

HAZARDOUS AREA MONITORING FOR INDUSTRIAL PLANT POWERED BY IOT

INTRODUCTION :

In some industrial plants, there are some areas which are to be monitored from time to time. Sometimes the condition becomes critical which may lead to loss of property and also human loss. To monitor the condition we can integrate the smart devices in the areas which are needed to be monitored. Every device will be acting as a beacon and it is connected to temperature sensors. We can broadcast the temperature data along with the location of that particular area through beacons.

LITERATURE REVIEW:

1. POTENTIAL AND LIMITS OF IOT FOR HAZARDOUS

JOBS IN PROCESS INDUSTRIES

The SmartBench framework is based on the cooperation of three fundamental actors: the operator, a mobile Application, and environmental smart sensors (ESS) deployed in the surrounding area.

It is possible to define objects and humans in perfect accord to the IoT paradigm.

The operator is equipped with a mobile device and a human smart sensor (HSS) able to field.

ADVANTAGES:

Future works will be devoted to the integration of the proposed architecture with the plant network (if available) in order to retrieve other useful data (e.g.: wi-fi camera).

DISADVANTAGES:

Another future enhancement will be focused to the introduction of an indoor positioning system in order to provide to the operators an estimation of their positions in their fields.

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AIR POLLUTION MONITORING AND ALARMING SYSTEM VIA INTERNET OF THINGS

LITERATURE REVIEW:

According to a severe situation of air quality in Thailand, air pollution emerges

from an internal combustion engine, construction, different transportation, forest

fires, industrial production and so on. These lead to a health's problem, especially

coronary heart disease and severe acute respiratory syndrome. For this reason,

researchers have a notion to apply information technology to monitor and alarm state of air quality in a hazardous area.

ADVANTAGES:

1. The smart box has been developed as a prototype to measure the level of air quality, dust, temperature, and humidity.
2. it is suitable to implement and apply in a smart city for the near future.

DISADVANTAGES:

Blynk application is selected as a real-time notification system to the user provided that air pollution is greater than the standard level.

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[3] Tasty, Thailand (2019). URL: <https://tastythailand.com/bangkok-air-pollution-at-dangerous-level-in-january-2019/>, access on 6/02/2019

[4] NPI (2019). URL: <http://www.npi.gov.au/resource/particulate-matter-pm10-and-pm25>, access on 9/04/2019

[5] S. Duangsuwan, A. Takarn, R. Nujankaew and P. Jamjareegulgarn, (2018). A Study of Air Pollution Smart Sensors LPWAN via NB-IoT for Thailand Smart Cities 4.0, 2018 10th International Conference on Knowledge and Smart Technology

ANDROID BASED REAL TIME INDUSTRIAL EMISSION MONITORING SYSTEM USING IOT TECHNOLOGY

LITERATURE REVIEW:

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.

ADVANTAGES: This will help companies in maintaining the machine and provide them emission data of gaseous elements such as carbon monoxide, particulate matter, sulfur and nitrogen dioxide that will help them in complying with the environmental standards of industrial emission.

DISADVANTAGES:

Security and privacy. Keeping the data gathered and transmitted by IoT devices safe is challenging, as they evolve and expand in use.

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Air Pollution Monitoring and Alarming System via Internet of Things

Introduction:-

In the present, Thailand is being categorized into developing country group which caused rapidly changes of economy, culture, and environment. Thailand have faced air pollution problem affecting health of a large number of people. Air is the necessary factor of human body being and life. Bangkok is the capital city of Thailand where people more than 8 million living crowded with high density of population.

Literature Review:-

Air quality is the most tremendous thing for the life of people. According to a severe situation of air quality in Thailand, air pollution emerges from an internal combustion engine, construction, different transportation, forest fires, and industrial production and so on. These lead to a health's problem, especially coronary heart disease and severe acute respiratory syndrome. For this reason, researchers have a notion to apply information technology to monitor and alarm state of air quality in a hazardous area. Internet of Things (IoT) is a network of smart sensors that can control and monitor things from anywhere over wireless communication and internet. 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 research results indicated that the developed smart box and mobile application can monitor and alarm the level of air quality effectively. Also, it is suitable to implement and apply in a smart city for the near future.

