Chou, Wei-Cheng Lin, Wei-Chun Chenand Chi-Min Shu. A Novel Environmental Monitoring Strategy for Industrial Safety and Disaster Prevention Management Applications (2020)**

Building an industrial safety and disaster prevention management (ISDPM) system can effectively prevent unforeseen industrial accidents, such as fires, explosions, releases of hazardous chemicals, and leaks of poisonous gases. To prevent disasters caused by the smoldering and spontaneous combustion of hazardous wastes in a hazardous waste storage area, we proposed a novel intelligent environmental monitoring system (IEMS) for ISDPM applications. The proposed IEMS based on the integration of a monitoring sensor network,

remote central database server, desktop/laptop/mobile network, and smart user interface has the ability to smartly and automatically help users prevent disasters from occurring. Through using network connections, all of the devices were able to perform real-time actual data transmission directly. Therefore, users could select a communication product from anywhere at any time to scrutinize the details of the overall current ambient environmental information, including surveillance images, thermal images, gas concentrations, air quality, temperature, and humidity. The results obtained with the proposed IEMS in practical field tests suggest its high suitability for use in a wide range of industries.

**5) Teixeira, Igor TT, and Frank Herman Behrens. "IoT-Based Indicator for Industrial Accident Risks." Brazilian Technology Symposium. Springer, Cham. (2020)**

The manufacturing industry is one of the most dangerous in terms of work safety. Among different kinds of accidents in industrial environments, the biggest causes involving humans are related to machines and equipment used for manufacturing. Although there are standards and regulations for machines’ safe operation, some specific criteria could only be identified by specialists and managers in Environment, Health, and Safety (EHS). The internet of things (IoT) is a fundamental technology for Industry 4.0, bringing many benefits for automation and process control. Despite the increasing automation leading to a decrease in manual work, there is still a considerable presence of employees subject to accident risks. This work proposes the use of physical variables collected on machines in a production line to create a safety risk indicator. Considering that these variables are available in IoT-based monitoring systems, a method of analyzing accident risks based on multi-variable graphs obtained from the normalization of the monitored variables is proposed. This risk display method is believed to assist in safety analyzes by operators and specialists in a Safety Management System (SMS).

**6) Nakpong, Nuttapun, and Nopphagaw Thongbai. "Air Pollution Monitoring and Alarming System via Internet of Things." Engineering Access 5.2 (2019): 65-69.**

Internet of Things (IoT) is a network of smart sensors that can control and monitor things from anywhere over wireless communication and internet. Therefore, this research aims to propose air pollution monitoring and the alarming system powered by the internet of things technology. The smart box has been developed as a prototype to measure the level of air quality, dust, temperature, and humidity. It comprises of two important units including a microcontroller and related sensors. Data from sensors is collected and sent to the IoT cloud server over a wireless network. The Blynk mobile application is used to monitor and display real-time related data through the digital dashboard. Moreover, Blynk application is selected as a real-time notification system to the user provided that air pollution is greater than the standard level.

**7) Bragatto, P., L. Faramondi, F. Failla, and M. Gnoni. "Potential and limits of IoT for hazardous job in process industries." *CHEMICAL ENGINEERING* 67 (2018).**

In process industries, including refineries, petrochemical plants, air fractioning plants, Oil and gas depots, there are many hazards for workers (both for employees and contractors). Occupational Hazards include thermal extremes, high concentration of toxic or flammable gas and low concentration of oxygen. These hazards are usually controlled by means of procedures, operating instruction, gas sensors, alarms, personal and collective protection equipment. The potential of IoT enabling technologies, including smart sensoring and human-machine communication, have a huge potential for reducing the uncertainties in hazard detection and promoting a more dynamic approach. The main idea is the adoption of a solution based on wearable and fixed sensors used to dynamically monitoring the environments in order to provide, in real time, information about situation context in order to help the workers to better estimate the actual level of risk. The use of IoT poses new problems, including web security, privacy, workers’ union acceptance. The implementation of IoT solution requires a special attention to these details, in order to avoid defeats in innovation projects.The framework presented in this paper makes it possible to establish a communication network among operators, environmental smart sensors, and industrial machines with the aim to provide a useful tool able to merge data in order to provide a risk assessment analysis.To this end the communication protocols and the operative characteristics of the framework are optimized in order to reduce the battery consumption.

**8) Gorli, Ravi. "A New Approach for Employee Safety in Industries with IoT." i-Manager's Journal on Information Technology 7.2 .(2018)**

Internet of Things (Iot) has become a buzz word in the society, as it is emerging in different sectors with broad applications such as smart cities, smart home, connected cars, industries and so on. Already many devices have merged into the market. The industries have turned into the fourth revolution, i.e. Industry 4.0, where the departments such as manufacturing, production, and deployment have already automated with the invention of IoT. Coming to the Industries, Safety is the main measure which should be considered by the industrialists. Presently followed prediction models depend on the previous data of the accidents and other health issues related to employee which are collected from the industries. From that, precautions are taken for reducing the death and injuries of employees in future. In this paper, a new approach has been proposed with the invention of IoT in Industrial Safety, where the live information is tracked and immediate measures are taken on demand so that the loss that occurs due to accidents or other health related issues can be reduced to the maximum extent. The implementation is shown in two models; Monitoring Employee Health (MEH), Safety Automation Model (SAM).

**9) Martillano, Dennis A., Joshua Miguel R. Dita, Christian G. Cruz, and Kunal S. Sadhra. "Android Based Real-Time Industrial Emission Monitoring System Using IoT Technology." *J. Commun.* 12, no. 11 (2017).**

The need to industrialize to compete with global standards is a complete requisite to realize a booming economy. However, there is no question that it has wreaked havoc on the environment caused industrial emissions of dangerous chemicals. This study aimed to create a system that will allow Industrial plants and factories to monitor the emission of the smoke stacks held in a manufacturing company anytime, anywhere using IoT or Internet of Things Technology. It explains IoT as a system of physical things embedded with different sensors, software, electronics and connectivity to allow it to perform better by exchanging information with other connected devices. This will help companies in maintaining the machine and provide them emission data of gaseous elements such as carbon monoxide, particulate matter, sulphur and nitrogen dioxide that will help them in complying with the environmental standards of industrial emission. Enabling manufacturing companies to gather plot and interpret data using the system which could be used to further improve emission output and make necessary decisions and corrective actions while imposing cleaner air will benefit the company, the people and the environment.

**10) Halim, Ahmad Ashraf Abdul, et al. Internet of things technology for greenhouse monitoring and management system based on wireless sensor network. Diss. School of Computer and Communication Engineering, Universiti Malaysia Perlis. (2017)**

Agrotech plays an important role in the production of out-of-season fruits, flowers and vegetable as well as high value and sensitive plants. The greenhouse concept has been widely used in precision agriculture to acquire the best quality for the production of fruits or vegetables. However a fully automated system, taking into considerations the different phases of plant growth and the optimal requirement by the plants during these growth periods and cycle is not fully designed and available. The optimal plant growth depends on several parameters such as irrigation, soil moisture, humidity, and temperature, radiation of light, pH level, and CO². Thus, this project develops an automated scheduler system by considering with all optimal plant growth requirements for every each phase of the plant to ensure that all subjects (mango) will grow perfectly. Main hardware component within project is Memsic, Zigbee and smart phone for display while MP Lab and LabView are used for software elements. It is anticipated, by using this system labor and maintenance cost will be cheaper and the process of monitoring and collecting data or information is more easy and efficient.