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AUTOMATIC RECYCLYING OF WASTE WATER IN INDUSTRIES

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***Abstract*— Water is the most important part of human being. This water need to be used in a suitable fashion to maintain the continuous availability for the human mankind. With this aim, the water utilization in the industries needs to be recycled to reuse it again and again. In this paper, the recycle process of waste water is developed and exclusively for the food industries. The developed process is well defined with the schematic diagram and flow chart.**

***Index Terms*— Recycle, Waste Water, Arduino, Water pump.**

I. INTRODUCTION

The total supply of freshwater on earth far exceeds human demand. Hydrologists estimated that if all the water available on the planet from oceans, lakes and rivers, the atmosphere, underground aquifers, and in glaciers and snow could be spread over the surface, the earth would be flooded to an overall depth of some three kilometers [1]. About 97 percent of this water is in the oceans, and out of the remaining three percent, only about one hundredth is the accessible freshwater that can be used for human demand. If this available water could be evenly distributed, still it is enough to support a population about ten times larger than today. The foremost use of water by humans is for the biological survival. However, water need for the biological survival is not the only issue being discussed in the world today. Because, apart from drinking, water is required also for household needs such as cooking, washing, and is vital for our development needs, such as for agriculture and industry [2].

Unfortunately, the available freshwater supplies are not evenly distributed in time and space. Historically, water management has focused on building dams, reservoirs, and diversion canals etc., to make available water wherever needed, and in whatever amount desired. Soaring demands due to rapidly expanding population, industrial expansion, and the need to expand irrigated agriculture, were met by ever larger dams and diversion projects. Dams, river diversions, and irrigation schemes affected both water quality and quantity.

Reuse of waste water for domestic, industrial and agricultural purposes has been occurring since historical times .However, planned reuse is gained importance only two or three decades ago, as the demands for water dramatically increased due to technological advancement, population growth, and urbanization, which put great stress on the natural water cycle. Reuse of waste water for water-demanding activities, which, so far consumed limited freshwater resources is, in effect, imitating the natural water through engineered processes. Several pioneering studies have provided the technological confidence for the safe reuse of reclaimed water for beneficial uses. While initial emphasis was mainly on reuse for agricultural and non-potable reuses, the recent tends prove that there direct reuse opportunities to application closer to the point of generation. There are also many project that have proved to be successful for indirect and direct potable reuse.

In industrialized countries, widespread shortage of water is caused due to contamination of ground and surface water by industrial effluents, and agricultural chemicals. In many developing countries, industrial pollution is less common; through they are severe near large urban centers [3].

1.1 Objective

To Develop the Waste Water Management system, against the existing manual technology and to reduce the wastage of Water, the recycling of this waste water is done for industrial applications. The other hand is to reduce the pollution of the water and also reduce the human efforts in industries for handling the waste water system.

1.2 Motivation

Reuse of wastewater can be a supplementary source to existing water sources, especially in arid/semi-arid climatic regions. Most large-scale reuse schemes are in Israel, South Africa, and arid areas of USA, where alternative sources of water are limited. Even in regions where rainfall is adequate, because of its spatial and temporal variability, water shortages are created. For example, India, Madhya Pradesh and Maharashtra are not dry areas, have limited options for water storage, and suffer from water shortages during dry spells. For this reason wastewater reuse schemes form an important supplement to the water resource of this region [4]. For the last three decades or so, the benefits of promoting

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wastewater reuse as a means of supplementing water resources and avoidance of environmental degradation have been recognized by national governments. The value of wastewater is becoming increasingly understood in arid and semi-arid countries and many countries are now looking forward to ways of improving and expanding wastewater reuse practices. Research scientists, aware of both benefits and hazards, are evaluating it as one of the options for future water demands [5].

II. SYSTEM DEVELOPMENT

A. *Power supply Unit*

The electric power is almost exclusively generated, transmitted and distributed in the form of alternating current as an economical proposition. However for many applications we require dc supply. Batteries cannot be used for the purpose as they are costly and require frequent replacement. Therefore, it is necessary to convert available ac supply into the required dc supply [6].

B. *Sensing circuitry*

The purpose of liquid float sensor is to open or close a circuit as the level of liquid rises or falls in the tank. A float sensor is a device used to detect the level of liquid within a tank. The switch may be used in a pump, an indicator, an alarm, or other devices. Magnetic float sensor is an electromagnetic ON/OFF switch. It helps to sense the level of water present in the overhead tank or sump. These sensors have a permanent magnet in the float [7]. The Switch is present in the white stem of the sensor. As the float rises or falls with level of water in the tank, the switch gets activated by the magnet in the float, thereby the signal which is obtained from the sensors is used along with the water level controllers for controlling the motor pump.

C. *Arduino UNO controller*

Arduino is an 8 bit microcontroller. We are using Arduino Uno Atmega 328 because it is heart of Uno version. With the help of Arduino, we control all the components. It takes input from different sensors and control solenoid valve and motor [8].

D. *Solenoid valve*

Solenoid valve is an electromechanically actuated valve. Solenoid valves are used to control the flow of liquids or gases in a positive fully-closed or fully open mode. This valve commonly used to replace a manual valve. The valve is controlled by an electric current through a solenoid. Solenoid valves are also characterized by how they operate. A small solenoid can generate a limited force. If that force is sufficient to open and close the valve, then a direct acting solenoid valve is possible [9].

