An Automatic Effluent Treatment Plant For Coir Industry

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***Abstract*—Water is basic necessity of life used for many purposes, the major one of which is industrial use. Industries generally take water from rivers, lakes and other resources but they have to pay heavy taxes for that. So it's necessary for them to recycle it in order to reduce cost and also conserve it. This proposed work focus on a coir industry where an enormous amount of water is used as a source and equally waste water comes out as drain. Main objective of this paper is to clean coir industry effluent and recycle it for further use. From the waste water the sluggish and other unwanted dust can be removed with the help of suitable water treatment process along with water recycling may help us to manage our vital water resources. This proposed system adopted with automation techniques can be achieved using PLC.**

Keywords—PLC Micro 830, Control Valve etc.,

I. INTRODUCTION

Numerous countries and districts everywhere throughout the world are confronting dangers of extreme water shortages or hardship of the water condition coming about because of issues, for example, hot-headed populace development, rising expectations for everyday comforts conveyed about by monetary advancement and developing utilization of modern water. Almost all industrial processes produce some form of pollute water. Throughout the years the solicitation for high caliber, greater effectiveness and computerized machines has enhanced in the mechanical part of water treatment plants. However, with growing urban population, altering lifestyles and industrialization the quality of contaminated water has worsened over the years and hence requires action before it can be reprocessed for any purpose.

The present framework is utilized for the mechanization is building computerization framework. A building administration framework or building computerization framework is a PC situated control framework set up in structures to control and screen the structure's electrical and mechanical hardware, for example: power frameworks, air circulation, brightening, security and fire frameworks, contaminated water treatment framework and water flood alert framework. Building administration frameworks are most generally connected in substantial activities with wide mechanical, HVAC, electrical and sanitation frameworks.

This framework purposes at computerization in this manner both microcontroller and Programmable Logic Controller can be utilized to accomplish. The microcontroller must be modified by utilizing programming dialects like C or Basics for which software engineer ought to be very much prepared in that particular dialect. Microcontroller additionally can't function as an individual controller. Subsequently relating them two, found that there are a greater number of advantages of PLC than microcontroller. PLC micro830 on a long run, it works intensely and its consistency is high. This framework presents specialized message of computerization industry which characterizes the specialized issues of mechanization control framework in operation development, refining administration level and high adequacy process in water treatment framework. There are various fields where the water treatment is required with the goal that it can be utilized for a few procedures other than mechanical procedures. There are positively more than 50 ecological acts, which must be followed by commercial ventures. The legislature of India has set it up obligatory for all commercial enterprises to amuse the water and reuse it for other modern procedure. In the water treatment plant various procedures require to be controlled and checked every now and again. Along these lines it gets to be dull occupation to handle the plant physically.

II. SURVEY

This section deals with the survey on several types of automation on waste water treatment technique. For the purpose of case study, a small scale coir industry has been chosen.

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Fig 1: Water used for smoothening the Coir fibres

The following observations are made during the industrial visit.

- As the part of the process, smoothening the coir is one of the important process in this industry.
- For the purpose of smoothening the coir large amount of water been used. It as shown in fig 1.
- This same water is reusing again and again, due to this process water gets highly polluted. This is shown in fig 2 and 3.
- This polluted water is very harmful, which causes illness and skin disease to workers and this water produces foul smell thus causing environmental pollution.

To overcome this problem, water has to be purified before subsequent uses. For the purification waste water treatment process is necessary and to achieve desire results with the help of Programmable Logic Controller micro830 in this process.

By using PLC micro830 build up a mechanized persistent procedure model for treating the defiled water. This procedure seems to be simple but degree of mechanization is higher for legitimate operation of this model. PLC micro830 is control apparatus and procedures to lessen the need of human inclusion and mental necessity. The PLC micro830 is seems to be more exact, dependable and more proficient than other existing controllers. This process leads to achieve secured and sustainable living.

