Automatic Water Distribution System using PLC

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Abstract— **The increasing population and thus the wide expansion of urban residential areas have increased the need of proper sharing of water. This distribution of water in every house within different areas needs the control and monitoring for preventing the wastage of water and the water theft practices. Different technologies have been studied to distribute/supply the water to each and every house of residential areas. This paper deals with the Literature review for the automated water distribution with monitoring the performance of the system through various application applied through the PLC system. At the start the exact idea about automatic water distribution for different areas with its proposed system is discussed, and then its several technologies are discussed.**

Keywords— Flow Sensor, PLC, Solenoid Valve, SCADA, Water Level Sensor.

INTRODUCTION

Water is basic need of human being. Water Distribution is one of the important process. Automation provides optimized solution to all problems of distribution of water system. Now-a-days, Water distribution system faces so many problems like water leakage & improper water supply. This leakage causes drastic reduction in pressure of water flowing through supply line. Due to this, consumer gets less amount of water. By, considering above scenario we are trying to find solution for the problem The main aim of this project is to provide effective water supply to each consumer. In this project we are working on the distributed network under the area of single water tank. Automation plays an increasingly significant role in the global economy. It improves the performance and also reduces human efforts hence we are implementing PLC based water distribution system. Initially we studied about the working of distribution system of existing system

For this system we have taken the reference of this IEEE paper. PLC Controlled Water Distribution Plant [1].

Existing Technology: Now-a-days, we seen lots of problem for water distribution system like water leakage & improper water supply. This leakage causes drastic reduction in water flowing through supply line. Due to this, consumer gets less amount of water. Hence, we need to develop the system to reduce such problems which face by today's WDS.

Need for PLC: Programmable Logic Controller plays vital role in automated water supply system. PLC is used in stirrer motors, controlling pump station motor contactors and distributed valves of the water. PLC programming is done using Ladder Diagram Language. Ladder diagram is main schematic language commonly used in automation industrial control logic systems. Specifically, our research idea focuses the proper method of water distribution system using PLC and methodology required to protect the leakage of water and constant pressure maintenance while water distribution. As the water is distributed by time shift method in the conventional system, we are facing lot of problems such as wastage of water, leakage of water etc. All these things are making the scarcity of water. So, in order to overcome the disadvantages in the earlier systems, we are going to distribute the water using our proposed system[1].

Water supply system plays important role in urban infrastructure. Our system is implemented using PLC/SCADA. The main objective of the automation of the water distribution system is to prevent the wastage of water due to malicious mischief. To keep an eye on the vandal and the stealing of water the SCADA unit has initiated red alarm pop-ups. [1]

The storage tank contains Water Level Sensor being controlled and monitored. These Sensor convert physical parameters into electrical signals. These Sensors are connected to electronic devices through the PLC (Programmable logic Controllers). The PLC provides data to control room where the SCADA servers present to store data from PLC and regulate the control system. Connection between the PLC and SCADA server is established using direct technique [2].

PROBLEM STATEMENT

In previous method, person supervisor will go to the pump station and open the valve for a particular time period. Once the time over the supervisor have to go there again to close the valve. It is time consuming. The proposed system is fully automated. Here human work and time is reduced. The water wastages such as leakages, mankind laziness and operating error can be avoided[3]. In present system due to improper handling, there is unnecessary loss of water and it is not properly distributed to the end users. Also the people may take extra water for their personal use with the help of motor.
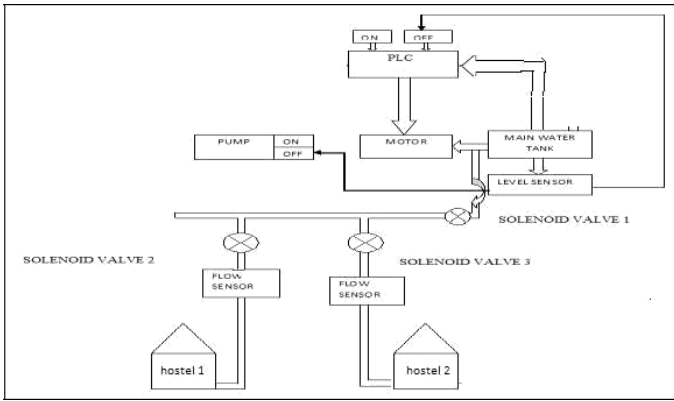
Fig.1 Block Diagram[6]

The main objective of project is to improve not only performance but also proper distribution of water with minimum human efforts. With increasing development of technology, the more focus is on selection of application oriented Controllers and tools, hence the concept of proposed system to control application it is combined with PLC. In order to overcome the normal conflicts facing during water supply and to minimize the water leakage in the corporation water distribution pipe. With the rapid changes in automation and information technologies in recent decades, the control of all equipment have been performed. In our research idea, we are using PLC for distributing the hostel water in efficient manner, as they are inexpensive, easy to install and very flexible in applications.

