

Canal Water Distribution and Leakage Detection in Pipes using IoT

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Abstract— As we know that now a days in canal water distribution there is a lot of misconduct in water distribution as they are managed manually and decentralized way. Though water is given to all demand specific farmers it is widely observed that if 90% was demand then only 70% is delivered, also after this demand it is also seen that farmers who have no rights for water they also are delivered with ample amount of canal water without and centralized demand. To avoid such misconduct, we are developing a computerized system, which will give the proper distribution of water to the farmers and avoid the corruption. Along with water distribution leakage detection of supplied is also done. Each farmer need to register on web application by means of visit to the nearest irrigation office for registration. As per the requirement specified by farmer the computerize system will open the valve of Solenoid valve for the time span as per farmer request and When the time bound the valve will close automatically. When farmer recharge for water supply they will be notified by means of message on his phone.

Key words: Canal Water Distribution, Solenoid Valve, Sensors, IoT

I. INTRODUCTION

Canal irrigation is widely used source of water for irrigation. So management of irrigation canal water is crucial factor in overall irrigation development. The conventional method is used to deliver water as per demand by the water users (farmers) in form of rotations. There should be change in the field of our irrigation system operational management. In India, it is necessary to have a computerized water distribution network for monitoring and controlling canal operation not only at operational level but at farm level also. As the farmers are the end-users, when new technology is applied, they have to be informed during implementation of the improvements planned and of the anticipated benefits which they will gain.

This system is based on a technology through which the farmers as well as the public sector will get benefit as the water which is been used by the farmers will be limited and the because of which we will save water at great extent. Other than that there will be a system through which the farmers have to pay only for what they will be using. A transparency will be maintained between the users as well as the irrigation department. Because of saving the water in condition of drought there will be plenty of water available for the farmers as well as the public sectors. The online recharge of bill is done by farmers through web application for the water distribution which will reduce the corruption.

The objective of this system is, provide the same amount of water requested by farmer as per their right. Design canal water distribution system automatic so transparency remains between the irrigation department and farmer. It is easy for irrigation department to add canal and add the prepaid recharge pack of water from their place and also easy for users (farmers) to done online recharge immediately.

When the recharge is over then that farm water connection is close through the system and it again starts from next recharge. The whole process follows the mission of digital India. All the farmers get text message of recharge of water and water supply. So, no misconduct is happened, as there is transparency between the farmers and department.

II. LITERATURE SURVEY

Prof. A. R. Gaidhani et. all, ^[1] gives a new way to the water distribution network through canals. It presents automatic water distribution for avoiding corruption because this system automatically generates bill for water supply therefore no need to third person for generating bill. The objective of this system is to provide the same amount of water requested by farmer as per their right. The basic requirement of the system is to improve the existing system which is a manual and thus lead to reduced corruption as well as wastage of water will also be decreased. There could be possibility of leaks in pipes as well as the canals for that they are using pressure sensor as well as density sensor.

M. Suresh et. all, ^[2] proposes smart water distribution metering approach. This is especially suited to third work countries with limited investments in infrastructure. These system relies on the use of simple Internet of Things (IoT) approach for Water metering in conjunction with a custom built Smartphone App. Metering data communication and update to CRBM, logging of complaints, dynamic checks for water leakages at consumer-end and Utility monitoring of hourly consumption from individual or group of meters for suspected leakages, tampering etc. are potential advantages using this approach. This system describes a novel Smart meter implementation architecture that permits both online and offline methods especially for areas with poor, unreliable cellular network coverage.

Alexandru Predescu et. all, ^[3] proposes a real-time control system for an experimental model of a water distribution system. The hardware and software implementation follow the latest trends in IoT and proves that such architecture can be used for real-time process control in distributed systems. The water flow control is implemented using a multiple-model control algorithm for the pumping station.

Edwin Milton Calderon Mendoza et. all, ^[4] gives a neuro-fuzzy Smith predictor controller (NFSP) for e elective control of water distribution in an irrigation main canal, which allows to improve the efficiency and to reduce the water losses. By using the real-time data the dynamic model of this process is been obtained. A neuro-fuzzy controller is combined with a Smith predictor to design a system behaves robustly against the elect of external disturbance and plant dynamical parameters variations. Obtained results compare the performance of the proposed controller with a standard PI controller, also combined with a conventional Smith predictor for several operation conditions. This proposed

controller out-performs the standard controller in terms of performance and robustness.

Kiran S. Shingote et. all, [5] propose a microcontroller-based design for flow of the control system for gate in canal automation. Flow control system consists of subsystems: RTU, solar power system, level measurement system, flow measurement system, gate actuator system and communication system. In this paper, more focus on flow control activities of distributed, laterals and Direct Pipe Outlets (DPOs). Remote Terminal Unit monitors upstream level, downstream level, downstream flow, power space, gate opening, gate health and security. All system components designed to operates on solar power and battery backup. Conventional operational system has some drawbacks and inaccuracies.

