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A REVIEW ON MAGNETIC INDUCTION BASED WIRELESS SENSOR NETWORK

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ABSTRACT :- Underground pipelines comprise quite possibly the main approaches to move a lot of liquid (for example oil and water) through significant distances. Nonetheless, existing spillage discovery procedures don't function admirably in observing the underground pipelines because of the brutal underground ecological conditions. In this venture, another arrangement, the attractive enlistment (MI)- based remote sensor network for underground pipeline observing, is acquainted with give minimal effort and ongoing spillage discovery and restriction for underground pipelines.

These framework detects and localizes leakage by jointly utilizing the measurements of magnetic induction based sensors that are located both inside and around the underground pipelines. By adopting an MI waveguide technique, the measurements of different types of the sensors throughout the pipeline network can be reported to the administration center in real-time. The system architecture and operational framework of Underground pipeline is first developed. Based on the operational framework, research challenges and open research issues are then discussed.

. ***Keywords*** *:-* Magnetic Induction, Sensor, Pipeline, GSM.

I. INTRODUCTION

Transportation of imperative items like water, oil and gas is normally done through pipeline organizations. Shortcomings in these lines can make major monetary ramifications and conceivable natural disasters. The vast majority of the nations dealing with the issue of water deficiency. The monetary worth of water is altogether lower than oil or gas , it isn't normally hurtful for the climate, the monetary ramifications of these misfortunes are not just restricted to the worth of the water that is lost yet additionally incorporate harm to different properties and requires huge fix costs. The disappointment in the framework causes unsettling influence in the stock of water which will contrarily affect on the water providers.By using the advanced technology and reduction in cost of electrical components real time leakage detection and monitoring of underground pipeline is more feasible. Currently, various methods are used in

order to detect and locate leaks in pipes. In that acoustic measurements, pressure measurements, fiber optic monitoring, vision-based systems, multimodal systems and Ground Penetrating Radar (GPR) based systems. which can be spaced several kilometers apart, or are inspected in sections with survey based techniques

The principle aim of this research is to design and manufacture a long-term, low power and continuous condition assessment monitoring system for underground water pipelines. The performance of the sensing technology used in a monitoring system directly affects its overall performance characteristics; such as power consumption, ease of installation, cost and reliability. This System can be used for leakage detection for any type of conductive fluids.

II. EXISTING PIPELINE MONITORING TECHNIQUES

Existing pipeline monitoring techniques can be divided into two categories based on the positions of the sensors, i.e., inside or outside the pipeline.

2.1. Sensors Outside Pipelines

2.1.1. Visual inspection

Traditional monitoring techniques for aboveground pipelines utilize image/video sensors to monitor the area around the pipelines [41]. The image/video sensors have large sensing ranges if visibility is good. Any leakage or other abnormity status along the pipelines can be detected and localized by the image/video sensors. However, this technique cannot be used to monitor underground pipelines.

2.1.2. Ground penetrating radar (GPR)

To detect the leakage of underground pipelines, the ground penetrating radar (GPR) is adopted in. GPR can accurately pinpoint buried pipeline leaks without digging. The GPR can be integrated to portable devices and can be carried by maintenance people. Although this method is able to cover several miles pipeline per day, it requires intensive human involvement. Moreover, the monitoring is not real-time. Hence, a leakage may not be detected in time.

2.1.3. Soil Properties Sensors

Since the fluid leaked from the pipelines may cause the changes of soil properties around the underground pipelines, the leakage can be detected through the identification of abnormal value of the soil properties. The type of sensors to be utilized is determined by the transported fluid of the monitored pipelines. For example, temperature sensors can be used to detect hot liquid leaks as the surZ. Sun et al. / Ad Hoc Networks rounding temperature increases after a leak develops Soil humidity sensors can be used to detect water

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2.2. Monitoring Techniques Based On Sensors In side Pipelines

Intensive inside measurements are not favorable for the underground pipelines since deployment of sensors inside the pipelines requires to set junctions between two adjacent pipes. In underground pipelines, high densities of junctions increase the leakage possibility. Therefore, the inside sensors can be only deployed inside the pipeline at the checkpoints or the pump stations. Consequently, the density of the inside sensors cannot be very high. Current inside leakage detection sensors are explained as follows.

