

WATER DISTRIBUTION SYSTEM FOR SMARTCITY USING SCADA

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Abstract: Smart towns are the coronary heart of the country, Cities are known as clever while they're included with clever structures i.e., Water Supply, Electricity Control System and clever communicate era. In our Paper we've got evolved a demo version of PLC (Programmable Logic Controller) and SCADA (Supervisory Control and Data Acquisition) for Smart town water supply control system wherein the method goes to be managed manually in addition to remotely. In this system we've used one-of-a-kind additives like motor, pump, switches, valve, sensors i.e., flow sensor, level sensors, strain sensor that may be managed from system and unique values generated via those additives are calculated and stored withinside the Scada. And with the aid of using fetching the stored data from the database we're going to show those values on a web portal of our device. The connection made among the SCADA and PLC performs an essential function in saving the actual time statistics in order that the data may be accessed from database itself. This system may be clearly carried out in any growing clever town for higher development of water deliver, because the complete procedure may be managed regionally in addition to manually from the panel or our non-public SCADA system. Data that's saved in database may be accessed via on line portal of water distribution system.

Keywords: PLC, SCADA, Database, Water Distribution system.

I. Introduction

Automation performs an increasing number of essential functions withinside the worldwide economic system and in each day experience. It improves the overall performance and additionally reduces human efforts subsequently we're applied PLC and SCADA primarily based totally water distribution system. The most important goal at the back of choosing this task is to enhance the overall performance of water distribution system with minimal human efforts. Cities have become smarter and smarter now a day's the usage of new one-of-a-kind technologies, so residing in clever towns makes human beings lessen the paintings load and offer the safety in addition to residing comfort. A town may be known as clever with the aid of using the manner of human being's residing and way of life in it, wherein each trouble of surroundings may be managed and the whole thing need to be automated. This system of water deliver may be carried out in towns with the aid of using the usage of technology like PLC and SCADA with the assist of presidency taking efforts to provoke it. The most important aim of this system is to take water from supply and deliver it to normal town regions and generate the data as consistent with the stored values. So, we took the survey of various towns that what clearly, they're imposing and what we've got carried out.

II. Overview of Proposed Model

Our task clever town water deliver manage system is absolutely primarily based totally on PLC and SCADA technology. In SCADA version of this system the activities like date, time, flow and quantity of water are recorded in Database system and statistics that's recorded in Database can be proven on the net portal of water deliver manage system. Data may be monitored via SCADA software program because the complete SCADA is attached remotely to the Database. Even the non-technical individual can get entry to the net portal made for our task. We are using Allen Bradley as a PLC. In our system we're growing a SCADA version for recording all of the activities, activities like time, date and float in liters are calculated and saved withinside the database the additives which might be required for this system are sensors, tanks, panel, led lights, switches etc. When we begin the execution of the system the PLC exams the extent of the sensors whether or not the town tank is complete or not, if the tank is empty then in keeping with the situation the water pump receives began out and as soon as the town tank gets complete then the extent sensor suggests that the town tank is complete after which automatically the water pump receives off. This system is executed on every occasion while the town tank receives empty. Now, right here the query arises in thoughts that what occurs while the supply water and town tank each are empty? So, we've got positioned a stage sensor in supply water too, to test the empty situation of the supply water and if it's far empty then water pump doesn't get began out. When the town tank receives complete then it's time to continue similarly with the water deliver in town in a clever manner so PLC tests the tank complete situation and opens the valve related to the town pipeline to deliver the water to one-of-a-kind regions of town. On the identical pipeline we've got related Flow sensor to generate the data of go with the drift in liters on the time of water deliver to the town. When the values are collected, they're stored in database with the assist of SCADA. This task also can be dealt with with the aid of using any non-technical individual.

B. SCADA

Supervisory control and Data Acquisition approach software program SCADA is a software program in order to be interfaced with PLC for Data acquisition. For Industrial Automation, Process manages and supervisory tracking it offers visualization for plant centric, operator centric, MIS (Management records System), in which records is shared inside and among the plants, absolutely included with all kind of records had to empower the operator. SCADA allows engineers, supervisors, managers and operators to view and engage with the running of whole operations via the graphical illustration in their manufacturing procedure.

