Fissure Spot Detection In Fluid Compactor Using Wisen

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***Abstract* – In this paper, asset monitoring of fluid distribution in pipe line becomes fastidious for Industrial sectors. Various techniques are incorporated in monitoring the pipe line distribution networks. This study, portrays the design, development and testing of smart wireless sensor networks for leak detection in pipe lines. Infrastructure monitoring of pipeline distribution faces many challenges in leak detection system. A wider range of wireless sensor nodes are placed randomly at the distributed network for continuous monitoring of pipeline as per designed phase. Sensor nodes are also capable of gathering the source information from the pipeline network. The collected data from the distributed network are further transmitted to the control unit for processing. Thus the sensors are highly efficient in identifying the leaks and observing the parameter changes in environment.**

Index terms – Wireless sensor, leak detection, network monitor.

I. INTRODUCTION

In many countries, the long range transmission of fluid distribution maintenance requires more computational financial cost. Real- time operation facing new challenges on intensive financial budget, Infrastructure ageing, limited resources, man-power monitoring, and improvement in safeguard attention and regulator inspection. A traditional approach involves manual inspection at various locations at different time intervals using analytical techniques. The offshore oil and gas industry has a major investment in subsea installations such as pipelines, risers and control systems. These subsea structures are vulnerable to attack by internal and external corrosion, manufacturing flaws, ship anchors and tectonic movements on the sea bed.

The often extremely harsh operating environment in which these installations are located can lead to a shortening of the lifetimes of component parts and failures which result in leaks of hydraulic fluids into the sea. Problems arise when trying to locate holes that can be only a few millimeters in diameter somewhere along possibly hundreds of kilometers of pipeline. This is particularly difficult if, as is often the case, the pipeline is either partially or totally buried in sediment. Work of this nature may take a long time, and time is expensive, especially if one has barges, vessels. Traditional techniques for leak inspection consist of filling the pipeline with a solution of water and a chemically or optically detectable compound. Traditional methods of water quality control involve the manual collection of water samples at various locations and at different times, followed by laboratory analytical techniques in order to characterize the water quality. There is a need for better on-line water monitoring systems given that existing laboratory-based methods are too slow to develop operational response and do not provide a level of public health protection in real time.

Rapid detection to instances of contamination is critical due to the potentially severe consequences to human health. Infrastructure monitoring has been an attractive subject for researchers in recent years. Advances in electronics and decreases in the cost of sensors and electrical components have made smart infrastructures a reality. Moreover, the proliferation of the internet has opened up new applications for the “internet of things” to serve as a backbone for infrastructure monitoring.

One of the main issues in infrastructure monitoring is power consumption and power availability. Power consumption of sensor nodes should be optimized while keeping their functionality to a suitable level. Another issue in the field of infrastructure monitoring, especially large scale infrastructure such as water pipe networks, is data handling. The sensor node in these systems should be capable of handling the produced data locally and then send the processed data to the control centre in order to minimize the required post processing and transmission packet size. Pipeline systems are responsible for transporting vital materials such as water, oil and gas. Any leakage in the pipe can cause major financial losses and possible environmental damages. Currently, buried pipelines are only monitored at key points, which can be spaced several kilometers apart.

A system with a higher spatial resolution would provide operators with a better understanding of their network. In buried pipeline monitoring, sensor nodes are deployed in soil. The underground environment imposes major limitations on sensornodes, such as poor RF transmission and lack of maintainability. This means that sensor nodes are required to be robust and consume a small amount of energy in order to last their desired lifetime. Measurements of the pipes condition should also be non-invasive to the pipe in order to maintain the structural integrity of the pipeline. This creates a need to design and develop new methods of measuring pipeline characteristics in order to monitor their structural integrity. Various methods are used in order to detect and locate leaks in pipes.

