

Automated Water Supply System and Water Theft Identification Using PLC and SCADA

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ABSTRACT:

In today's world rapid growing urban residential areas, to avoid scarcity of water problems and requirements of consumers, therefore it is supposed to supply adequate water distribution networks are managed automatically. Along with this another problem in the water supply system is that public is using suction pumps to suck the water directly from the home street pipeline. The best way to improve the automation and monitoring architectures which contain a supervision and control system for the real time installation, programmable logic controllers with basic functions communication systems, standard interfaces or dedicated ones with proximity sensors, electrical drive elements, measuring devices, etc. In this project it is proposed to develop the PLC & SCADA based water monitoring and theft prevention. Control System is further coupled to SCADA unit. This paper focuses particularly to a control system for controlling and monitoring within a Water Distribution System. Process automation system based upon utilization of an industrial PLC and PC systems including all the network components represents the best way to improve the water distribution technological process.

Keywords: Analysis, Data Acquisition, Monitoring, PLC, SCADA

I. INTRODUCTION

In urban infrastructure with the continuous economic growth, the water demand of enterprises is also increasing. The water wastage is due to many reasons such as leakages, mankind laziness, operator error etc. There is also problem of irregularity of water supply. The water supply can be control by using PLC to reduce wastage of water. The monitoring of water resource for these enterprises can prevent the occurrence of stealing water and leaking water effectively. Therefore, the monitoring system of urban water supply has aroused extensive attention in recent years. Urban water supply networks form the link between drinking water supply and drinking water consumers. The water distribution supply systems are crucial part, therefore system must assure the continuity of the water supply distribution, the water quality control, monitoring and control of the technological process parameters, and water theft identification and deal with the restrictions imposed by the water availability, hydrological conditions, the storage capacity of the tanks and water towers and the increasing diversity of water use. The system includes pumping stations, filtering/chemical treatment utilities, storage tanks and towers, the piping distribution network and the central dispatching unit. The complete SCADA system structure includes one or more central PC main-

station that communicates with more PLC's implemented into the pumping stations or RTUs located in control panels throughout the network (pressure and flow measurement or valves remote control). The PLC's handle the direct control of the technological process whereas the central dispatching unit user interface- HMI, the treatment of data is implemented by the central PC station.

II. EXISTING SYSTEM

The water wastage is due to many reasons such as leakages, mankind laziness, operator error etc. There is also problem of irregularity of water supply i.e. the schedule of water supply is not fixed. Now-a-days, water storage and distribution system, monitoring temperature, pressure and for every stage for measuring and analyzing. We can't able to identify the theft in urban drinking water supply. Water flow control is impossible. The water supply systems are part of the urban infrastructure which must assure the continuity of the water distribution, the water quality control and the monitoring. In existing system, urban water is supplied to the home with the help of some man power. The person in charge will go to the place and then open the valve to that particular area. Once the time is over the person will go again to that place and close the valve. This type of operation needs man power. This is waste of

time to go to that place and comeback often. Also the people may take excess water for their personal use with the help of motor or some other equipment. Due to this many people will not receive sufficient water for their use. Water is the basic needs of the humans. The theft can be prevented only when any public inform the officials about the theft. But the possibility of public is informing to higher officers are rare.

III. PUMPING STATION AND DISTRIBUTION SYSTEM

The technological equipment installed in the pumping stations are controlled by a PLC based equipment which acquires all the hydraulic parameters (pressure, flow, reservoirs water level) and the electrical parameters for all the electric drives. The pumping functioning module implemented in the PLC includes a schedule optimization tool based on the following criteria:

- The water theft is prevented. The water demand dynamic and constraints, inflows.
- Statistical records regarding the water demand.
- Maintenance planning related to wastage of water.
- In the system have proximity sensors. It used for tank level detection; one is at bottom of tank.

If water level detector detects a level at low or mid level thus PLC will turn on pump station motor. Using proposed system both the motors will be included in the system and controlled as per need using PLC. Current status of the entire sensor will be displayed on PC. SCADA software will used to developed graphical user interface. The optimization module facilitates the move to the preventive or predictive exploitation of the water resources and storage capacities based on intelligent control algorithms. They represent the support for electrical energy cost optimization by real time monitoring the pumping schedule and the on/off electric drive transient load reducing, maintenance planning based on the functional wear and loading. Now next step is face tracking, in which we can use the detected face as a template in future frame. Tracking the face involves much easier and less time consuming operation than face detection, allowing the monitoring system to operate in real time with a reasonable amount of processing power. In face tracking we uses canny edge detection for good face detection and good face localization of edges. That means, the algorithm should mark as many real edges in the image as possible and edge marked should be as close as possible to the edge in the real image. Canny edge detection algorithm performs better than other under almost all scenarios and performs well under noisy condition [i]. The method uses two thresholds to detect strong and weak edges and include the weak edges in the output only if they are connected to strong edges. The canny method applies

two thresholds to the gradient: a high threshold for low edge sensitivity and low threshold for high edge sensitivity. Edge starts with the low sensitivity result and then grows it to include connected edges pixels from the high sensitivity result. This helps in filling gaps in the detected edges.