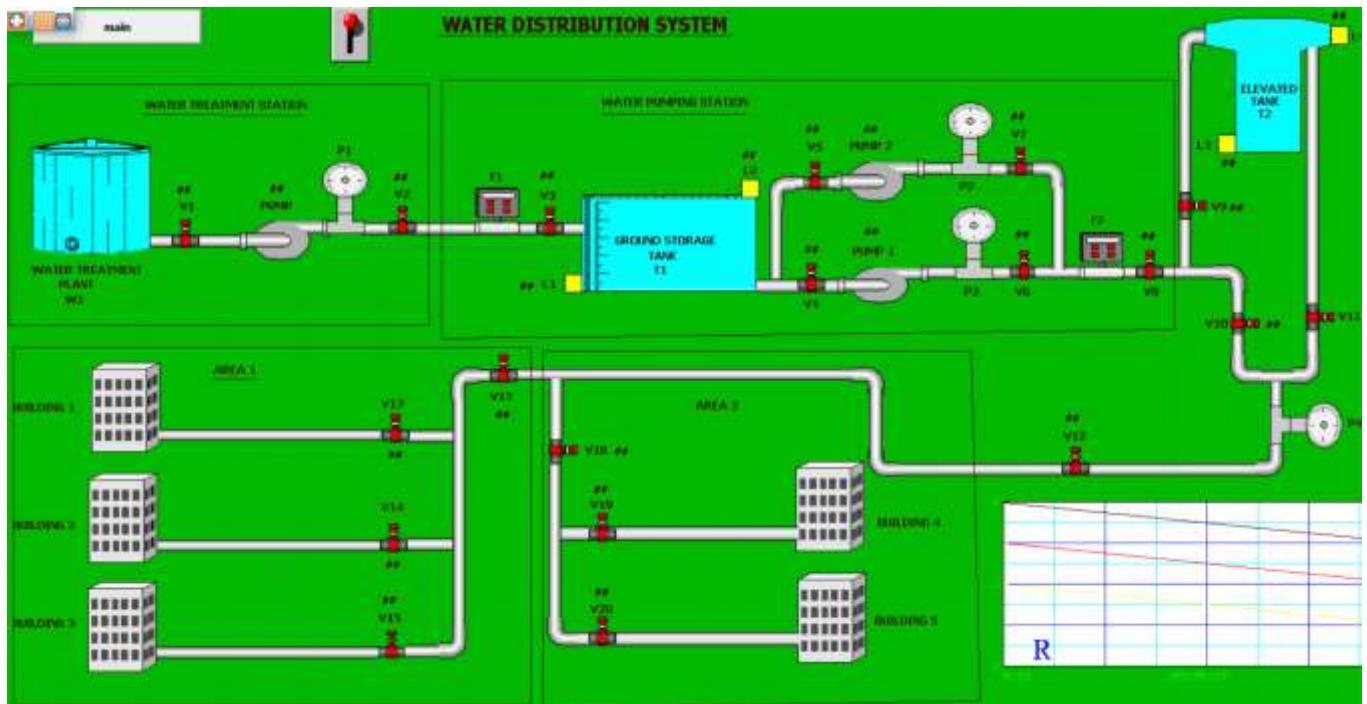


Fig 3: Scada animation

C. Window script

We have used window script to expose the automated procedure in Scada.

- **Description**

SW is the principle transfer to begin the simulation. When start button (SW) is pressed, valves V1 & V2 are open, stage sensor L1 experience low stage of tank than pump will on and water flows via water remedy plant to the water pumping station. Flow meter F1 test the full in overdue go with the drift for water pumping station. Tank T1 will constantly fill until excessive stage sensor L2 experience. When L2 experience than V1,V2,PUMP all will off .When V4,V5,V6,V7,V8,V9 are open, L3 experience low stage for tank T2 than Pump 1 and Pump 2 will on and Tank T2 begin filling. Flowmeter F2 test general out overdue go with the drift from water pumping station. Tank T2 will constantly fill until excessive stage sensor L4 experience. When L4 suggests excessive stage of Tank T2 Than valve V9 will open. When valves V10,V12,V18,V19,V20 are open Than water is shipped to Area 2. Area 1 is larger as examine to place 2. so, while call for is greater than valve V11,V12,V13,V14,V15,V17 opens and place 1 and a couple of each gates deliver. If call for isn't anyt any greater however any fault creates in community line or in any individual pump or motor than we will deliver water which assist of the accelerated tank, that's used as a backup tank.

D. Butterfly valve

A butterfly valve is from an own circle of relatives of valves known as quarter-flip valves. In operation, the valve is absolutely open or closed while the disc is circled 1 / 4 flip. The "butterfly" is a metallic disc installed on a rod. When the valve is closed, the disc is growing to become in order that it absolutely blocks off the passageway. When the valve is absolutely open, the disc is circled 1 / 4 flip in order that it permits a nearly unrestricted passage of the fluid. The valve can also be opened incrementally to throttle go with the drift.

