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Design of Smart Monitoring System for Sour Gas Release in an Offshore Platform Using IIOT

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ABSTRACT: *To optimize efficiency and safety, upstream off shore Oil and Gas (O&G) production requires round-the-clock monitoring of numerous equipment and parameters. As such, it's no wonder that O&G companies have been at the forefront of technology adoption for remote supervision. Having said that, traditional communication solutions are either limited, expensive or cumbersome for connecting large numbers of disparate assets at offshore drilling platforms. Wired infrastructure like SCADA systems are designed for data acquisition to serve remote monitoring. Cellular connectivity is most likely absent in the middle of the ocean. And, given the massive size and complex, dense structure of oil rigs, setting up mesh networks is often a difficult endeavour. Due to its seamlessness and ubiquity, satellite connectivity has been the most common option for offshore wireless implementation and it is cost effective. Given the absence of a cost-effective and scalable communication solution. O & G companies used to heavily rely on manual data reading and visual inspection to monitor large parts of their operations, equipment and facilities. Needless to say, this is highly inefficient and error-prone, while exposing workers to significant field dangers and hazards. To avoiding dangerous and hazard environment in off shore platform, in the project Functional safety and Industrial communication system is developed for monitoring sour gas in off shore platform. The system is consist of sensors, intelligent controller and secured industrial Internet of Thinks (IIoT) based industrial communication.*
Keywords: SCADA,IIOT, GPRS-GSM, MCU.

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I. INTRODUCTION:

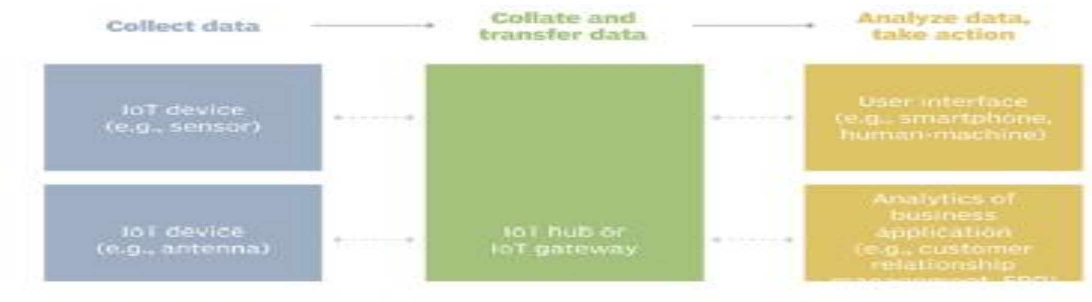
Many industries, including manufacturing, energy management, utilities, oil and gas, and others, utilizes the IIoT. Utilizing the data that inefficient machines have been producing in industrial settings for years, IIoT leverages the capabilities of intelligent equipment and real-time analytics. To better utilize the data that industrial machines have been producing for years, IIoT harnesses the strength of smart equipment and real-time analysis. Smart machines are the primary driver of IIoT for two reasons. The first is that real-time data collecting and analysis are possible only with smart machines, not by humans. The following are some essential qualities of an IIoT-enabled industry: precise management of operating procedures. Implementations those are quite safe. Swift and adaptable Response time lag is almost negligible. In order to keep things like vehicles running and homes warm, fossil fuels are still an essential and crucial element of modern life. Exploiting previously deemed unattractive areas has become more crucial as demand has increased and oil and natural gas reserves have been exhausted. One such choice is sour fields, or areas with high concentrations of acidic gases like carbon dioxide and hydrogen sulfide (H2S). The poisonous nature of the sour gases, hydrate formation, and equipment corrosion are just a few of the challenges and risks that come with working sour fields, which have previously hindered the utilization of these resources. The solutions to these issues have been created in a wide range of ways, from eliminating the sour ingredients to reducing their impact. This overview outlines the main problems caused by sour fields as well as a variety of current fixes. This study provides a ground-breaking platform created for use in industrial automation practical work. The platform contains the many functional safety technologies, such as safe actuators, safe programmable logic controllers, safe sensors, and safe relays, all of which may be configured using the unique software of each manufacturer [1]. It is taken into consideration to employ common industrial programmable controllers in safety-critical applications. There are descriptions of several settings along with each configuration's benefits and drawbacks [2]. In this article, we demonstrate a sensorized glove for workplace safety that uses Near-Field Communication (NFC). The demonstration is a proof-of-concept application that demonstrates how an NFC-enabled sensor implanted in a worker's glove may be used to monitor worker activity and alert supervisors to potentially risky circumstances in advance, therefore reducing the risk of accidents and injuries[3]. this research undertakes a series of tests to demonstrate the feasibility and validity of employing electrocardiograph (ECG) and skin temperature (SKT) data to reflect the training effect and quality in the ergonomics evaluation[4]. This paper's goal is to create a framework for industrial IoT systems using the Assurance Case approach[5]. This paper develops a method for predicting risk factors for the IoT-based safety management of industrial valves. It is based on the creation of an actuator control system and wireless communication [6].

II. IoT-INDUSTRY SAFETY NETWORK

The use of Internet of Things (IoT) technology to monitor and manage safety and health situations at work is referred to as "IoT in workplace safety." A public safety network is a wireless communications network that emergency services organizations, such police, fire, and emergency medical services, utilize to prevent or respond to occurrences that risk or injure people or property. Industrial safety, as its name suggests, relates to safety management procedures that are used in the industrial sector. These procedures are designed to safeguard industrial personnel, equipment, buildings, facilities, and the environment.