II. RELATED WORK

Literature and research on the use of large-scale pipeline monitoring is sound or vibration measurements. Most of these methods are based on the detection of acoustic emission

from the pipe. This signals the frequency and size of pipe pressure, leakage of fluid inside the pipe diameter and depends on the type. These signals detected by the hydrophone or accelerometers. Cross correlation can be calculated by different methods after the leak location.

Facilitate the delivery of every industrial and commercial liquid system to reduce fluid loss control measures should enable low fluid loss. Pressurized delivery systems, fluid systems, leak detection fluid to promote censorship, and as a means to reduce operating costs and to protect the liquid to leak repair. Leak detection and repair of pressurized fluid system are used in the audit of the liquid, also in the customer's meter systems.

The main functional description is: i) At regular time interval the flow of pressure, temperature and valve data are collected. ii) The instrument diagnose the collected data for further validation iii) Various operation conditions such as transient steady space, threshold range are analyzed for the leak location detection. iv) Location of the leak and the size of leak are calculated. v) Observed data are recorded periodically.

Measuring the ends of the audio signal, which requires a high sampling rate. Limited power consumption and lasts for a short amount of time. The methods which increase the complexity of the production and processing of large data sets require power consumption of the sensor nodes. Sensor Nodes at low cost are placed in water pipelines to monitor the distribution system. Light weight, low cost, long reliable optical sensor are deployed in optical network performs the logging, processing, signal conditioning of data.

Tests are performed to evaluate and validate these instructions of various concentrations of heavy metals. Testing results indicate the inexpensive system that is capable of detecting the high impact of very low concentrations of contaminants. End Adequate files that this system online, in-tube, low demonstrate on the cost of operation used, and based on good detection
accuracy of an effective early warning system. Reliable remote monitoring for reporting Oil and gas to the control rooms in a timely manner. Leak sensing networks focus on the reliability and Wireless Data Communication.

III. EXISTING SYSTEM

Various methods such as Underground Wireless Sensor Network, Acoustic Leak Detection technique, Vision based system, pressure and temperature measurement, Fiber optic monitoring, Ground Penetrating Radar system and Multimodal System are incorporated for leak identification. Although multiple technique are available to reduce the man-power, further to improvement is needed to identifying the leak location detection. More expensive and modern technology provided at feasible result for short range of pipeline monitoring system. Monitoring the larger geographical area and pipeline sectors with infrequent inspection leads to poor maintenance in massive network. The system deploys the combined version of data processing and infrastructure management in analyzing the Distributed Network. Propagation of radio frequency signal terms path loss, increase density, delay in response time, vibration and flow of management, signal strength, energy level in distributed networks. Pumping, treatment and an increase in operational costs, identify methods of finding and fixing leaks, water loss by developing and pushing against the water utilities. Leaks and explosions are an inevitable feature of the management of water distribution systems and if left undetected for long periods of significant water loss in the distribution network. Leaks, especially the joints aging pipes and lead to a buildup of corrosion that causes the crossing leaks.

IV. PROPOSED SYSTEM

A modular analysis of data storage in control system is maintained. RF transmission link established between sensors are limited in range and also the communication in turn limits. Transmission range also extends the routing protocol designed for each sensor node communication. Maintenance of the sensor nodes in terms of power consumption, coverage range, spatial data, transmission rate, etc is higher cost effective process. The data gathered by the sensor nodes are forwarded further to the control unit. The back up and larger database of observed sensor node information is stored in control system. Further analysis and complete monitoring to find the leak location is carried in this unit. Control system analyses the data obtained from sensor node. It calculates the object variation in normal structure. It's further designed to proceed if leak exist in the structure which differs from normal image. Processing the variation pattern of the
observed data divides the whole structure into several pixel compartments. As the size of pixel rate increases the exact leak location is identified with the leak size. Measuring the height and width of the observing structure are further sub divide into quadrant. Processing tool identifies the leak location by variation the quadrant pixel rate. Further analysis in the particular sort of pixel data the exact leak location in the axis is calculated. Thus the size of the leak is also evaluated.

