

AUTOMATION IN DRINKING WATER PURIFICATION, DISTRIBUTION & THEFT IDENTIFICATION USING PLC & HMI

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Abstract—The present drinking water supply control system is facing many problems related to testing of water, purification, pumping of water, storage and distribution of water. The major problems in water supply system are leakage or wastage of water and the majority public is using suction motors to suck water from main supply connection. The problems an automated system has been proposed which enhances the water purification, storage, distribution and reduces wastage of water as well as identify the theft of water. The GSM Modem for wireless communication so that the information can be passed to particular responsible officer's cell phone for immediate action. The water supply system is a continuity of the water distribution, water quality control and the monitoring.

Index Terms – PLC, HMI, Level sensor, Flow Sensor, Solenoid Valve, GSM module, Pump

I. INTRODUCTION

Water is very important to us. Water plays an important part in the human life. Now a day's drinking water distribution is the major task for the corporation field. Lots of water is being wasted in its distribution. In the old distribution system the whole work is done manually. The opening and closing of valve in each and every society is done by man. Due to this sometimes he doesn't have an idea of time and sometimes he may also forget to distribute the water to the society and the people of the society have to stay without water.

Here the new theory of automation is developed to reduce the disadvantage of manual system by using the Programmable Logic Controller (PLC). The project is designed to develop an drinking water purification & water distribution using plc. That is very useful in modern field. The level of the storage tank is sensed and the command is

given by the PLC to the pump. Also according to the decided time the valve of a particular house is being operated. The advantage of using this method is to reduce human intervention and ensure proper distribution.

II. SYSTEM DESCRIPTION

A. Proposed System

The project aims at introducing an intelligent system in automization in water supply control and anti-theft control system for drinking water supply. This is overcome by automatic open and close of valves by using PLC. The PLC calculates the difference in the flow rates of sensors, if the difference exceeds the limiting value it is recorded as leakage or theft, and the valve behind the first flow sensor and distribution motor are turned off automatically. As leakage or theft occurs a message is delivered to responsible officers in control room and wall men using GSM modem

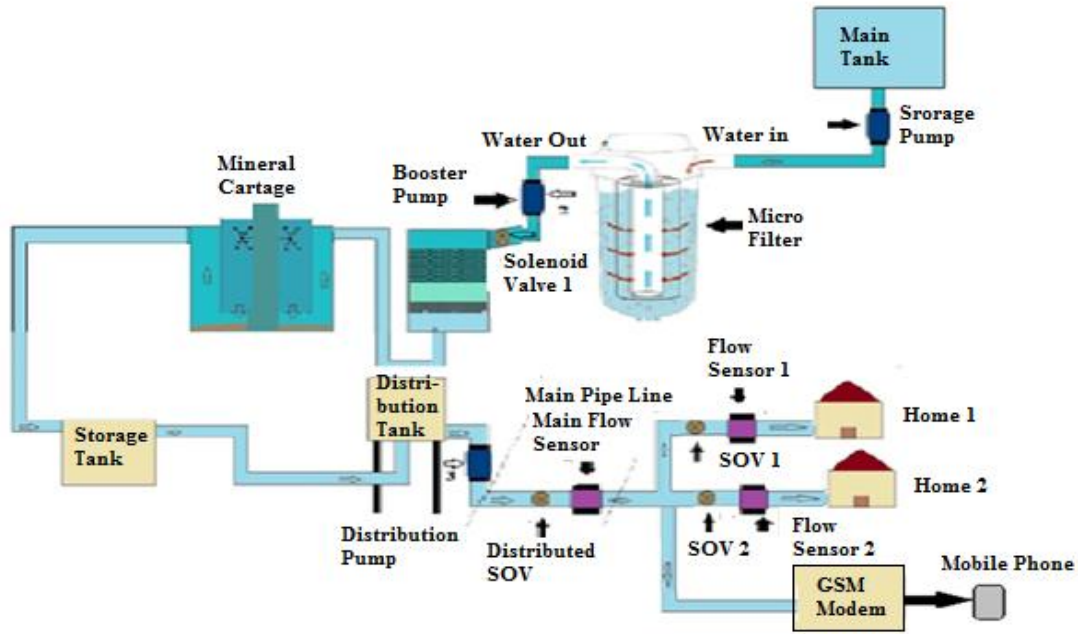


Fig. 1 Structure of proposed system

B. Block diagram

The block diagram of intelligent automation system for drinking water supply control, water theft identification is shown in Fig 2