Advantages:-

- The research focused on applying the IoT to monitor the dust via Blynk application on a smart phone.
- The purpose of creating small dust monitor station by designing as a box is to be easy for using and portable.
- The researchers can configure forms of display results of current air quality.

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- The Thaiger (2019). URL: <https://thethaiger.com/news/bangkok/bangkok-air-qualitybkk-governor-calls-for-help-as-pm2-5-smog-continues>, access on 10/04/2019
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- K. Ashton, (2009). That Internet of Things in the real world, things matter more than ideas, RFID Journal

Android Based Real-Time Industrial Emission Monitoring System Using IoT Technology

Introduction:-

Industrialization is inevitable in a progressive country. As the Philippines makes its way to finally realize a booming economy, the need to industrialize to compete with global standards is a complete requisite. This requisite entails innovation of new technology, commencing manufacturing corporations and building and housing a den of factories and industrial plants. With all of these complex changes, there should be a complete balance between industrialization and environmental protection. Several policies and environmental protection procedures that may vary from country to country have been implemented around the world.

Abstract:-

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. 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.

Advantages:-

- Self-Calibration was made and baseline data was used to provide accurate output.
- The system could be used in any industrial factory that emits dangerous smoke, and specific chemicals and gaseous elements.

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- U. Sharma and S. R. N. Reddy, "Design of Home/Office automation using wireless sensor network," International Journal of Computer Applications, vol. 43, pp. 53-60, 2012.

Leveraging IoT to Improve Machine Safety in the Mining Industry

Introduction:-

Of the hundreds of machinery-related accidents occurring every year in the mining industry, incidents involving stationary machinery at surface mines continue to be among the most frequent. A National Institute for Occupational Safety and Health (NIOSH) study showed that the majority of fatal accidents involving stationary machinery at surface mines occurred at sand and gravel (38%) and stone (26%) operations. Of these accidents, entanglements in conveyor components were the most common cause of fatal accidents (48%). The U.S. Mine Safety and Health Administration (MSHA) acknowledged this problem, stating in a recent request for information (RFI) This paper describes the design and field deployment of phase I of this system, which represents a vital first step towards widespread adoption of intelligent safety monitoring systems. Current and future work for phase II is also described, which will see the completion of a final, comprehensive system for use by industry.

Literature Review:-

Each year, hundreds of mine workers are involved in machinery-related accidents. Many of these accidents involve inadequate or improper use of lockout/tagout (LOTO) procedures. To mitigate the occurrence of these accidents, new safety methods are needed to monitor access to hazardous areas around operating machinery, improve documentation/monitoring of maintenance that requires shutdown of the machinery, and prevent unexpected start-up or movement during machine maintenance activities. The National Institute for Occupational Safety and Health (NIOSH) is currently researching the application of Internet of Things (IoT) technologies to provide intelligent machine monitoring as part of a comprehensive LOTO program. This paper introduces NIOSH's two phase implementation of an IoT-based intelligent machine monitoring system. Phase one is the installation of a proof-of-concept system at a concrete batch plant, while phase two involves scaling up the system to include additional sensors, more detailed safety/performance metrics, proximity detection, and predictive failure analysis.

Advantages:-

- The mining sector in particular will benefit enormously from the ability to remotely view safety-related data in real time and to receive alarms when safeguards are potentially failing.
- Initial testing of the IoT monitoring system, in collaboration with Central Pre-Mix, has successfully demonstrated a method for electronically tracking and confirming lockout/tag out.

References:-

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HAZARDOUS AREA MONITORING FOR INDUSTRIAL PLANT POWERED BY IOT INTRODUCTION:

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To monitor the conditions we can integrate the smart devices in the areas which are needed to be monitored. Every device will be acting as a beacon and it is connected to temperature sensors. We can

broadcast the temperature data along with the location of that particular area through beacons

LITERATURE SURVEY:

1.Modular automation cabinet for proactive monitoring in ATEX Zone 2

INTRODUCTION:

The paper presents an automation system dedicated to oil & gas machinery applications, such as electrical gas compressors. The future aim is to introduce it into the Romanian oil & gas industry. The system consists of a low size cabinet and its dependencies, which can be used in ATEX. The electronic equipment is dimensioned and chosen according to the standards in force, so that the limited current and voltage requirements for methane gas to be met. The key feature is that this system complies with all ATEX standards for Zone 2. Moreover, it can also be a mobile and modular solution if needed, for a versatile and easy use in proactive monitoring of multiple locations across various compressor plants. The design, wireless transmission and possible implementation of this cabinet are presented. Remote data transmission via Wi-Fi and RS-485 communication interfaces between the devices is considered, due to several advantages: mobility, versatility, wide compatibility, environmentally friendly, as well as higher resources efficiency (reducing time and costs).