III. PROPOSED SYSTEM

The proposed system is centralized and automated. It has multiple users (Farmers) and these farmers are controlled by single admin.

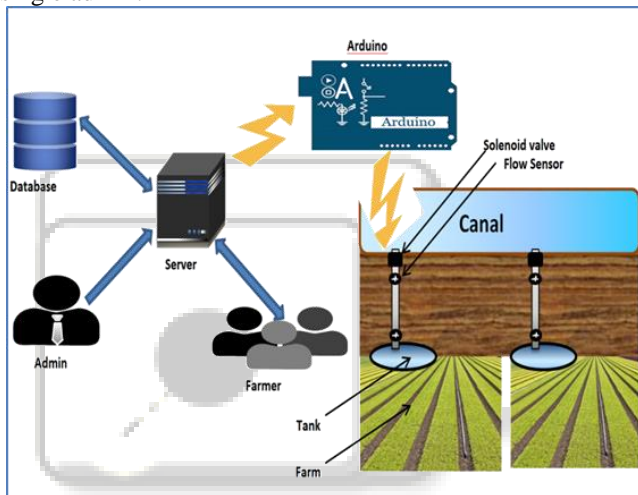


Fig. 1: Proposed System Architecture

A. Registration

To use this system each farmer need to register on web application by means visit to the nearest irrigation office for online registration and this registration (i.e. information of farmer like Adhar ID, Farmer name, Address, Mobile no, Crop details etc.) form is filled and verify by the admin (irrigation officer) then he will give username and password to the respective farmer. As per the requirement the irrigation officer will order to install the pipe with Solenoid valve in the farm of farmer who registers for water.

B. Login

There are two types of login 1) Admin login 2) Farmer login. After the admin login, he/she will add canals, add farmers/users and also add recharge plan for farmers. If the farmer is new then he has to register first to our web application and if he/she is already registered then he can directly login. Once the farmer login to our web application next time they can directly login to it and can make online prepaid recharge.

C. Leakage detection in Protocol

As per requirement the irrigation officer will order to install the pipe with Solenoid valve in the farm of farmer who registers for water supply. Other than that the pipes which are going to install has Flow Sensor through which the amount of water is measured and this report is given to the server through the arduino, which is been flowing through the pipes so, if any person tries make hole in the pipe so, it will be automatically detected and action will be immediately taken on it.

D. Prepaid Recharge

When farmers need water then he need to login on web application and can choose prepaid recharge plan and fill details about water requirement. The payment for online recharge is done on web application after login. In this system the farmers are notified with a text message when they done online recharge for water supply. The supply of water is done immediately to farm. Farmers can also checks water status on web application. In this system the recharge is prepaid so no need to third person for generating bill.

E. Water Supply

After online prepaid recharge is done, the server will contact to the Solenoid valve with the help of Arduino and the solenoid valve plug will get open through it for the time span which the farmer has requested during recharge. When the time span gets over the valve will close automatically.

F. Give Feedback

Using these web application farmers/users can also give feedback about system. It is stored in database and will be analyzed by the admin and according to that additional improvement will be done.

IV. ADVANTAGES

- 1) Eliminate the need of being physically present in any location for task involving the operation of web application within a household/office.
- 2) Avoids wastage of water which flow through pipes.
- 3) Maintain the transparency between the users as well as irrigation department.
- 4) Detect the water leakage in pipes during water supply.
- 5) Avoid misconduct in irrigation department because payment of water supply is prepaid so there is no need of third person for bill payment.
- 6) The farmers can check water supply status and done recharge from his mobile phone at their place.

V. APPLICATIONS

- 1) This system use in company sector for water supply.
- 2) It is use in prepaid water meter in city water distribution management as well as leakage detection in it.
- 3) Use for leakage detection in water pumping station.

VI. CONCLUSION

This proposed system provides a new way to distribute canal water automatically. The system is avoiding misconduct in irrigation department because payment of water supply is prepaid so there is no need of third person for the bill

payment. It reduces the stealing of water from unauthorized person, as we are using IOT approach it is easy for the user to communicate with the system which makes all the process automatic. The farmers can do their recharge of water and all the things from the home. Leaks and flaws of pipes are also detected through sensors so it avoids wastage of water. Water is distributed as per the requirement of the farmers and prepaid recharge system limitation given to them, so the water will also be saved and the saved water can be utilized by other people. Farmers can also give the feedback about the problems and complaint of water delivery service. It is then stored in database and according to that further improvement will be done. All the data in the system is going to be centralized so all the work can be managed centrally.

VII. FUTURE WORK

Here a web application is used which is used by irrigation officer and farmer. So this system can be converted into the Android application for farmers as they are easy to use. Along with android application Adhar ID can be used for a farmer registration. Also, data security is one of the major issues in IOT- based system thus this will also be improved in our prototype on this front.

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