Waste Water treatment Management System

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Abstract

Water is an essential component for life, it is considered as one of the biggest natural resource on earth, but nowadays this resource is being polluted. When wastes water from residential, commercial& industrial processes are disposed into a water sources. The waste water which is contaminated is called waste water. Since water is a scarce resource thus we need the waste water treatment before disposing them into water. The treatment process involves the primary treatment, Secondary treatment and then chemical treatment thus increasing the efficiency level of water and automating the overall control system for operation development, improving management level and high efficiency process and making the overall system reliable in Waste Water Treatment System.

Keywords: Treatment, Digester, Chlorination, Automation, Dechlorination, Efficiency.

Introduction

Our project i.e, Waste Water Treatment Management System is the system in which the hole process is automatically controlled and monitored which improves the reliable operation of the plant and require less time as required in the manually treated waste water treatment plant. Automation is used in the whole process of treatment plant. Basically the two main tools of automation i.e, PLC and SCADA is used for automation. The word Automation is a combination of two words "auto"(means: self)and "mation"(means: motion), so Automation is the delegation of human control to control technical or field equipments to increase the productivity, reliability, safety conditions, reducing cost etc. Hence, the automation has made the great revolution in industries all over the world. Introduction of automation system in Waste water management system have increased the efficiency of the plants and also helped in reducing the errors caused by humans. Thus helped to improve the reliability of the system. Another benefit of automation is that it also saves labor therefore increasing the precision, accuracy and efficiency. The system uses various programmed robots to perform activities in an industry. Various sensors, controllers, indicators, valves are used in the process. Programmable logic controllers are used to control various instruments used. It uses control systems, such as computers or robots and information technologies are used for handling different process machineries in an industry to replace human being, fault occurring anywhere in the system is easily and efficiently displayed on the screen. The fault can be cleared using the computer itself. SCADA designing is done for the controlling and monitoring of the system which is the software implementation of the project. Intouch wonderware is the software used .PLC programming is done for connecting hardware and software.
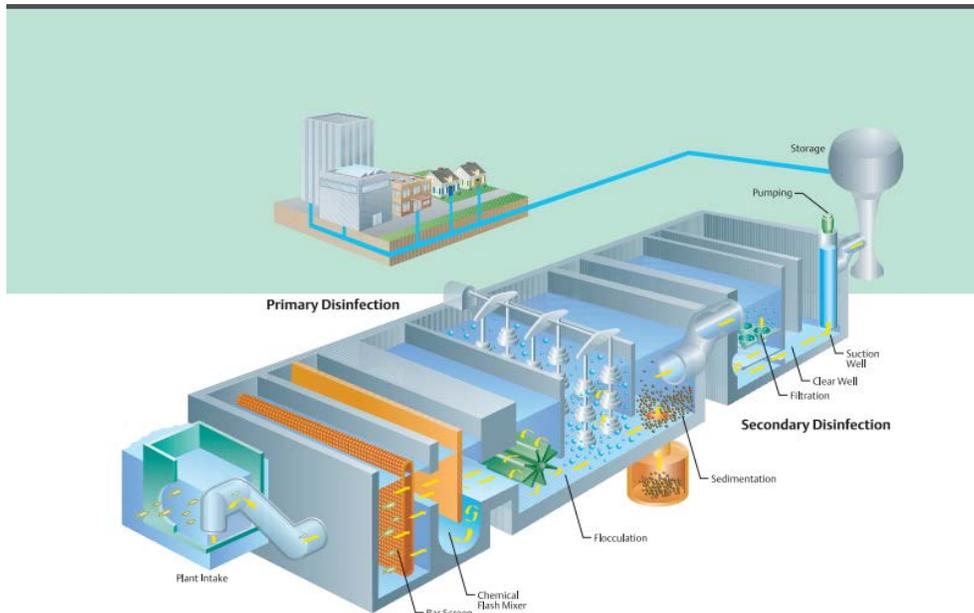
Figure 1: Waste Water Treatment Plant [1]

Features of WWTM SCADA System

Some of the important features of the SCADA systems are as follows:

Control: SCADA systems has a standard control algorithms like P, PI, and PID regulatory control algorithms for maintaining specific levels in storage tanks, maintaining prescribed flow rates. They also execute Boolean logic for automating the starting and stopping of pumps and motors, opening and closing of valves, and other discrete functions. SCADA systems also provides set of command or scripting language which serve as a programming tool to make the system in a sequence or a in a particular flow.

Monitoring: SCADA system provides an effective visual interface between the process and an operator. Most SCADA systems usually have a sophisticated set of tools for displaying individual process values and incorporating them into animated graphic depictions of the process. They take real time data and showing it as a trend so that process changes may be monitored and observed.