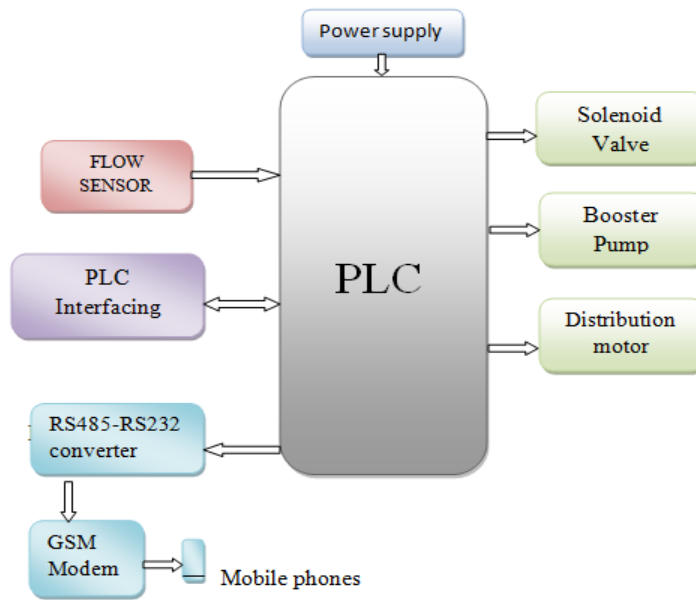


Fig. 2 Block diagram of system

Motor is used for purpose at Purification tank. These motors are turned on and off using PLC according to purification of water. The stored water is pumped to distribution tanks from which water is supplied to individual home street lines using distribution motors. The PLC records the rate of water flow from the flow sensors located near distribution area.

If there is difference in flow rates, it is recorded as leakage or theft then PLC automatically closes the valves to avoid unnecessary flow of water. This information is passed to GSM modem through RS485 to RS232 converter. The information about leakage and water theft in pipeline is passed to cell phone in control room through GSM modem. The working of entire system can be viewed on SCADA screen and home street pipeline.

III. SOFTWARE DESCRIPTION

A. PLC Programming

A PLC is a used DVP14SS2 to control machines and processes. They have a number of different programming languages which include Ladder logic, Instructions List, and Sequential Function Charts. Ladder logic is the main programming method used for PLCs. The WPLsoft is used for Ladder It therefore shares common terms with typical PCs like central processing unit, memory, software and communications. Unlike a personal computer though, the PLC is designed to survive in a rugged industrial atmosphere and to be very flexible in how it interfaces with inputs and Outputs to the real world.