In 2010, gengenbach and Michael F reported on “Incentives in the water chain: Waste water treatment and reuse in developing countries”. In this paper the proper management of contaminated water and its reuse is crucial in order to reduce dangers and maintain a variety of benefits. The advantages of improvement in waste water organization are particularly high where effective contaminated water treatment is not in place and completely untreated waste water is recycled. This setting applies to many emerging countries. There is a need to study the trade-off between welfares and costs of the use of waste water to establish well-organized water management. Moreover, fruitful water management needs to take the individual inducement of stakeholders into account. In 2011, abudiand and zaidunNaji reported on “the effect of sand filter characteristics on removal efficiency of organic matter from grey water”. In this paper the major welfares of moderate gravel filtration are because of the microbiology of the channel. The microbiological open must be kept alive for the channel to be compelling. In a traditionalist moderate gravel filter, oxygen is supplied to the life forms through dissolved oxygen in the water. Thusly, they are planned to be worked continuously.

Fig 2: Reusing same water without purification

Fig 3: Using Contaminated Water

Fig 4: Coir industrial works in 2010

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III. METHODOLOGY

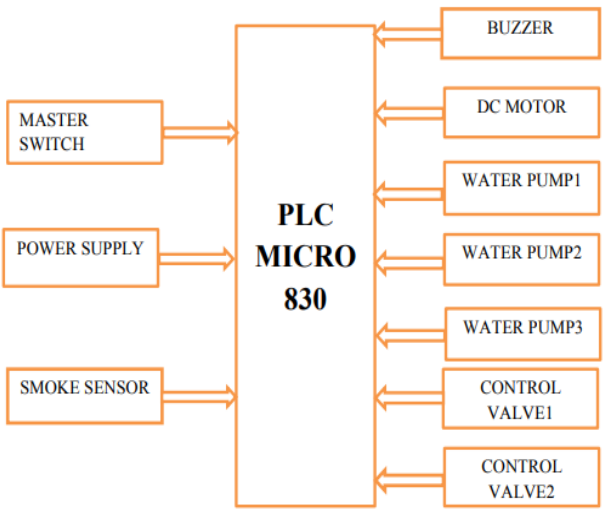

Fig 5: Block Diagram of Programmable Logic Controller based Waste water treatment system

Fig 5 delineates the basic diagram of the framework equipment. The proposed work incorporates inputs, yields, equipment and PLC. The information comprises of store tanks, control supply, smoke sensor and ace switch ON/OFF. The yield comprises of DC engines, control valves, water pumps and bell. The store tank comprising of the waste water to be dealt with. The water direct controlled by PLC, draws the water through a work to channel large scale molecule like sand, stones and so forth the following stage comprises of the channel film which channel minute or broke up molecule present in the water. Finally chlorination process will happens. The solenoid valves open and close as indicated by the controlling activity of PLC to permit the water treatment in various stages. send back the treated water to the little scale businesses, flat and furthermore can be reused for agricultural. This treated water is conveyed to the little scale ventures or condos in a steady progression for some predefined time span thus implanted clock works in this framework to do the procedure. Entire process for squander water treatment is keep on rehash.

A. Power Supply:

From power supply block The required power supply for different circuits has to be given. The entire system is operated with a mains 24V DC power supply. Further for interface PLC, sensor and motor drives etc.

B. Smoke Sensor:

Smoke sensor MQ7 identifies the nearness of carbon monoxide within air and its reads the output of the analogue voltage at fixations from 10 to 10,000 ppm. only one analogue input pin from PLC micro 830 required sensor's simple analogue voltage for the purpose of interface. The smoke sensor used here is MQ7. This MQ7 sensor is suitable for an wide range of applications and very reasonable.

C. Control Valve:

In this system 12V solenoid valve using as a control valve. A solenoid control valve working as a electromechanically. This 12V solenoid valve is controlled by an electric current through a solenoid valve. These are utilized to stop, discharge, measurements and circulate liquids. These valves give minimized configuration, safe and quick operating, great medium similarity of the materials utilized, long administration life, low control power and high unwavering quality.

D. DC-Motor:

A DC motor has being controlled by PLC micro 830. In this system using 5V DC motor. It will operate the stirrer. A DC motor's any class of electrical machines that proselytes direct current electrical force into mechanical force. A DC engine's velocity can be controlled over a wide range, utilizing either a changing the quality of current in its field windings or by variable supply voltage.

