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Detection Of Water Leakage In Water Pipeline Of Solapur Municipal Corporation With The Help Of Solar Energy.

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Abstract

In an analytical study of the Associated Chambers Of Commerce and Industry Of India(ASSOCHAM).It has been revealed that distribution losses are Primarily due to leakages in network of water Supply lines and because of theft committed in Unauthorized connections. Leakage in water Distribution systems is an important issue which is Affecting Indian society and economic development. The paper discusses about design and prototyping Of system for water pipeline leakage detection for Municipal pipeline. Though there are some systems Like Acoustic leak detection and Non-acoustic leak Detection, they are not feasible to be applied Continuously in distribution network. The paper Discusses designing a system that will be Continuously in working to detect the leak. Leak Can be detected by observing change in flow Parameters (due to leak) of flowing water. Mechatronics system is used to detect the leak.

Keywords: **flow sensors, Mechatronics system, Solapur, Municipal, water- Supply. Ujjani Dam.**

INTRODUCTION

In most water-distribution systems, a large Percentage of the water is lost in transit from Treatment plants to consumers. Water transmission And distribution networks deteriorate naturally with Time and, subsequently, lose their initial water Tightness. The deterioration results from corrosive Environments, soil movement, and poor Construction standards, fluctuations in water Pressure, and excessive traffic loads and vibration. The recovery of water loss caused by distribution System leakage, through leak detection and repair Programs is significant as a readily available water Resource. The amount of water that is lost or Unaccounted for is typically 20-30 percent of Production. Some older ones, may lose as much as 50 percent. The primary economic loss is the cost Of raw water, its treatment, and its transportation. Of the many options available for conserving Water, leak detection is a logical first step. At present there are many methods like Acoustic leak detection and Non-acoustic leak Detection methods. These are the methods applied To detect the leak after specific time period or in Case of suspecting of leak i.e. they are not Continuously working to detect leak. The specific Objective of this paper is to elaborate leak detection Method which is continuously working to detect And locate the leak. This system will compare flow Parameters at different locations, specifically flow Rate.

SURVEY

Case study on Ujjani to Solapur water supply line is Done. This system is designed by Maharashtra Jeevan Parthian Solapur, used and maintained by Solapur Municipal Corporation.

No.	Name of the plan	Plan started in	Design capacity	Available water(MLD)	Actual Available water(MLD)	Length of pipe (km)
1	Hipperga	1932	27	15	05	07
2	Bhima River.	1968	107	80	80	35
3	Ujjani Dam.	1998	80	75	75	110
	Total		215	170	160	

Table. 1 Current water supply plan

In above table the longest pipeline is Ujjani dam to Solapur (110 km) maximum region of city is supplied with water by this pipeline. This is the reason to study Ujjani Solapur pipeline.

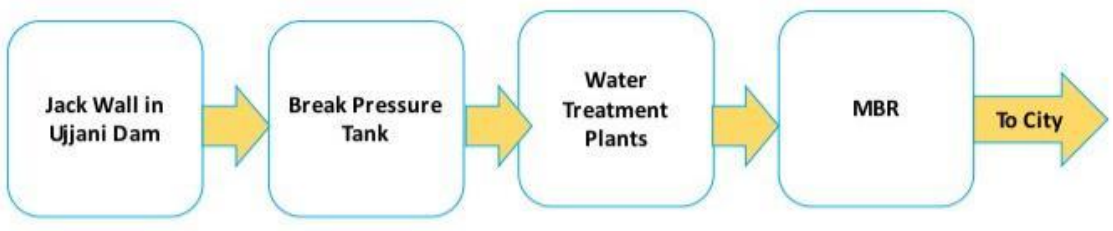

Fig.1 Ujjani to Solapur Water distribution line

1. **The water is extracted from jack well which is built in ujani dam. For extraction of water four vertical turbine pumps each of 600 HP with two standby pumps are used.**
2. **This extracted water is supplied to break pressure tank (BPT) through 1100mm dia. Pipe with 250 m head.**
3. **Water supplied from BPT to next station with the help of four pumps each of 250 HP with two standby pumps.**
4. **Types of pipes used**
    a. **Prestressed concrete pipe used for distribution line.**
    b. **Ductile Iron pipe is used for pressure line**
    c. **Now PSC pipes are replaced by MS pipe.**
5. **Current leakage in pipeline is 29-30%, but allowable losses are 20% only.**
6. **Leakage through air valves is necessary, which are installed after each 500m.**
7. **Method used now a days in India for detection of water leakage**