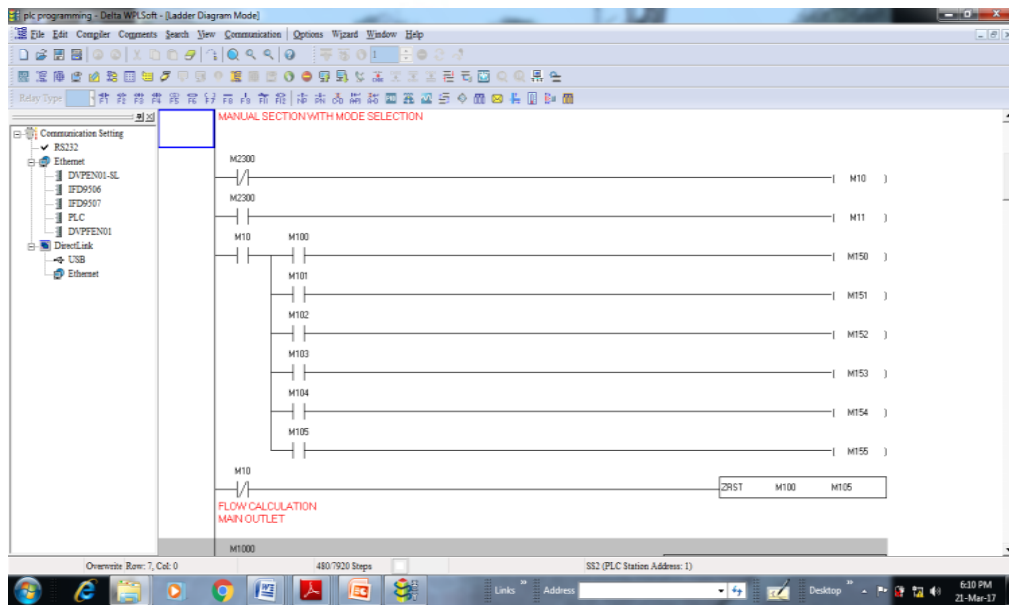


Fig. 3 Ladder Logic

B. H.M.I Communication

The Human-Machine Interface is quite literally where the human and the machine meet. It is the area of the human and the area of the machine that interact during a given task. HMI is a medium for information exchange and mutual communication between electromechanical systems and the user.

It allows the user to complete settings through touchable images or keys on the user-friendly window. This not only offer's fast and convenient control of manufacturing automation, but also has replaced traditional controlling panels which need extensive wiring. Delta DOP series Human Machine Interface provides vario us touch screens with multiple dimensions and colors and it also offers fast and convenient control functions for industrial automat ion machines. Programming the whole DOP series is done using the Delta Windows-based and user-friendly Screen Editor software. By using this software, the user can quickly edit images and graphs and set suitable communication protocol through Macro command.