E. Water Pump:

This system uses a 6V DC water pump for pumping water into the tank when water level in the tank reduces to low level and turn off on filling of water to maximum level.

F. Programmable Logic Controller :

The programmable rationale controller is described as a modernized electronic device to execute limits and to store bearing, for instance, sequencing, basis, timing, math words to control machines, systems and numbering. PLC is used to control the progression of activity. In this structure PLC is controlling the information parameters like sensors, control supply and yield parameters like water pump, solenoid valves, DC engines. Programmable rationale controller i.e. the info or yield character resembles that of an electromagnetic pneumatic valve controller or hand-off. In the electronic memory the program will be put away. Regardless, the endeavor of a PLC have immediately expanded, Timer and counter limits, which can be executed in every way that really matters by any of the present PLCs. The PLC used as a piece of this system is micro830. Everything is apparently more correct, strong and more capable as a result of PLCs. The Programmable rationale controller delineated in the fig 6.

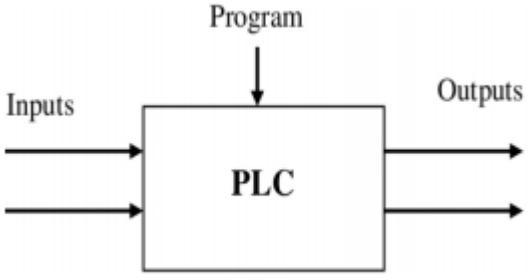

Fig 6: Programmable Logic Controller

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IV. HARDWARE & SOFTWARE DETAILS