IV. PROPOSED SYSTEM

The proposed automated urban water supply system consists of plc and scada system, and level sensors pressure transmitter, proximity sensors r for water theft detection, smoke detector, pumping system and electronics valve. Programmable logic controller is the heart of automated water supply system. plc has been help in controlling pump station motor contactors, motor. plc programming is done using ladder diagram language. ladder diagram is specialized schematic language commonly used to document industrial control logic systems. The real time data displayed on SCADA.

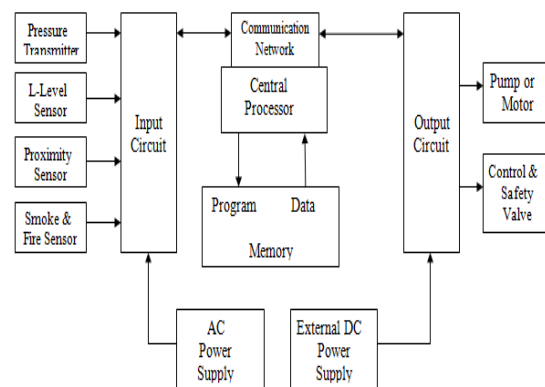


Fig.1 Block Diagram

1. power supply - this can be built into the plc or be an external unit. common voltage levels required by the plc are 24vdc , 120vac , 220vac.
2. input come from sensors that translate physical phenomena into electrical signals. examples as follows:
 - a. proximity sensors - use inductance, capacitance or light to detect an object logically.
 - b. switches - mechanical mechanisms will open or close electrical contacts for a logical signal.
3. outputs to actuators allow a plc to cause something to happen in a process.
 - a. solenoid valves - logical outputs that can switch a hydraulic or pneumatic flow.
 - b. lights - logical outputs that can often be powered directly from plc output boards.
3. Motor starters - motors often draw a large amount of current
4. Servo Motors - a continuous output from the PLC can command a variable speed or position.

The result of the skin location technique is a black and white image which highlights the skin location by converting the face to white and the background and the areas around the driver to black. These background eliminations reduce the errors due to false object detection in the background. The face is detected by finding the largest white connected component and will cut that area.

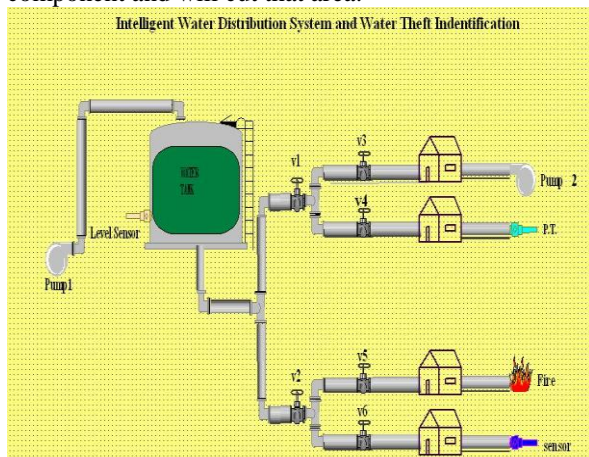


Fig 2.Scada Review

V. Conclusion

The automated system implemented into the water distribution network insures the update of the refurbished water supply urban utilities it offers new ways of monitoring. Measurement data reliability by the global monitoring of the network in the central dispatching unit, Continuity of the water distribution and prevention of the water theft. In this project we can completely eradicate the water theft in the government pipelines. So that people could get equal share of water. This system is excellent and cost effective to prevent the drinking water from the theft. In future our government is planning to send liquid petroleum gas and other fuels through pipelines.

References

- [1] Mrs. Gaikwad Sonali Ashok, "Water antitheft and quality monitoring system by using PLC and SCADA", *International journal of electrical and electronic engineering research*, ISSN 2250-155X vol3 issue 2 ,June 2013,pp-355-364.
- [2] Gouthaman.J, Bharathwajanprabhu.R & Srikanth.A "Automated urban drinking water supply control and water theft identification system" *Proceeding of the 2011 IEEE Students' Technology Symposium*14-16 January, 2011, IIT Kharagpur.
- [3] Stancil, Stoian, and kovacs "Urban water supply distributed system", Vol.3, pp.316-321, May 2004

- [4] Mr.PrashantPalkar, Prof (Dr.)Shrinivas patil, Prof.Mrs.Pooja Belagali, Mr. Ashish Chougule "IOSR Journal of electronic and communication Engineering".ISSN:2278-2834,PP:36-38.

[5] www.google.com