V. DESIGN PLATFORM

In system architecture, the sensor nodes are placed on the outer region of the pipeline tube in the boiler or fluid compactor. Pipeline consists of flow of water, gas, oil any kind of fluid as carrier. Monitoring the flow of pipeline is normally carried out by the sensor nodes. The group of sensor which are processed for the purpose of monitoring, are grouped together to form a WISEN network.

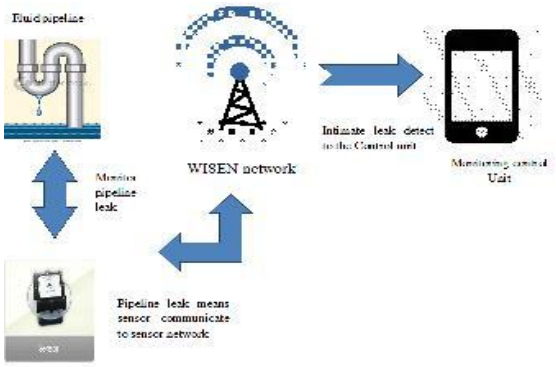

Fig 1.Block diagram

A. Functional Block:

1) Fluid Pipeline

Pipeline are made of metallic, plastic, steel etc, are designed to withstand in all range of temperature, humidity, toughness, high quality & cost effective reliable product description. Many sorts of fluid such as oil, gas, water flows in the pipeline. Leaks or cracks occur in the pipeline unit due to some environmental breakage intuitive defects in manufacturing products, bending and joints mismatch screwing.

Aging of pipeline life time is also leads to fissure. Temperature measurements in the environment and the ability to build the pipeline pipe wall Leak detection and useful information in its spread. Fluid can leak from a pipe in the ground. In comparison with other measurements from the ground, the local temperature profile maintained.

2) Sensor Unit

Sensors are used for the purpose of sensing or monitoring the surrounding as per designed phase. Various sensors such as pressure sensors, temperature sensor, humidity sensor, acoustic sensor, sound/vibration sensor etc., are invoked in WISEN Network. Propagation techniques are incorporated in sensor nodes using external link for communicating multiple sensor.

Most transceivers will be consumed in idle mode of operation rule is roughly equal to the energy consumption. Gathering the sensors information for further processing for communicating with nodes connected in the network is the concept of sensor node. Sensor nodes are often free radio spectrum allocation and global presence gives the ISM band for use. Possible choices for wireless transmission media, radio frequency (RF), Optical Communication (laser) are in the infrared.

Lasers require less energy, but the line-of-sight communication needs and sensitive to atmospheric conditions. Infrared, lasers have any antenna, but it is limited in its transmission capacity. WSN radio frequency-based information is the most suitable for applications that fits better.

3) Wisen Network

Connection of multiple sensor nodes within the boundary area is WISEN Network. One of the main Infrastructure monitoring system issues power consumption and power availability. Power Consumption performance takes place at an appropriate level, while sensor nodes are optimized. Another problem in the field of infrastructure, such as water pump monitoring around large-scale infrastructure Networks needs data manipulation.

In short, it would be in contact with each other on a low-power RF link is a system of battery-powered sensor modules. The humidity, light, and temperature data adhere. It is connected to a PC and then transmits this data to a gateway mote. After a user to retrieve and analyze data source that connects to a web server to a web project that calls a web browser, you can access this data minimize power consumption while providing efficient modularity and allowing concurrency-intensive operations.

4) Monitoring control unit

The systems must be capable of handling the sensor node. Production data locally and then send the processed data in order to reduce the control center needed for the processing and transmission of packet size. In the proposed system RF signals are shared via two nodes. Also, the master nodes are able to connect with the Internet and transmit data from the cloud nodes. Cloud Data with different devices can be accessed via the Internet connection. The individual sensor nodes generally have four main components: Transmission unit, Data gathering, Processing unit, power management

In terms of performance for each of these categories greatly affects the overall performance and reliability of the power consumption of sensor nodes and i) Strewn with conventional cabling capabilities remotely ii) Normal network to provide backup communications link in case of failure iii) Connect portable or temporary workstations iv) To overcome situations where normal cabling is difficult v) Connect mobile users or networks.