While estimating total quantity of water For town nearly 20% of total quantity of water is Made to compensate for losses, thefts and leakages. When leaking observes, people in the region Complaints to zonal officer. Zonal officer then Sends worker, confirms leakage and prepare report On it. Then Report is sent to municipal corporation Head. Then workers visits the location and repair it. It takes lots of time and too much water is wasted. This system requires lots of work force and time to Work. Also there is a patrolling team to detect Leak by visual inspection. This team is well Equipped with repair equipment to repair small Leaks.

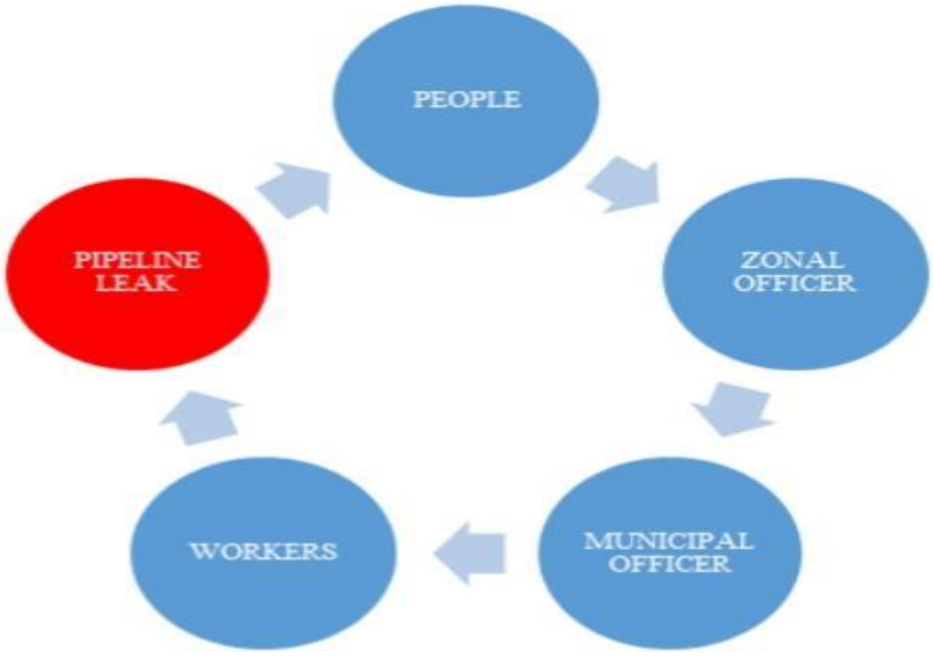

Fig.2 Method used now a days in India for Detection of water leakage.

CONCEPTUAL DIAGRAM

1. **Water Flow sensors (YF-S403):- Two sensors. Range of sensor is 1 to 30 liter/min.**
2. **Arduino UNO:- The Arduino Uno is a Microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of Which 6 can be used as PWM outputs), 6 analog Inputs, a 16 MHz crystal oscillator, a US USB-to serial driver chip.**
3. **SIM 300:- SIM 300 is a GSM modem with a Simple serial interface.**
4. **LED and Buzzer: - These are the indicators of Water pipeline leak.**
5. **Pump ½ HP:- It is a device which convert Mechanical energy into hydraulic energy.**
6. **Pipes and Joints: -PVC Pipe of 25mm diameter Is used to carry the pressurized water**