Alarming: Integrated into the data and graphical displays are alarm functions that can raise and display alarms as they occur. On some systems they can be tied into Auto-Paging and Auto-Phone-dialing features that will automatically notify operating personnel of a problem.

Working: The project is made in the window viewer of SCADA software (In-Touch Wonderware). In window viewer project would run as:-When the switch is on the waste water from factories are stored in storage tank .From storage tank the waste water is pumped out through motor .As pumping action is started the valve is open and the water is further passed for screening action .After screening is done it is sent to the Grit Chamber which removes the small particles from the waste water .The treated water is then sent for the primary treatment and then secondary treatment and further for the chemical treatment .The Chemically treated water is Uv treated and then sinked to the water bodies.. The water from the river bodies is then further treated and filtered and stored in another tank for usage.
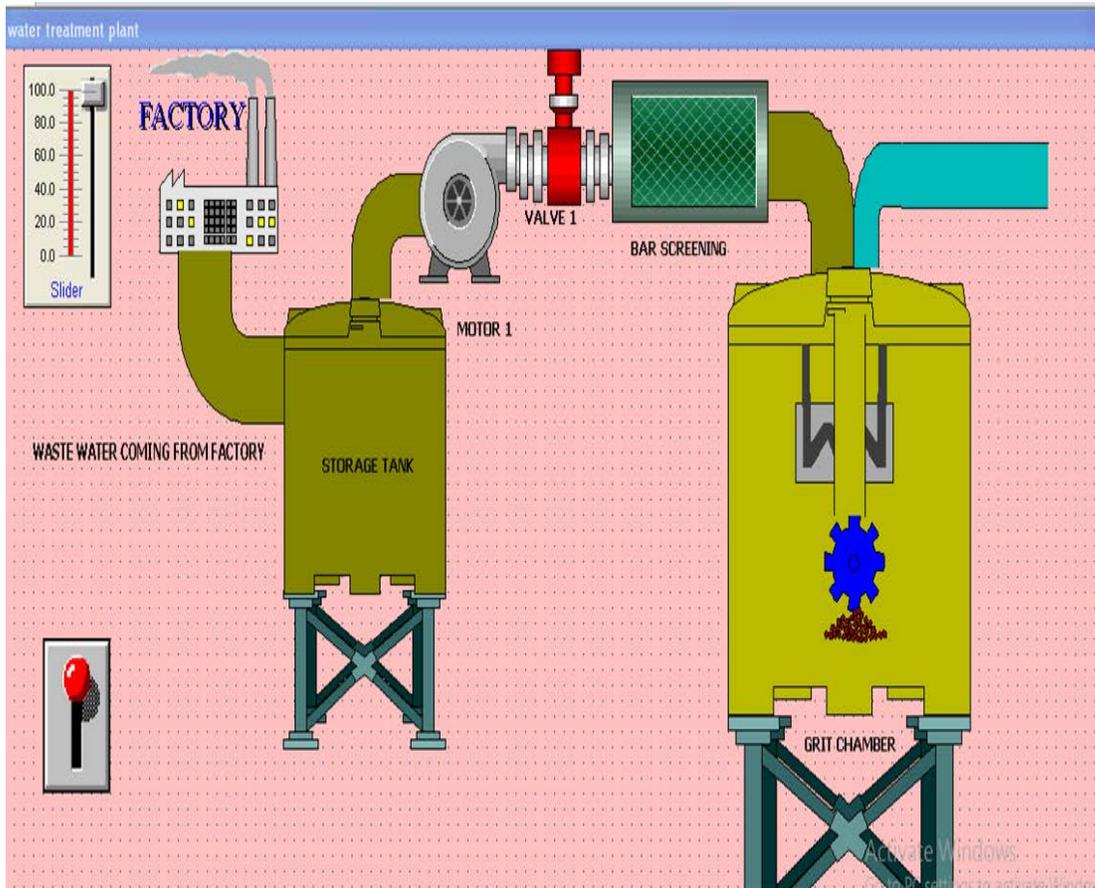
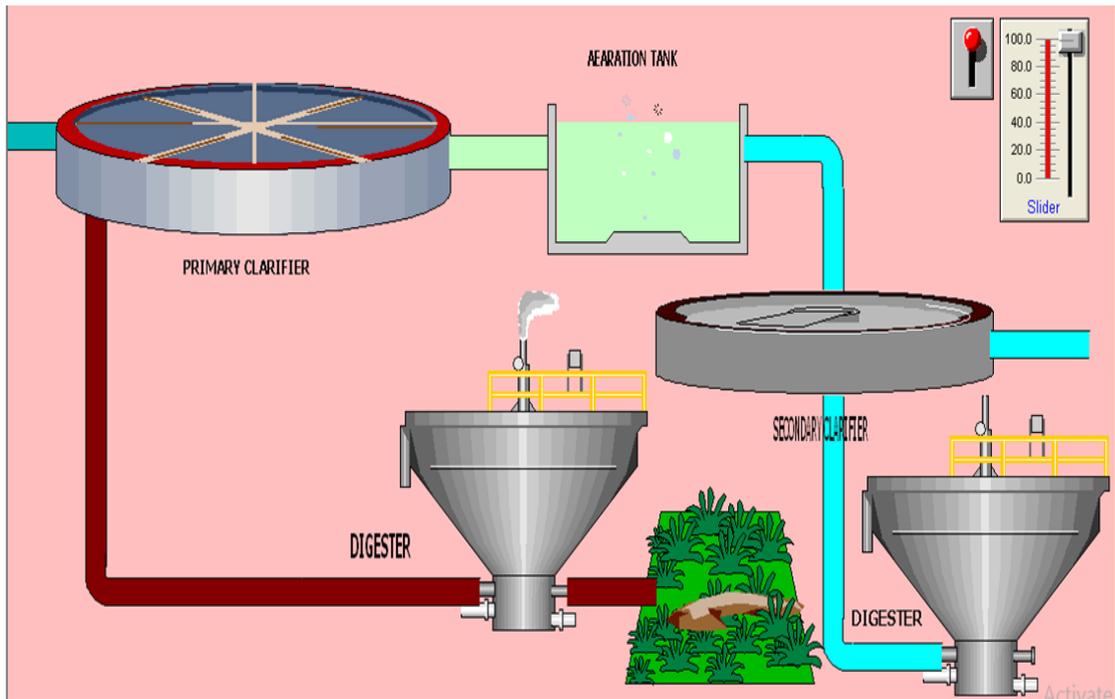**Figure 2: Storage of waste water and removal of waste particles (screenshot)**
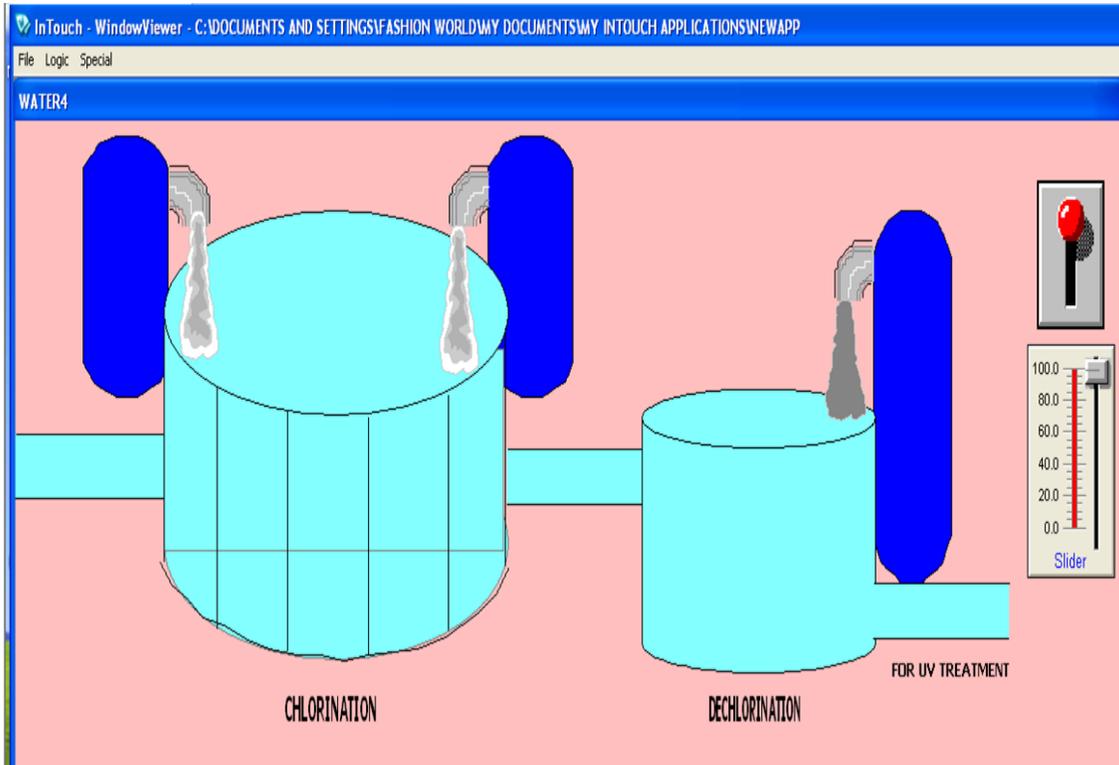