Literature Review:

1. A versatile modular monitoring equipment for the proactive diagnosis and monitoring of a wide range of industrial equipment [2, 3] is becoming more and more useful
2. Automation systems have started to be modularized in order to be able monitor a wide range of equipment (such as compressors, electric motors, gas turbines, blowers etc.)
3. A properly designed automation cabinet [4, 5] can increase productivity, lowers costs, and ensure processes reliability.

ADVANTAGES:

- 1.The proposed cabinet is also portable, easy to install and then switch to another plant.
- 2.This can easily compensate the downside of wireless equipment costs.
- 3.wireless instrumentation helps reduce human work and material costs, by eliminating expensive cables and most related wire infrastructure and work.

DISADVANTAGES:

1. Previous experience has proven the unquestionable benefits of portable diagnosis cabinets.
2. Increasing need for multiple such systems.

AIR POLLUTION MONITORING AND ALARMING SYSTEM VIA INTERNET OF THINGS

Introduction:

Nowadays, safety of goods and people as well as sustainability, are major goals of modern industrial enterprises. The risk of major accidents is mostly associated with the presence of dangerous substances at such quantities and under such conditions that an uncontrolled product handling or mis-positioning, a fire or explosion can take place, with potential adverse effects on workers' health, on materials and environment (Gnoni et al., 2012; Artsiomchyk and Zhivitskaya, 2013). Handling, storage and disposal of hazardous substances give rise to specific constraints particularly in a warehouse management system (WMS) (Goode et al., 2014). Internet of things (IoT) is the next step towards global and pervasive interconnection between object, machine, human and environment that allows new dimensions and opportunities for object-to-object (O2O), object-to-human (O2H), and object-to-environment (O2E) interactions. Moreover, services can be offered by individual entities like products or resources owing to highly autonomous communication and distributed decision-making capabilities (Borgia, 2014; Trab et al., 2015). In this innovative IoT vision, warehousing and more broadly smart logistics, can take a huge benefit from multiple interaction abilities (O2O, O2H and O2E) to carry out human, material and environmental safety assurance. When deployed in a warehousing facility, wireless sensor network (WSN) is a key technology to achieve such objectives by offering capabilities of sensing,

Literature Review:

1. The smart product concept can be used as a generic term figuring out many other naming such as intelligent product, connected object, smart object, smart thing... The multiple definitions of the smart object were analysed by (Gutiérrez et al., 2013), in order to provide a consensus definition satisfying all the software and system engineering domains.
2. Kiritsis, 2011; Niskanen, 2011; Zouinkhi et al., 2011) have provided various context-application dependent definitions that can be seized to design and model smart object in multiple research areas such as the IoT, ambient intelligence, robotics and process

automation.

3. Overcoming the major issues of safety in WMS with the help of the smart product concept requires providing intelligence and decision-making capabilities dedicated to safety-control for each warehousing operation

ADVANTAGES:

1. For secure storage of hazardous substances, some areas should be designed or adapted to ensure suitable storage conditions

2. A safety rules system was firstly proposed in (Zouinkhi et al., 2011) that defines the chemical substance state of each supervised container (i.e., a product).

3. Sensed data is then transmitted wirelessly via multi-hop communications towards one sink node or gateway, or a small set of sink nodes

4. Sensed data is then transmitted wirelessly via multi-hop communications towards one sink node or gateway, or a small set of sink nodes

DISADVANTAGES:

1. Overcoming the major issues of safety in WMS with the help of the smart product concept requires providing intelligence and decision-making capabilities dedicated to safety-control for each warehousing operation

2. These operations will be monitored by product-embedded safety mechanisms to detect environmental disturbances, risky and conflictual situations in order to harmoniously coordinate warehousing operations of hazardous and harmful products with respect to safety of goods, people and environment.