1. Acoustic devices
2. Mass balance methods
3. Transient-based methods

III. SYSTEM DEVELOPMENT

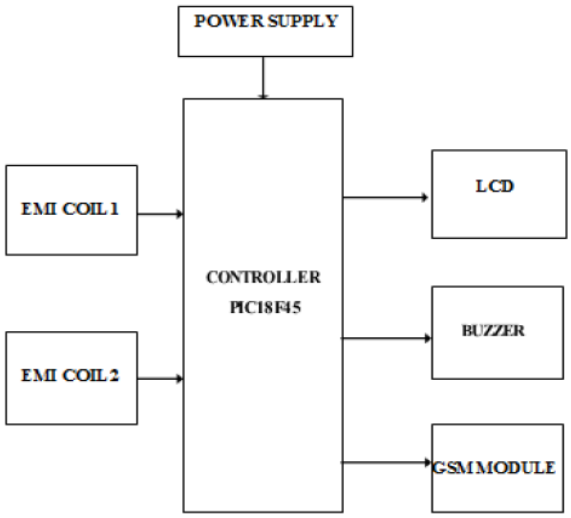

Fig.No 1 Block Diagram of Pipeline Monitoring and Control.

3.1 Power Supply

The input to the circuit is applied from the regulated power supply. The AC input i.e. 230V from the transformer to 12V and is fed to rectifier. The output obtain from the rectifier is pulsating DC voltage. So in order to get pure DC voltage, the output voltage from the rectifier is fed to a filter to remove any AC component present even after rectification. Now, this voltage is given to a voltage regulator to obtain pure constant DC voltage. This regulated DC voltage fed to the system.

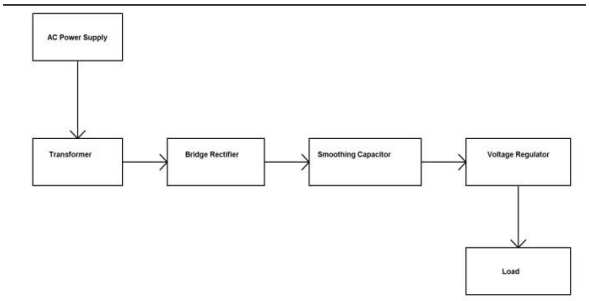

Fig No .2. Block Dia. of Power Supply

3.2. PIC Controller

The PIC controller in this system is used to compare the voltages of the different EMI coils located on underground pipeline at specific distance and gives the signals to the output devices connected to the controller like LCDs, buzzer and GSM Module.

3.3 Electrical Circuit Diagram

The electrical circuit organization of the framework is appeared in figure. The microcontroller is utilized to control the framework. Microcontroller is associated with the LCD show, Buzzer, GSM Module, EMI Coils with Power supply gadget. At the point when the fluid passes from the pipeline and if there is spillage happens in the pipeline. The attractive curls will have greater conductivity which is put on the underground pipeline, because water in the pipeline acts as core material for the conductivity in magnetic coils. This coils will give signal to microcontroller and then the controller will give signal to the GSM Module. The GSM Module is used to send the Massage to the user or operator. LCD display is connected to microcontroller which will show the status of leakage. when the status displayed by display at the same time buzzer will gives audible signal to operator. Power supply is used to supply the power to circuit.