PROPOSED WORK

The hardware layout of the proposed system is shown in figure.2 Pumping section is connected to PLC. If the water level goes below the set point the pump will automatically turn ON. Checking the level in storage tank is the first process. If the level attains the set point, overall system is started. The water is flow through the pump when the main solenoid valve opens. The flow rate is measured with the help of pulse output from the flow sensor [2]. The people can get water until the set point is reached. Once the water usage attains solenoid valve is automatically close.

Once the main solenoid valve gets opened, the water flow through the pump. The water level in the storage tank gets decreased. We can measure the water level using the sensor attached to the storage tank. When the water decreased below 80% the pump is on.[4]
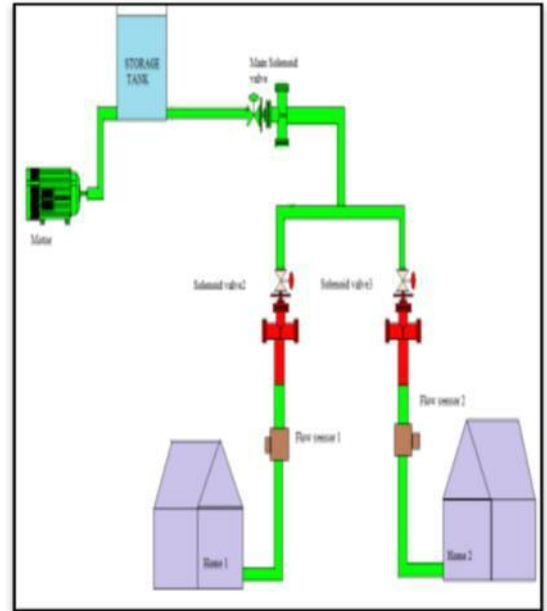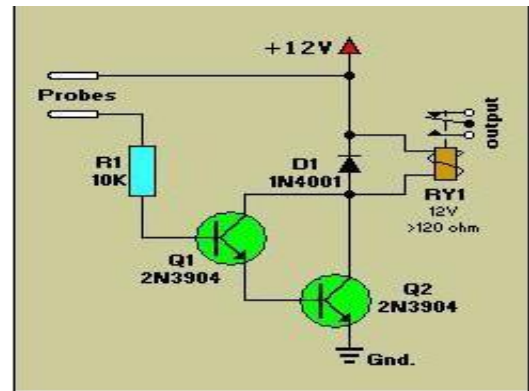

Fig. 2 Proposed System [6]

Fig.3 Water Level Ciruit

Fig. 4 Solenoid Valve

Solenoid valve is a two port valve. It will be used to turn on and off condition. In this system three solenoid valves are used. 24V supply is given to the main solenoid valve. PLC output is connected to the solenoid valve. The output from the PLC in the range of 24V DC. So it is necessary to give switch function on and off the solenoid valve. If the water

level in the storage tank is reached the 80%, main solenoid valve is automatically turned on. The set point is fixed for solenoid valve. If anyone one of its valve or both the valve attains the set point the solenoid valve is turned off. *(Shown in Fig.4)* normally closed solenoid valve is used to control the flow rate

Fig.5 Flow Sensor

Flow sensor is used to measure the flow rate of the water. YF-S201 type of flow sensor is used (shown in Fig.5). Flow sensor contains pin wheel in its. Pinwheel contains 6 teeth. The pulse output is comes from the pin wheel sensor. If the teeth rotate at one time, it will give the pulse output according to the specification of the flow sensor. From the pulse output easily measure the amount of water passed through the pipe. The pulse is converted to voltage with the help of Hall Effect sensor. Flow sensor output is in the range of 5V DC. So it is necessary to give signal conditioning. Optocoupler is used to amplifying signal.
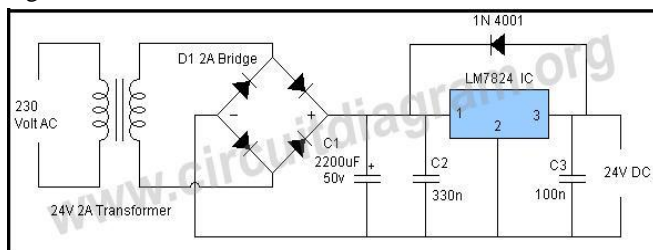

Fig.6 Power Supply

I. PROPOSED RESEARCH STRATEGY

Specifically, our research idea focuses the proper method of water distribution system using PLC and methodology required to protect the leakage of water and constant pressure maintenance while water distribution. As the water is distributed by time shift method in the conventional system, we are facing lot of problems such as wastage of water. All these things are making the scarcity of water. So, in order to

overcome the disadvantages in the earlier systems, we are going to distribute the water using our proposed system

II. BENEFITS TO THE SOCIETY

- Automatic Water Distribution (AWD) system provides balanced water distribution throughout the society.
- Saves water and Power.
- Awd systems focuses on energy crisis.

CONCLUSION

The automation of water distribution system eliminates not only water wastage but also provides continuous water flow according to the set point. This project is automatic so it reduces lots of man power. The automatic water distribution system ensures to avoid wastage of water and reduces time. And also we can completely avoid stealing of water in the pipelines. So that people could get equal share of water. This system is excellent and cost effective. It is best way to prevent the drinking water from the theft.

ACKNOWLEDGMENT

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