3. Overcoming the major issues of safety in WMS with the help of the smart product concept requires providing intelligence and decision-making capabilities dedicated to safety-control for each warehousing operation

4. No warehouse manager would want to be told or blamed that a temperature excursion occurred at his warehouse.

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different transportation, forest fires, industrial production and so on. These lead to a health's problem,

especially coronary heart disease and severe acute respiratory syndrome. For this reason, researchers have a notion to apply information technology to monitor and alarm state of air quality in a

hazardous area. 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

LITERATURE REVIEW:

1. In the present, Thailand is being categorized into developing country group which caused rapidly

changes of economy, culture, and environment.

2. In this case study, from air quality problem that is directly affect people's health as mentioned

above, researchers' study and develop breathe box to be the tool measuring AQI in living place

with tools installed in each room of the house that data can be shown via smart phone.

3. IoT has been increasingly used in smart life. It is applied in smart home platforms to control

home devices and appliances from remote locations such as automatic door opening and closing system, motion detection sensor, intruder alarm system, automatic power on/off system, and remote home monitoring.

ADVANTAGES:

1. Internet of things (IoT) is the concept of bringing the internet to connect to other devices and making those devices to be able to receive and transfer data through internet network.
2. IoT has been applied to many functions, for example, public health, transportation, agriculture, and industrial factory.
3. It is used to regularly monitor and collect patients' information necessary for medical analysis and providing emergency medical assistance
4. . IoT is used to manage an urban public transportation system and control energy and environmental management systems through smart sensor network.

DISADVANTAGES:

1. It only selects widget from widget box, then dragging and dropping widgets in the location of digital dashboard that user creates.
2. It will show the warning message when very high pollution occurred as "High pollution! Force signal active."

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7. ATEX Directive 2014/34/EU (2014)

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INTRODUCTION:

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time to time. Sometimes the conditions may become critical which may lead

to loss of property and human loss.

To monitor the conditions we can integrate the smart devices in the areas which are

needed to be monitored. Every device will be acting as a beacon and it is connected

to temperature sensors. We can broadcast the temperature data along with the

location of that particular area through beacons.

LITERATURE REVIEW:

1. Electrical Hazardous Area Classification Design as a Basis

for Safer Operations:

The use of Electrical Hazardous Area Classification drawings as a

basis for communicating the degree and extent of explosive

hazards within industrial facilities is explored. Existing

occupational health and safety regulations are referenced to

determine a link between operational activities and the use of

electrical hazardous area classification drawings as a tool for

hazard assessment and management.

ADVANTAGES:

They are primarily used to influence the selection and installation

of electrical equipment. They can also be used as a means for

communicating the potential explosion hazards associated with electrical and non-electrical operational activities.

DISADVANTAGES:

Employees must be able to identify and assess the hazard in order to properly mitigate the hazard. This requires a standard means of communicating the nature of the hazard.

REFERENCES:

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- [2] The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR), Her Majesty's Stationery Office (HMSO), London UK.
- [3] OSHA Law & Regulations, U.S. Department of Labor - OSHA 200 Constitution Ave., NW Washington, DC.
- [4] Alberta Occupational Health and Safety Code, 2009, Alberta Queens Printer.

2. Continuous Remote Monitoring in Hazardous Sites Using Sensor Technologies:

The deployment of a distributed point source monitoring system based on wireless sensor networks in an industrial site where

dangerous substances are produced, used, and stored is described. Seven essential features, fundamental prerequisites for our estimating emissions method, were identified. The system, consisting of a wireless sensor network (WSN) using photoionisation detectors (PIDs), continuously monitors the volatile organic compound (VOC) concentration at a petrochemical plant on an unprecedented time/space scale.

ADVANTAGES:

- (i)being inexpensive
- (ii)being suitable for leak detection (all compounds, all locations)
- (iii)being suitable for all of the site's equipment and their phases of operation
- (iv)allowing real time estimation.
- (v)allowing easy inspection for enforcement.

DISADVANTAGES:

Volatile organic compounds (VOCs) are widely used in industries as solvents or chemical intermediates. Unfortunately, they include components which, if present in the atmosphere, may represent a risk factor for human health.

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