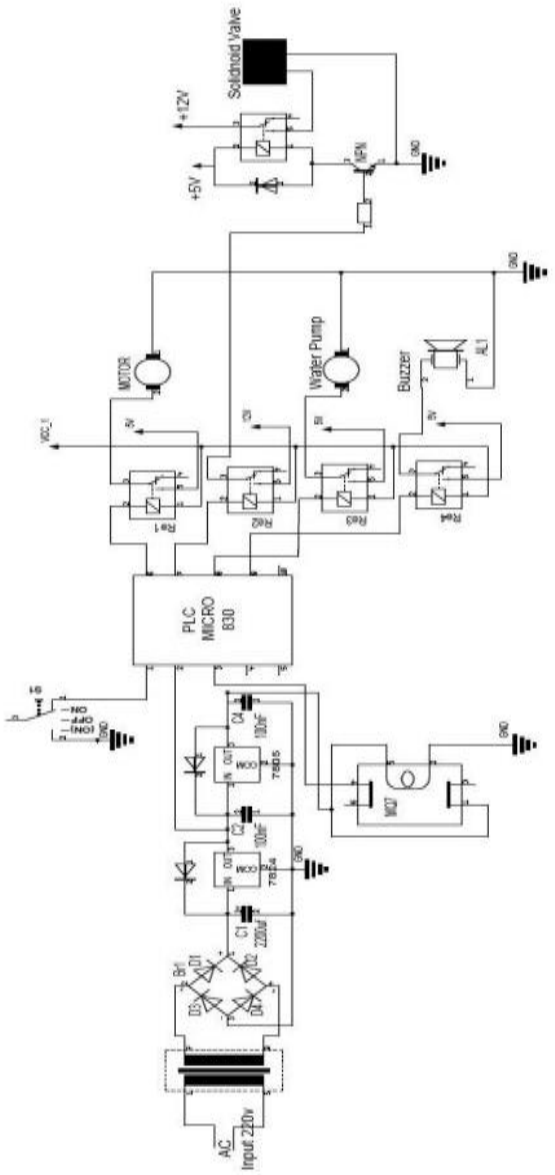

Fig 7: Main Circuit Diagram

The circuit graph comprises of fundamental parts, for example, smoke sensors, ace switch ON/OFF, control supply, water pumps, solenoid control valves, signal and DC engines alongside programmable rationale controller miniaturized scale 830 in which best in class PLC small scale 830 estimates the simple voltage from the information segments and creates advanced yield. The information put away in the programmable memory, so where facilitate investigation will occur in programmable memory of PLC. The PLC controller uses a stepping stool rationale approach to do its programmed controlling activity everything being equal. In the circuit chart fig 7 the ace switch ON/OFF is utilizing to controlling the entire procedure of the framework like begin the procedure and stop the procedure which is associated with the primary information terminal of PLC. The 24V DC control supply utilized for entire framework which is associated with second information terminal of PLC smaller scale 830. The relationship 5V smoke sensor MQ7 utilized as third info terminal of PLC, with the end goal of smoke identification and gives computerized 5V, the bell is utilizing as a yield part. The 12V solenoid control valves are utilizing as a sensor and actuator of the procedure, which is associated with yield terminal of PLC. The 5V DC engine is utilized to change over electric power into mechanical power and it is given to the yield terminal of the PLC. The 5V water pump which going about as sponsor which will support the stream of fluid through it. It is going about as a yield parameter of PLC.

A. Flowchart:

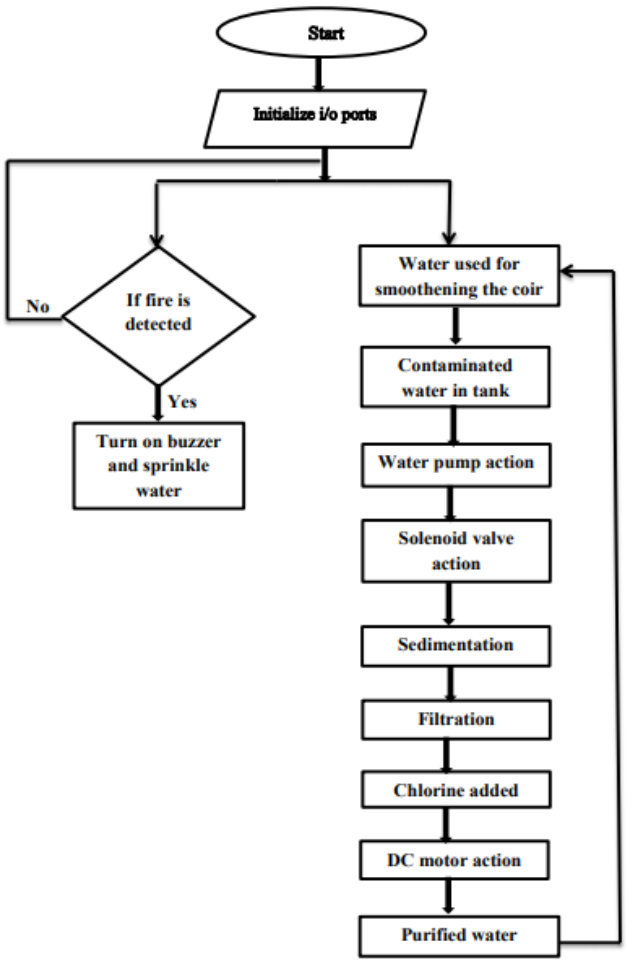

Fig 8: Flow Chart of the Proposed System

B. RS Logix-500

The ladder logic programming group which helps customer to amplify execution, spare endeavour progression time and upgrade effectiveness. This application is designed to work in windows operating system. RS Logix helps the program with DOS based programming packages for the SLC 500 and Micrologix group of processors, making code maintenance on equipment essentials convenient and straightforward.

V. RESULTS

The planned model shows the computerized wastewater treatment process and fire caution framework around the little scale industry by using Programmable rationale controller small scale 830 and 24V power supply. The composed framework primarily incorporates the repository compartment and capacity holder, pumps, solenoid valve,

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DC engine in which sedimentation, filtration and chlorination process occur. The PLC set up relies upon which gadget using as a piece of the strategy. Toward the finish of methodology cleaned water go to the business. The step rationale program has and keeps on demonstrating the customary method for electrical requests of working. The stepping stool program speaks to the interconnection of field gadgets in a way that the turning ON or enactment, off one gadget will switch ON another gadget rendering to a prearranged request of occasions. The guidance by guidance Programmable rationale controller here executes the program. The earlier advance and legitimate activity is made Based on the program and the status of the info accomplished. The action might be establishment of particular yield and the results can be put off and put away in memory. The in view of the programming directions, a Programmable rationale controller takes contribution from sensors and certifiable gadget and controls this present reality yield gadgets. To compose programming guidelines the stepping stool rationale programs are utilized in Programmable rationale controllers.

