Water Classification and Distribution System For Rural Areas Using PLC

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Abstract- *Water is commonly used for domestic consumption as well as for agriculture and industry. Proper sensing and controlling of available water resource are thus essential for sustainability of this precious resource.The Water Classification and Distribution system for Rural areas using PLC will classify the water into the category potable and non-potable using Ph-meter. The Potable water will distribute for drinking purpose and Non-potable water will distribute for farming purpose. This paper report is based on PLC based system to Classify and Distribute water in Rural areas.*

Keywords- PLC, water classification, water distribution, PH Meter.

I. INTRODUCTION

In traditional drinking water supply system is facing many problems related to pumping of water, filtration, distribution of water and testing of water in the plant. Conventional water supply department comprises three different sections for supplying waters on it. First is the pumping station unit, which does the sucking of water from water source. The second section is a filtration department unit in which measurement of pH and chlorine is done. Third section is the distribution section through which water is distributed in the entire village. Currently these three sections are working independently . The major problems in water supply system are wastage of water . To advance above said problems an automated functioning system has been proposed which enhances the water distribution, reduces wastage of water as well as the water also distributed to farms.

"G. Sathishkumar1 and etal", develop the best way to improve the water distribution system is by using industrial PLC and PC system, which includes all network components like flow sensor, pH sensor etc. The water theft can be best monitored by the flow variations given by the flow sensors mounted on the several channels. The reliable instrumentation connected to PLC assure real time monitoring of the main technological parameters of large water distribution networks[1]. "Ninad.D.Mehendale and etal (2016)", Normal water contains particulate matter including suspended particles, parasites, bacteria, algae, viruses, fungi and a range of dissolved and particulate material derived from the surfaces, that water may have made contact with after falling as rain. This contaminates water for household and drinking purposes. We have developed purification system using proportional-integral-derivative (PID) controller at water storage tank in metropolitan cities, which helps in controlling pH of water, clarity and presence of microorganisms in water. We used alum treatment followed by filtration for clarity, UV treatment and chlorine for disinfection and acetic acid/alum, soda ash for pH control[2].

"Abhijeet Mancharkar and etal (2016)", In Rural area the water distribution infrastructure is not widely spread effectively. It 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[3].Therefore after the successfull Literature Survey we have found the method of using Water classification and distribution system using PLC. This system has generated enthusiasm in Automation to providing water purification technologies to rural areas of developing countries.

The main focus of this system is to evaluate the social, economic feasibilities of providing water purification technologies to rural areas of developing countries. Rural areas of the developing world are populated with poor people unable to fulfill the basic needs for clean water and sanitation. These people represent an important group of potential users whereas in case of water distribution system they are using traditional method, which is not atomized. The best way to improve the water distribution system is by using industrial PLC which includes all network components like flow sensor, pH sensor etc.

II. METHODOLOGY

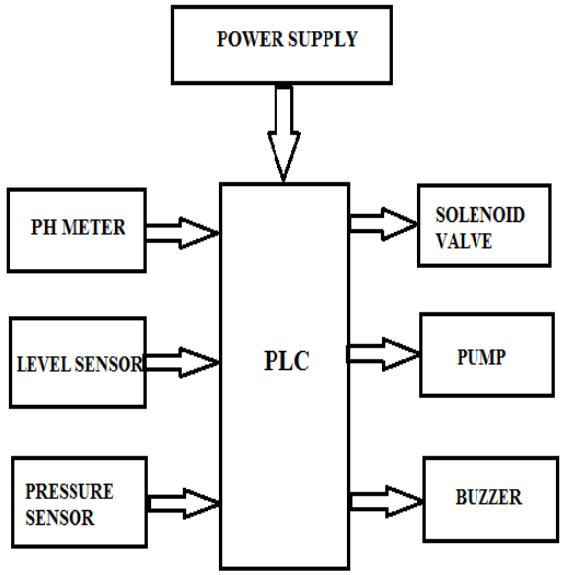

Fig 1: Block diagram of proposed system

The water purification & distribution system consists all hydraulic parameters (pressure, flow sensors, water level, free and residual chlorine ph meter, distribution valve).

The system utilizes Programmable Logic Controller to control the whole system operations. The river which is not potable will be first filtered using all necessary equipments i.e flow sensors, ph meter by the automation process. Then the potable water which is safe for drinking will distribute to whole tank through the main pipeline and the non potable water i.e having ph value less or more than standard value will provided to the farms. This will ensure the reduce of wastage of water as well as supply only purified water in tank.

Chlorination : Chlorination is the process of adding chlorine to drinking water to disinfect it and kill germs. It is highly effective as a disinfectant for bacteria and viruses

Ozonation : Ozone is widely used for drinking water treatment because of its excellent disinfection and oxidation qualities. This combination has several benefits: Removal of organic and inorganic matter, Removal of micro-pollutants, such as pesticides, Enhanced disinfection , Odor and taste elimination.

PLC – PLC Micrologix 1400 itsOperating Voltage 24 V DC and Input/Output Voltage (recommended): 24V. It has Digital Input 20&12 Output.It has Analog 4 Input & 2 Output.

PH Meter – PH Operating Range :
Pure/Drinkable water=7(standard)
Farming = 5.5 to 8

Level Sensor – Float type level sensor
Cable length =2m
Operating Range = 2 to 12V DC Voltage range, 5 to 50mA DC is current range, 10 watt.

DC PUMP – Weight = 150 g
Voltage range = 8 to 12 V DC
Current range = 0.1 to 0.5 A
Flow rate = 300 L/H

III. EXPERIMENTATION

As per shown in above block diagram (Figure1), We have proposed our system as per the below figures. The PLC kit consists SMPS , MCB switch, connector for digital I/O, and analog I/O(Figure 2).

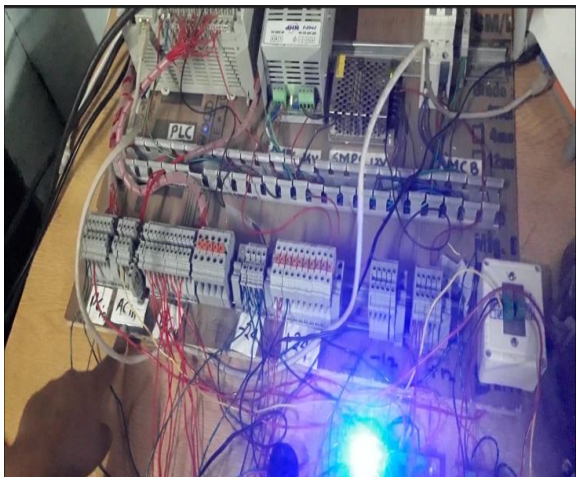

Fig 2 :PLC Board

Fig 3 : Working Model

As per shown above working model, there are tanks for purification & distribution purpose. Among them first tank is used as source and also used for sedimentation process. Water level sensing is done in second tank. Third tank is used for chlorination process. The ozonation process is carried out in fourth tank. Fifth tank is used for distribution purpose (Figure 3).

IV. CONCLUSION

In this paper we have proposed concept design of Water Classification and Distribution system for Rural areas using PLC. The motivation behind this research it is expected to reduce the wastage of water by distributing non potable water to the farms and to evaluate the social, economic feasibilities of providing water purification technologies to rural areas of developing countries.

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