Figure 3: Primary and secondary treatment (screenshot)
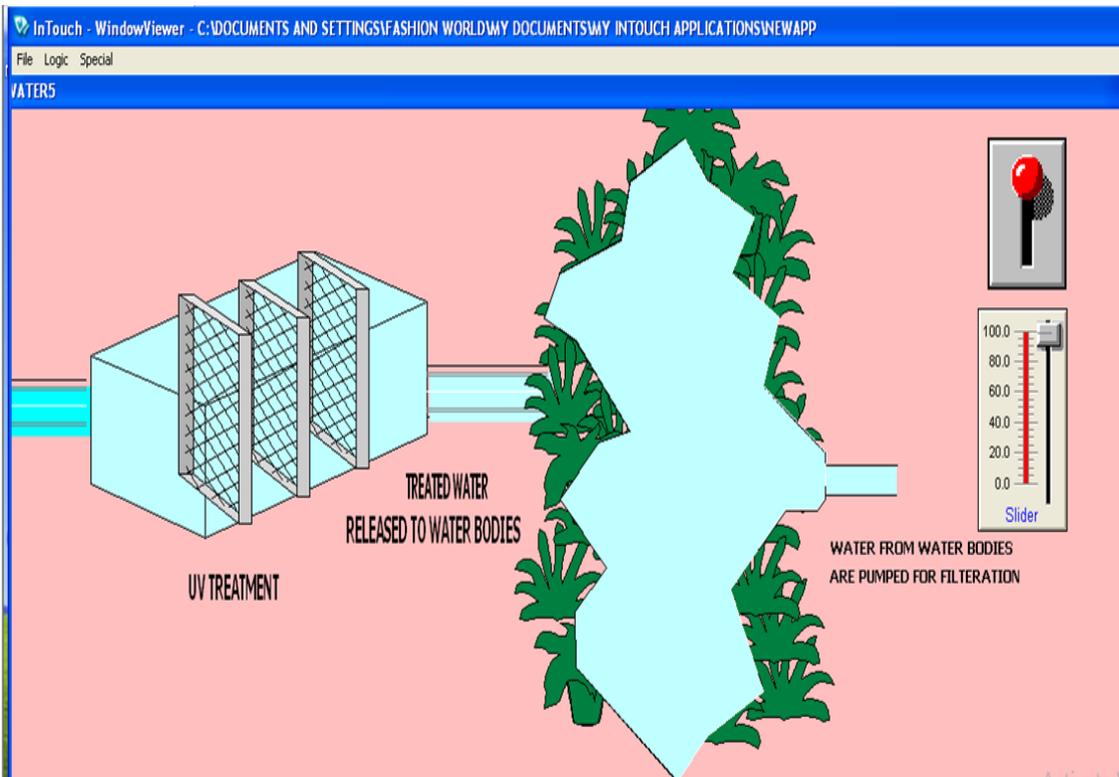
Figure 4: Chemical treatment (screenshot)

Figure 5: UV treated water is sinked to the water bodies (screenshot)

Benefits of SCADA System

• Monitoring of Pressure, Fluid level, Flow rate, Leakage, filtration time, chemical Dose concentration or any other parameter on PC/Laptop/Mobile Phone.
• Energy Conservation can be effectively managed through scada system
• The efficient water pumping is done without wasting energy.
• The data logging function provides accessing past records of the system operation.
• The automated control of the system reduces the manpower requirement.
• The automated system gives the efficient and effective use of the chemicals for the process.
• The integration of the different sections of the WWTM system makes the system reliable and efficient improved control over the process.
• Reduced errors because of the less human interference.

Conclusion

The above system is manually treated before which makes it unreliable and there is also a considerable difference between action and reaction. Making the system automatic and designing done in the SCADA makes the monitoring and controlling easier .As in the critical state where manual operation can be quite slower and require personal attention can be effectively done. All the monitoring and controlling is done with computer so this require less man power and has improved the overall cost

Future Scope

• This project can be implemented practically when SCADA is connected with PLC. More enhanced features can be added up to it. For e.g. Reverse Osmosis purification system can be added.
• The project based on sewage can be extended to water purification systems, oil refinery systems in industries.
• The project can also be extended to packaged drinking water industries where water is first purified, then filled into bottles, capped, labelled and then sold in bottles.

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