

Automated Water Management System For Smart City Using Arduino & Scada

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Abstract- Sustainability of clean water resource has been a big issue being discussed lately. From the reason of lack of resources to the attitude of end user that frequently waste clean water, the problem seems not having any improvement on finding ways to at least contain it from increasing. The problem is related to poor water allocation and monitoring, inefficient use, wastage and also lack of adequate integrated water management. There are some reasons that this cannot be controllable such as raw resources and the attitude of end user. But there is an area that we can at least control it to the lowest level possible by applying better technology and management. The area that can be improved is the monitoring and management of water storage and distribution. Usually we see water pipe leaks, which results in a fountain of burst water. As a result, there will be a water shortage problem because of the pressure lost, which prevents the water from being supplied to the storage tank. By applying the automation system such as SCADA with the integration to control water storage, the management of water distribution and monitoring can be improved thus resulting in reducing the level of water wastage and maintaining the supply of clean water.

Keywords- Arduino, Ultrasonic Sensor, SCADA, Solenoid valve.

I. INTRODUCTION

There is rapid growth in wide urban residential areas, therefore it is a need to provide better Water Supply. To fulfill the customer's requirement as well as to avoid faulty conditions there must be a better water supply management. Earlier the monitoring of the process was done by human effort which caused the error. The present system of water distribution is operated by manually and also monitoring of system is not properly maintained. In that all the distribution of water from water storage to water distribution through pipes is totally depends on the human and Problem arises in the water supply management system due to improper water supply management and they will have to pay an equal amount irrespective of usage of water by individual houses. This project presents a prototype for water distribution system comprising a control system, communication means, piping, actuators, sensors and valves. This system utilizes a communication bus for controlling and monitoring water flow

through the piping via control of the actuator and valves. The reliable instrumentation connected to Arduino (Micro Logic Controller) assure real time monitoring of the main technological parameters of large water distribution networks Control System is further coupled system.

II. LITERATURE REVIEW

Initially we studied about the working of distribution system of existing system. For this project we have taken the reference of this IEEE paper.—Automation Of Water Distribution Plant (IJREAT International Journal of Research in Engineering & Advanced Technology, Volume 2, Issue 1, Feb-Mar, 2014). Also we referred 'SCADA Supervisory Control Data Acquisition'. This paper gives idea about SCADA system. We studied the paper 'Automation –The key to water management', In-depth for Instrumentation and process control.

A. Existing Technology:

Traditionally, In area the water distribution infrastructure is widely spreaded effectively. Now-a-days, Water distribution system faces some 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. Hence, their need to develop the system to overcome such problems.

B. Need for Controller:

Programmable Controller is the heart of automated water supply system. It helps in controlling water station motor contactors and distributed valves as well as to measure flow transmitter of the water. Arduino programming is done using C and C++ Language. It is specialized schematic language commonly used to document industrial control logic systems.

C. Proposed System:

The conventional method used before in older times, results into problems like empty running, overflow, leakage. The automation of the process thus helped to overcome this

problems based on level, pressure, flow parameters and it also minimizes human efforts for the same. If there is any problem in system then using SCADA system we can detect problem easily.

III. PROBLEM DEFINATION

The water wastage is due to many reasons such as wastage of water, human laziness, operator fault etc. There is also problem of indiscretion of water supply i.e. the list of water supply is not secure. Now-a-days, water storage and distribution system, controlling temperature, pressure and for every stage for measuring and analyzing. We can't able to identify the robbery in urban drinking water supply. Water flow control is impossible and not controlling. The water supply systems are part of the urban structure which must assure the continuity of the water distribution, the water quality control and the displaying. In existing system, urban water is supplied to the home with the help of some human power. The person to take the charge will go to the place and then open the valve to that exact area.

Once the time is over the person will go again to that place and close the valve immediately. This type of operation needs human power. This is excess of time and to go to that place and comeback often. Also the people may take extra water for their personal use with the help of motor. Due to this many people will not receive sufficient water for their use. Water is the basic and important needs of the human life. The water theft prevented only when any public inform the officials about the theft.

So, to overcome this problem we need to introduce to new proposed system of water management system by using Arduino and SCADA.

IV. AIMS AND OBJECTIVES

AIM:

The main aim of the project is to develop and to test an automation system having a low cost equipment and feedback type controller for site-specific management of distribution systems. The data available from the various sensors will be received at the wireless base station for proper control, based on data.

OBJECTIVES:

The objectives of this project are:

- i. To design a simulation model of a water level and distribution monitoring system using Arduino/SCADA.
- ii. To design controller system that is able to maintain the water level at the main tank within the desired level.
- iii. To verify that the system is able to monitor the water level at main storage tank and turn on/off the water pump autonomously.

V. MATERIALS AND METHODS

1. CONTROLLER

A PROGRAMMABLE CONTROLLER is an industrial computer control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices.

2. ARDUINO UNO

The Arduino Uno shown in Fig. below is a microcontroller board based on the Atmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. Arduino Uno has open source software that is why it's quiet easy to implement control logics on this microcontroller.

3. SCADA

SCADA (supervisory control and data acquisition) is a type of industrial control system. Industrial control systems are computer controlled systems that monitor and control industrial processes that exist in the real world. SCADA systems has the ability to connect multiple type of industrial automation and control system and able to control large scale processes that can include multiple sites and also system that are large distances. These processes include industrial, infrastructure, and facility-based processes.

4. ULTRASONIC SENSOR

It emits an ultrasound at 40 000 Hz which travels through the air and if there is an object or obstacle on its path It will bounce back to the module. Considering the travel time and the speed of the sound you can calculate the distance. The HC-SR04 ultrasonic sensor (like the one shown in figure 2) uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range

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