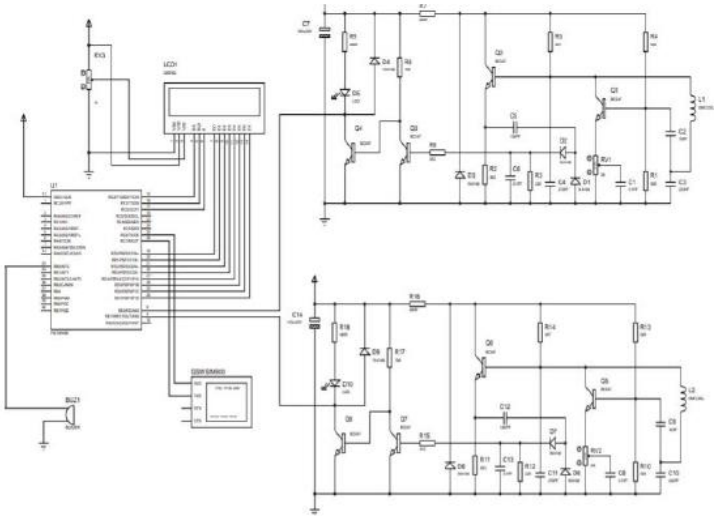

Fig No 3 Circuit Diagram.

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3.4 EMI Coil

When a current-carrying-conductor is formed into a loop or several loops to form a coil, a magnetic field develops. It flows through the center of the coil along the longitudinal axis and circles back around the outside of the coil. The magnetic field circling each loop of wire combines with the fields from the other loops to produce a concentrated field down the center of the coil. The strength of a coil's magnetic field increases not only with increasing current but also with each loop that is added to the coil. A loosely wound coil is illustrated here to show the interaction of the magnetic field. The magnetic field is essentially uniform through the center of the coil when it is wound tightly. The density of the concentrated magnetic field (magnetic flux lines) inside a coil.

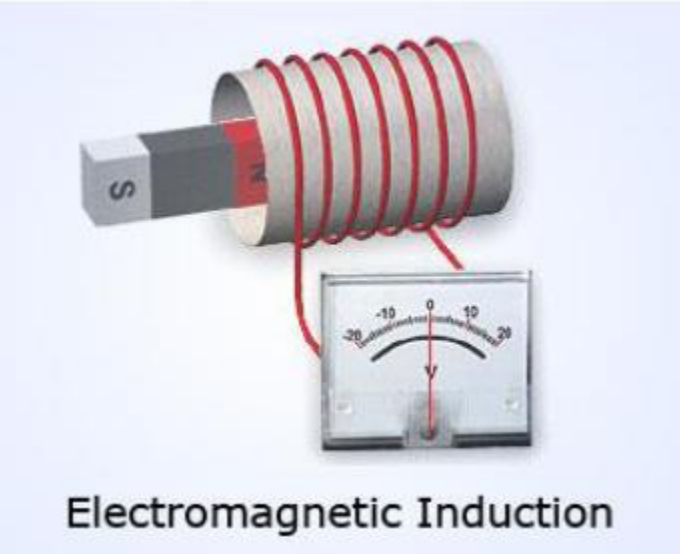

Fig.No 4 EMI Coil

IV. ADVANTAGES AND APPLICATION

4.1 Advantages:

1. Accurate Real time leakage detection and localization.
2. Effective Controlling and Monitoring of liquid through pipeline.
3. Save huge amount of economy for recovery.
4. Reduce environment pollution.
5. Flexible and Long Life.
6. Operate in any environmental condition.

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4.2 Application:

1. In Agricultural field for siphon monitoring.
2. Pollution Monitoring and environmental monitoring
3. Fuel Transportation
4. In urban areas for transportation of liquid.

V. CONCLUSION

The proposed framework which we are creating is the best prudent, manage capable answer for the pipeline spillage identification and ongoing observing. This can be utilized for some applications in provincial zones just as mechanical reason where spillage in pipeline can make numerous issues, for example, natural and conservative. Likewise the framework is useful for the water supply office since water is a major test for an immense populace. By utilizing this task the continuous observing of underground pipeline is conceivable.

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