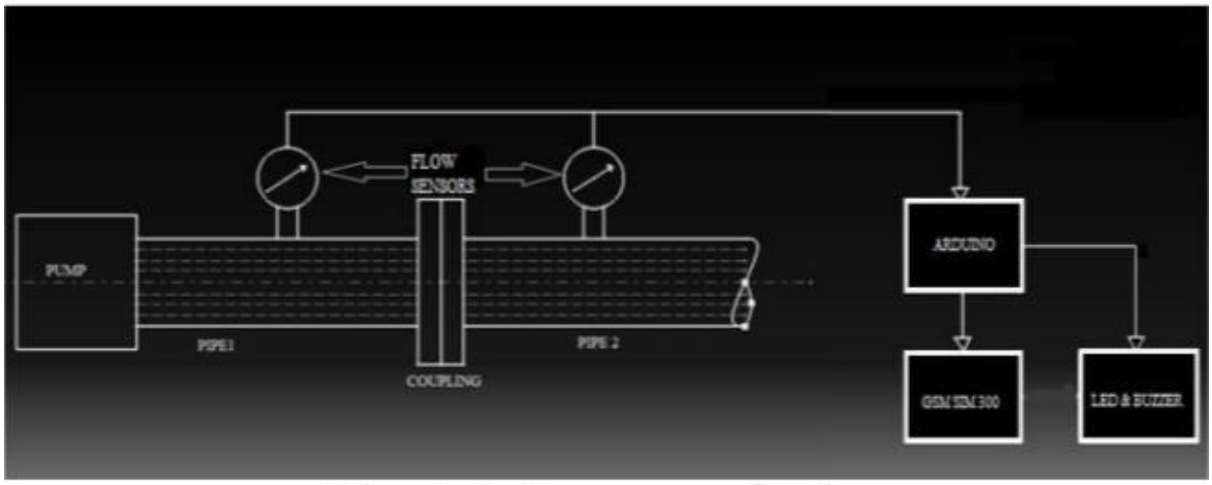

Fig.3 Conceptual Diagram

WORKING OF PROTOTYPE

Two flow meters are installed in pipeline, to Measure flow rate. Arduino UNO will generate Electric signal according to the flow rate of water. When there is no leak in pipeline flow rate will be Constant all over the length of pipe. When leak Occurs difference in flow rate occurs. Flow sensors Will sense the lack of quantity after the point of Leak, and give signal to Arduino. Arduino will Generate different outputs like buzzer, LED and Text message as per defined in Arduino sketch. GSM module is used to send message to Responsible person.

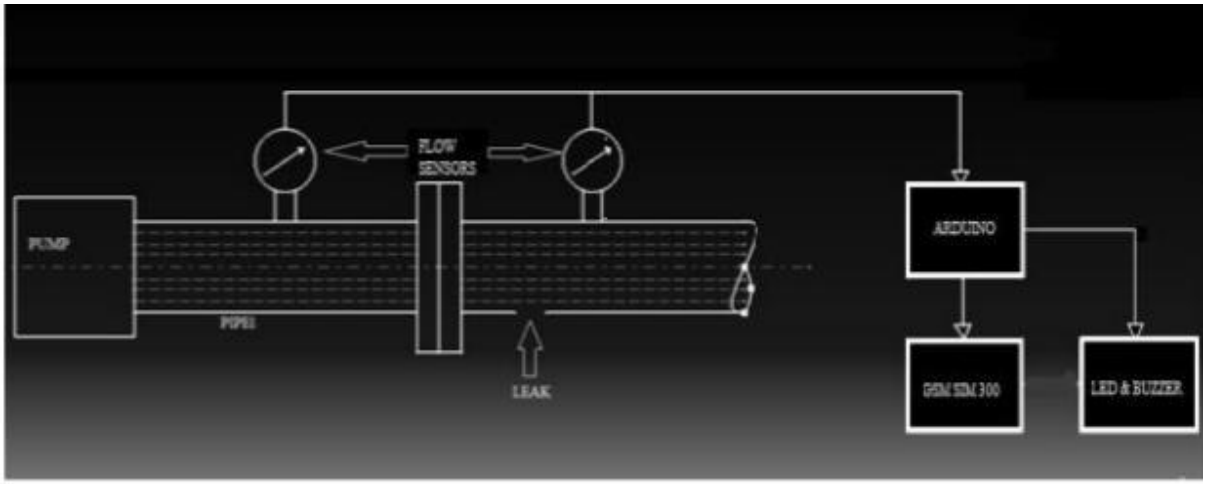

Fig.4 Actual working with leak

Fig. 5 Final Set up

PARTS SELECTION AND ASSEMBLY

1. Sensors :-

2. Arduino UNO :

3. GSM SIM 300 :

4. Pipes and joints :

CONCLUSION

Leak detection can be easily, quickly and Economically done by this method. Huge Amount of water leakage can be detected by Sitting in office only. Message can be quickly Given to contractor for repair. As water is most Precious part on earth this will help in Preserving it.

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