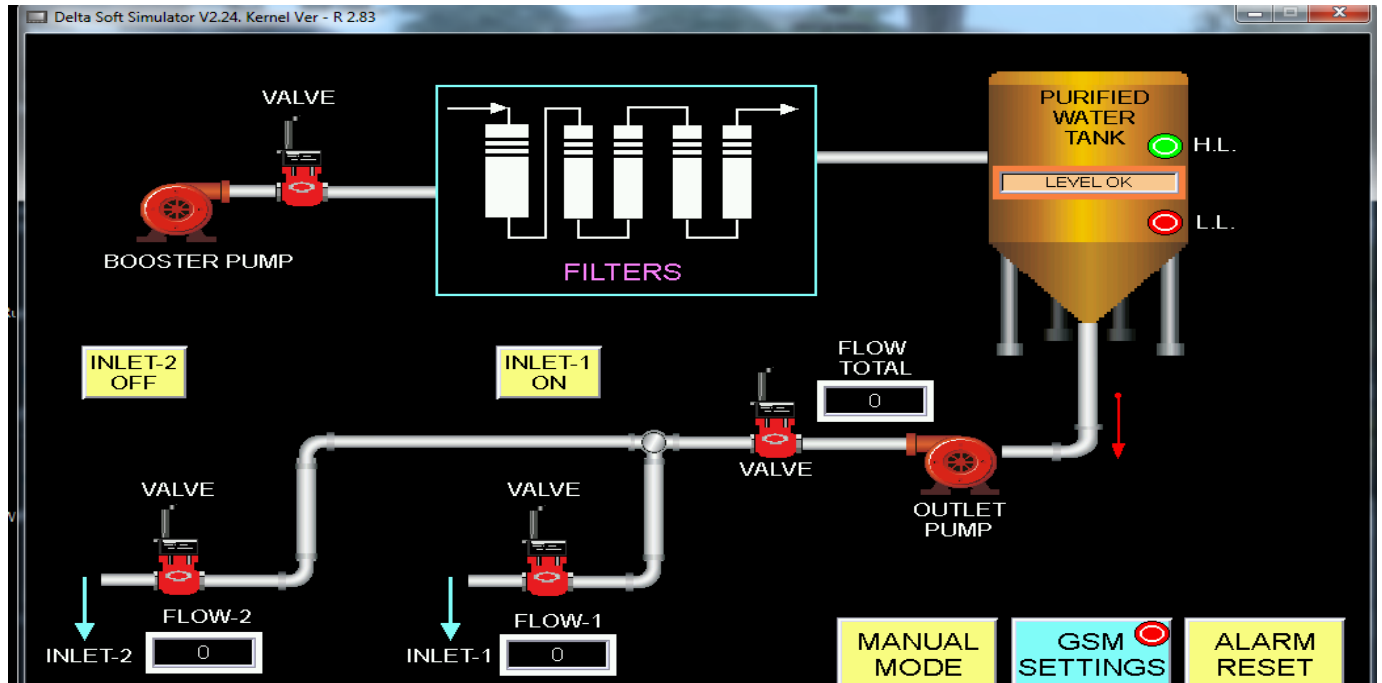


Fig.4 HMI Screen

IV. RESULTS & CONCLUSION

The automation of water distribution system eliminates water wastage. Automation system provides continuous water flow according to the use. This project is automatic so it reduces lots of man power. The automation implemented in water distribution system ensures to avoid wastage of water and reduces time. And also we can completely avoid the water theft in the pipelines. This system is excellent and cost effective to prevent the drinking water from the theft.

The Project of Water Distribution System with the purification Water is developed to help the people of the house to get the water in proper time. This project will make human life simple, water saving, time saving & electricity saving. This project will be very useful for corporation as technology is involved in it.

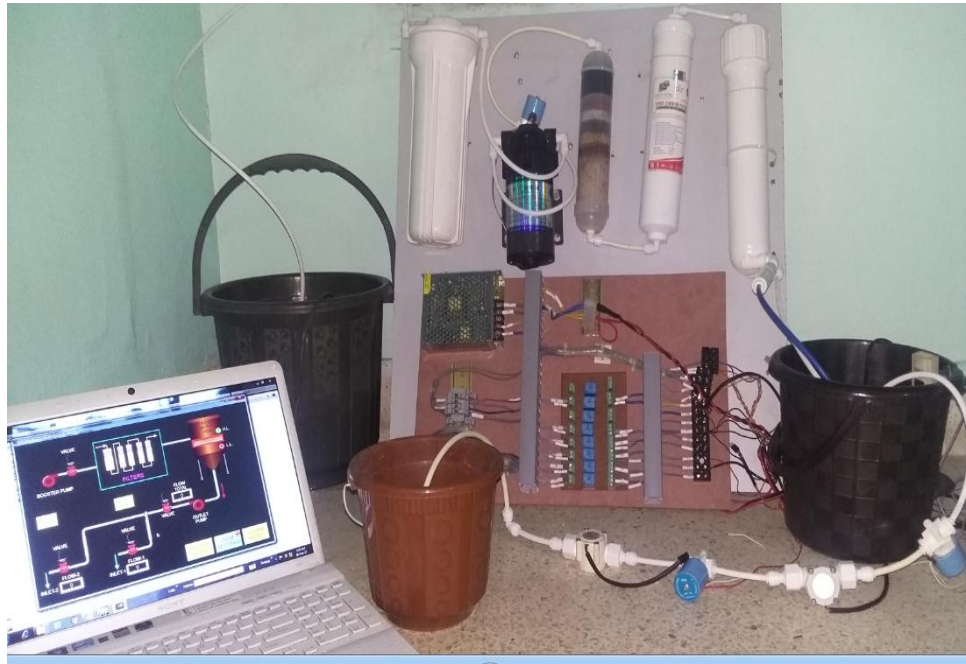


Fig. 5 Working Model

- The entire system can be operated by person who apparently has no knowledge over PLC and HMI
- By using water theft identification method in real time it is possible to reduce 75% of water loss that is occurring due to leakage or theft in pipelines.
- The real time alarms created in HMI when any equipment fail in distributed or pump station awareness is created and as well as messages can be passed to the responsible officers using GSM Modem
- Automated system enhances the water filtration, storage, distribution and reduces wastage of water as well as identifies the theft of water.
- This project will be very useful for corporation as technology is involved in it.

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