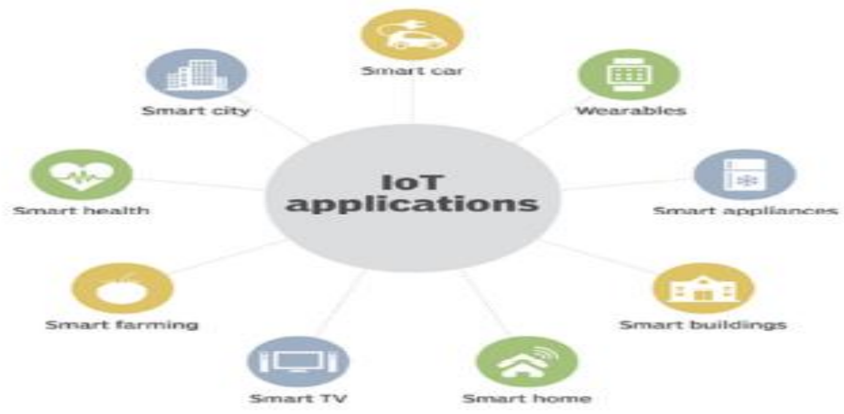
- **IOT devices:**

IoT devices are pieces of hardware, such as sensors, actuators, gadgets, appliances, or machines that may transfer data over the internet or other networks and are designed for particular uses.



- **Consumer and Enterprise IOT:**

Wearable technology equipped with sensors and software can gather and analyze user information while also communicating with other technologies to improve the comfort and convenience of users' lives.



- **IOT security:**

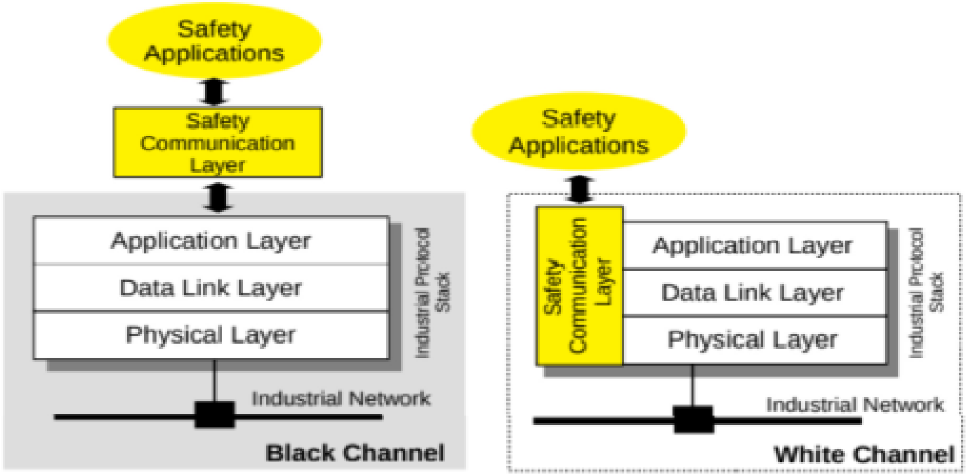
The technique of protecting IoT devices and the networks they use is known as internet of things (IoT) security. Its key objectives are to uphold user privacy and data confidentiality, guarantee the security of equipment and other relevant infrastructures, and permit the smooth operation of the IoT ecosystem.

- **IOT devices in Arduino:**

When developing IoT projects, you must have some form of connectivity module or component that enables remote device monitoring and control. Sometimes we'll connect to another device through local connections, and then through that device, we'll connect to the internet.

- **Functional safety protocol:**

Functional safety focuses on making sure that safety-critical threads and functions in the system, subsystem, and software are examined and validated for correct behavior in accordance with safety criteria, including functional failure states and faults, and that these are appropriately mitigated in the design.



- **Detachment of the API Interface:**

The artificial programming interface (API) serves as the audience's access point to the data. It makes sense for app developers to segregate the API interface in light of this. This is because market trends are always shifting, necessitating the need for flexibility.

- **Scalable Targets:**

The likelihood of the Internet of Things expanding is extremely high. App developers should use a design that gradually increases organic traffic. Basically, the app should be able to accommodate any appreciable rise in data requirements.Therefore, it is advised that developers keep an eye on mobile app analytics to support scalable solutions.

- **Superb Data Streaming Services:**

Data streaming is the process of sending a constant stream of data, often referred to as streams, to stream processing software, usually for the purpose of gaining insightful information. A data stream is made up of a number of data components arranged chronologically.

III. CONCLUSION

In IIoT ecosystems, functional safety networks are anticipated to be employed more and more, particularly over wireless media. In this regard, we addressed safety measures in this article, concentrating on those outlined in the IEC 61784-3 International Standard, and looked into whether they were appropriate for IIoT applications. We were able to draw some interesting conclusions from the supplied analysis and the outcomes of a lengthy experimental session performed on a prototype implementation of FSoE via WiFi. First, it is possible to successfully implement safety protocols via communication means other than those for which they were originally intended by using the black channel principle. Second, while the black channel technique theoretically guarantees viability, it is obvious that it may introduce constraints, notably in terms of performance. This feature results from the indisputable reality that every protocol was designed for a certain network. First, it is possible to successfully implement safety protocols via communication mediums other than those for which they were originally intended by using the black channel principle. Second, even if the black channel technique in theory guarantees viability, it is obvious that it might introduce restrictions, notably in terms of performance. This feature results from the inescapable reality that each protocol was designed for a certain network. For instance, functional safety protocols created for Ethernet networks can be challenging to implement on communication systems that use small payloads, like Controller Area Network (WAN). Even more obviously, with regard to OPC UA Safety, SPDUs may grow to massive sizes, necessitating sufficient MAC and physical layers for transfer.

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