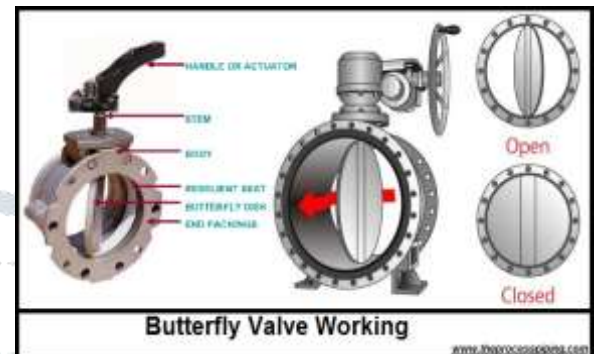


Fig 5: Butterfly Valve Working

E. Gate valve

Common gate valves are actuated with the aid of using a threaded stem that connects the actuator (e.g., handwheel or motor) to the gate. They are characterized as having both a growing or a nonrising stem, relying on which give up of the stem is threaded. Rising stems are constant to the gate and upward push and decrease collectively because the valve is operated, supplying a visible indication of valve position. The actuator is connected to a nut this is circled across the threaded stem to transport it. Nonrising stem valves are constant to, and rotate with, the actuator, and are threaded into the gate. They may also have a pointer threaded onto the stem to suggest valve position, because the gate's movement is hid withinside the valve. Nonrising stems are used wherein vertical area is limited.



Fig 6: Gate valve

F. Ultrasonic Flowmeters

Ultrasonic flowmeters use sound waves to decide the rate of a fluid flowing in a pipe. At no go with the drift conditions, the frequencies of an ultrasonic wave transmitted right into a pipe and its reflections from the fluid are the identical. Under flowing conditions, the frequency of the contemplated wave is one of a kind because of the Doppler effect. When the fluid actions faster, the frequency shift will increase linearly. The transmitter techniques indicators from the transmitted wave and its reflections to decide the go with the drift rate.



G. Level sensor

Ultrasonic stage transmitter, which plays calculations to transform the space of wave tour right into a degree of stage withinside the tank. The time lapse among firing the sound burst and receiving the go back echo is at once proportional to the space among the transducer and the fabric withinside the vessel. The medium is generally air over the fabric's floor however it is able to be a blanket of a few different gases or vapours. The device measures the time for the bursts to tour right all the way down to the reflecting floor and go back. This time can be proportional to the space from the transducer to the floor and may be used to decide the extent of fluid withinside the tank. This simple precept lies on the coronary heart of the ultrasonic dimension era and is illustrated withinside the equation: $\text{Distance} = (\text{Velocity of Sound} \times \text{Time})/2$. These noncontact gadgets are to be had in fashions that could convert readings into 4–20 mA outputs to DCSs, PLCs, or different far-flung structures.



Fig 8: Level sensor

H. Centrifugal pump

pumps are designed for drinks that have a relatively low viscosity that transfers like mild water. Centrifugal pump additives especially consist of 3 elements inclusive of an impeller, a casing, suction pipe with the aid of using a foot valve & strainer shipping pipe. A centrifugal pump makes use of rotation to by skip on speed withinside the path of the fluid. Each centrifugal pump makes use of a hydraulic element like an impeller that turns to by skip on speed in the direction of the pumped fluid. This pump especially used to alternate the rate into liquid go with the drift. Each pump makes use of a hydraulic element like a casing that captures the rate that's knowledgeable with the aid of using the impeller & directs the driven fluid in the direction of the pump expulsion give up.

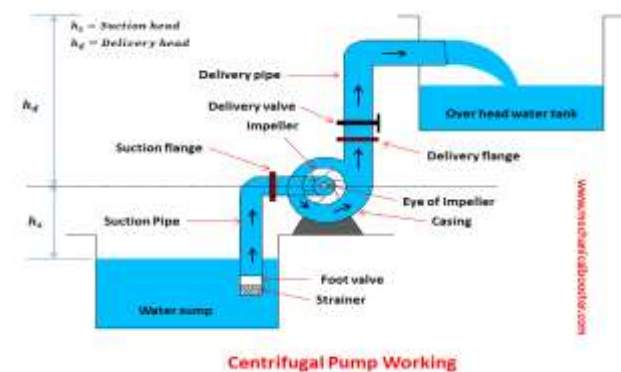


Fig 9: Centrifugal pump

IV. Conclusion

In smart city water supply control system, the methods used in older times results into problems like overflow, leakage and empty running of city tanks. So, to overcome these problems the automation system is made to reduce the human efforts. This procedure made for a particular city has proved important and effective for future implementation.

In this system we represent PLC and SCADA technology from which the project is completely controlled from SCADA as well as Panel. Thus, for reducing the human efforts and save the real time data in Database this technology has helped a lot to implement the actual demonstration.

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