A Reliable Internet of Things based Architecture for Oil and Gas Industry

ABSTRACT

*A*nomaly detection systems deployed for monitoring in oil and gas industries are mostly WSN based systems or SCADA systems which all suffer from noteworthy limitations. WSN based systems are not homogenous or incompatible systems. They lack coordinated communication and transparency among regions and processes. On the other hand, SCADA systems are expensive, inflexible, not scalable, and provide data with long delay. In this paper, a novel IoT based architecture is proposed for Oil and gas industries to make data collection from connected objects as simple, secure, robust, reliable and quick. Moreover, it is suggested that how this architecture can be applied to any of the three categories of operations, upstream, midstream and downstream. This can be achieved by deploying a set of IoT based smart objects (devices) and cloud based technologies in order to reduce complex configurations and device programming. Our proposed IoT architecture supports the functional and business requirements of upstream, midstream and downstream oil and gas value chain of geologists, drilling contractors, operators, and other oil field services. Using our proposed IoT architecture, inefficiencies and problems can be picked and sorted out sooner ultimately saving time and money and increasing business productivity.

EXISTING SYSTEM

In recent years various Wireless Sensor Network based solutions have been developed to handle Condition monitoring, Refinery , Pipeline monitoring , cathodic protection , corrosions , Well head monitoring , pumping unit , Oil Drilling in the oil and gas industry. But they all may suffer from noteworthy limitations radio communications are used for transmitting information sensed from the sensors for pipeline inspection. In , pipelines are monitored by placing sensors along the pipelines. In uses radio communications for in-pipe inspection by deploying sensors at some

fixed checkpoints inside the pipe but it is not feasible to perform sensing very close to a leak. Some proposals are *Acoustic Wave Technology* based systems . In a transmitter is placed in the pipeline and the communications with the receiver are carried out by emitting acoustic signal bursts using the pipelines as a waveguide or channel. These systems are not suitable to monitor long pipelines with different pipe geometries. In this ,authors have adopted elasto-dynamic waves for enabling wireless communications in pipeline monitoring systems. This proposal is not suitable for in pipe inspection due to deployment challenges. Some proposals focus on *Magnetic Induction* for wireless communications to monitor pipelines. In a network of magnetic induction units is disclosed which is configured to transmit a signal or receive a signal from neighboring units by modulation of a time-varying magnetic field and sensed data is relayed in a multi-hop fashion. In , authors have proposed to transmit data wirelessly through magnetic induction based communications by using coils of wire wound on the pipelines. However, due to short range of communication between magnetic induction units or coils, large scale deployment or long underground pipeline monitoring is not possible. The most recent proposal involves robotic technology for pipeline inspection. It discloses wireless communication system for underground pipeline inspection including a plurality of sensor nodes carried by robots within the pipeline and each sensor node equipped with a radio transceiver. The system sends the leak detection information to aboveground relay nodes via low frequency radio transceiver which in turn send the received information to the remote monitoring center using high frequency radio transceiver via an aboveground mobile network.

DRAWBACKS

- They lack of coordinated communication and transparency among regions and processes.
- It is expensive and inflexible
- It provides data with long delay.

PROPOSED SYSTEM

In this paper, a novel IoT based architecture is proposed for Oil and gas industries to make data collection from connected objects as simple, secure, robust, reliable and quick. Moreover, it is suggested that how this architecture can be applied to any of the three categories of operations, upstream, midstream and downstream. This can be achieved by deploying a set of IoT based smart objects (devices) and cloud based technologies in order to reduce complex configurations and device programming. Our proposed IoT architecture supports the functional and business requirements of upstream, midstream and downstream oil and gas value chain of geologists, drilling contractors, operators, and other oil field services. Using our proposed IoT architecture, inefficiencies and problems can be picked and sorted out sooner ultimately saving time and money and increasing business productivity.

ADVANTAGES

- Data collection is simple,secure and robust.
- It saves time and increase business productivity.

SYSTEM EQUIREMENTS

H/W System Configuration:-

- Processor - Pentium –IV
- RAM - 4 GB (min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

S/W System Configuration:-

- Operating System : Windows 7 or 8 32 bit
- Application Server : Tomcat5.0/6.X
- Programming Language : Java
- Java Version : JDK 1.6 and above