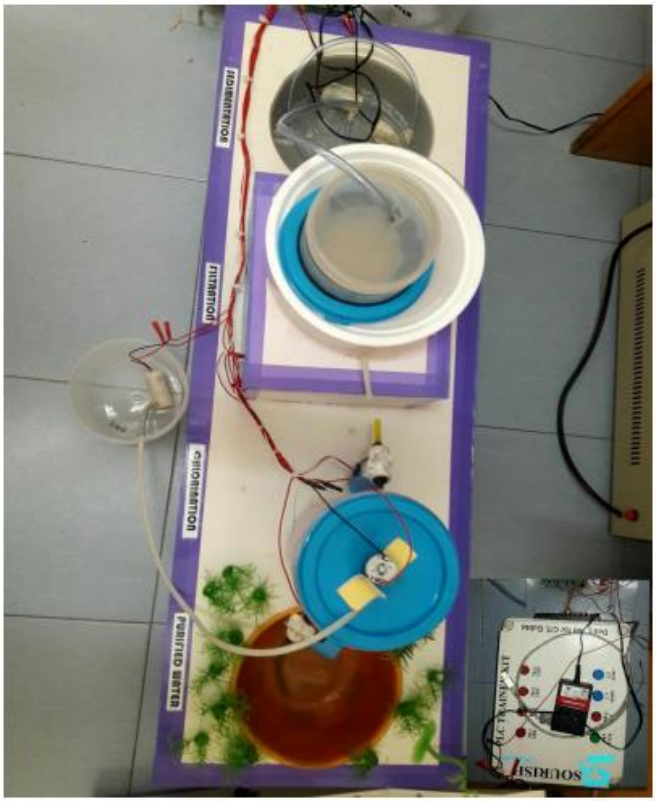

Fig 9: Snapshot of the Prototype Designed.

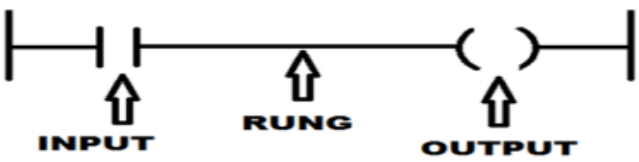

Fig 10: Simple Ladder Logic Representation

VI. Conclusion & FutureScope

A. *Conclusion:*

As, water is a standout amongst the most fundamental characteristic assets and the essential need of human life, protection of water assets by the execution of strategies, for example, Reduce/Re-Use/Recycle is the need of hour. And furthermore as, accessibility of safe drinking water and water for the horticultural reasons for existing are progressively turning into the most difficult issue of our nation, water protection and use designs alongside coordinated comprehension of every one of these issues is above all required. The treatment of sullied water should be possible with this proposed work, this waste water treatment plant tidy up the little scale industry effluents. Thus, treated water can be reused for additionally utilize. Hence, cleansed water is reused and put away. It has extraordinary significance in little and huge scale enterprises and also in the public arena. Water is a standout amongst the most essential common asset and alsoone of the fundamental necessities of human life. Squander water treatment forms are extremely exact and great controlled. It is in fact demonstrated that any sort of poison water can be expelled utilizing the proposed framework.

B. *Future Scope:*

By knowing the procedure of PLC micro830 controller utilized in the proposed framework, it very well may be further produce for huge scale businesses, residencies or condo and furthermore to drink reason. Without these waste water treatment, not ready to get purged water for local employments. The control specialist can explore the method if any botches happens besides be checked what is happening amid the procedure of framework. For ongoing observing and controlling reason can be utilize SCADA framework. This PLC micro830 based robotization prompts a prevalent, pleasant life by lessening cost and upgrade the idea of human's life.

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