VI. EXPERIMENTS AND DISCUSS

Pipeline leak detection system was proposed based on the relative change in pressure. So the sensors are designed to measure raw data for the laboratory tests.

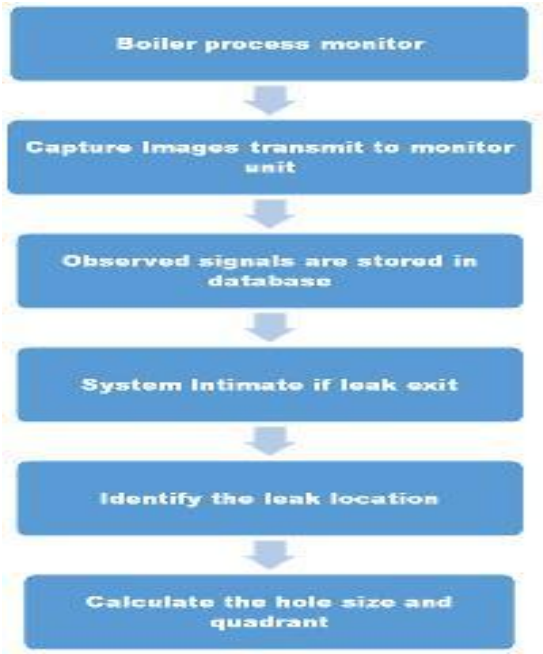

Fig 2. Flow chart

This adds when pump switched to the pump pressure, but the pressure increase the pressure drop due to leakage development. Switching off the pump soon after the development of leakage processed. A process monitoring and control structure provides a collaborative mechanism and it's used in industrial plant monitoring and control protocols for a specific measure to achieve the process goal. This will describe the use of a simple wired us wired infrastructure.

Four phases of the test: i)Start of the pump ii)Stabilization iii)Detect leak iv)Pump off For example, by adjusting the flow rate through the cooling jacket becomes a plant cooling achieve specific, desired outcome of that process. To maintaining a standard front temperature needs over time. The desired temperature set point valve open position sets the cooling valve.

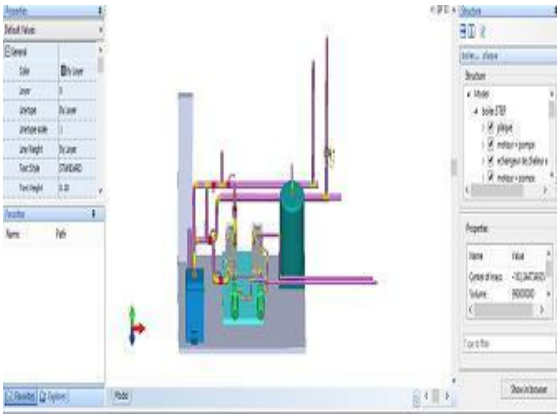

Fig 3. Screenshots

VII. CONCLUSION

WISEN Network for monitoring distributed pipeline for the purpose of leakage detection. The observed data from the sensor nodes were forwarded to the monitoring control unit. The test such as object variation in measuring the height and width of observed patterns are detected, the leak location and the leak size was estimated. Stimulation process was carried out at low cost design to find the exact location of leak in quadratic axis, but analysis of leak location consumed more time period.

FUTURE ENHANCEMENT

Real-time Hardware implementation of the designed system may estimate some difficulties. Monitoring the large area consumes very expensive process. An improved version should be designed for reducing the process delay time. Maintenance of sensor node at high temperature will find variations in its range. Accuracy of variation in leak spot should be increased.

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