E. *Relay driver circuit*

The relay takes advantage of the fact that when electricity flows through a coil, it becomes an electromagnet. The electromagnetic coil attracts a steel plate, which is attached to a switch. So the switch's motion (ON and OFF) is controlled by the current flowing to the coil, or not, respectively. A very useful feature of a relay is that it can be used to electrically isolate different parts of a circuit. It will allow a low voltage circuit (e.g. 5V DC) to switch the power in a high voltage circuit (e.g. 100 V AC or more).The relay operates mechanically, so it cannot operate at high speed [10].

F. *DC motor*

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields [11]. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

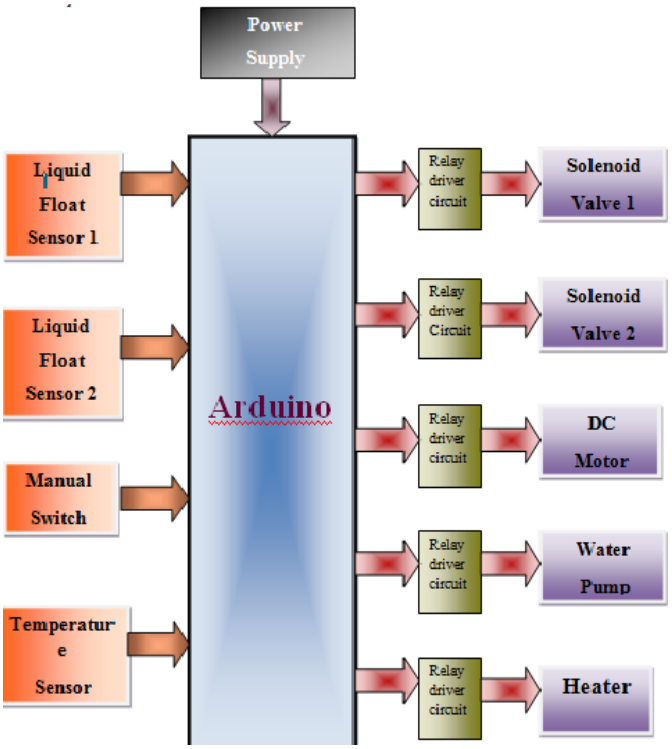

Fig. 1 System Block Diagram

G. *Induction Pump*

A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps [12].

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III. RECYCLING PROCESS

In this project, one tank is used for collecting the waste water with the help of motor. This tank is divided in two levels and at each level we connect float sensors for detecting the water level. There are three solenoid valves are used, one is connected at the bottom of the tank and second one is connected to second level of the tank. Second tank is used for collecting water from first tank. The 3rd solenoid valve is connected at the bottom of second tank One float sensor is connected at bottom of second tank for detecting the water level. In second tank, the heater is placed for heating water.

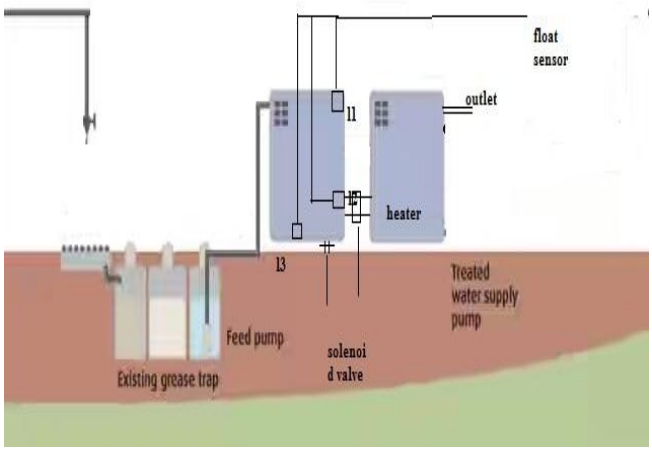

Fig. 2 Illustration of the process

When switch is on, microcontroller starts the 1st motor for collecting water in first tank. When 1st level float sensor detects water level i.e. tank is full then microcontroller will switch off the 1st motor and starts the second DC motor is used to stir the alum in water. Alum is used to clarify water by neutralizing the electric double layer very fine suspended particles, allowing them to flocculate (stick together), after the flocculation, the particles will be large enough to settle and can be removed. After some time delay, we get 80% pure water and this water will be collected in 2nd tank by activating 1st solenoid valve. When water level goes below solenoid valve, then output of second level float sensor goes low and microcontroller will switch off 1st solenoid valve and switch on the 2nd solenoid valve which is connected at bottom for the waste water which can't be purify. At the end when total waste water is discharged, then microcontroller switches off 2nd solenoid valve.

At the same time, microcontroller switches ON the heater. Here we use a temperature sensor LM35 for monitoring the temperature of water. When temperature of water reaches at 60 degree Celsius then microcontroller stops the heater. By this method we remove some kind of bacteria. After some delay microcontroller switch ON 3rd solenoid valve and this purified water is used for industry. When output of the water level float sensor goes low, i.e. total tank is empty then microcontroller automatically starts the 1st motor for collecting water in first tank and process will be continued.

IV. FLOW CHART

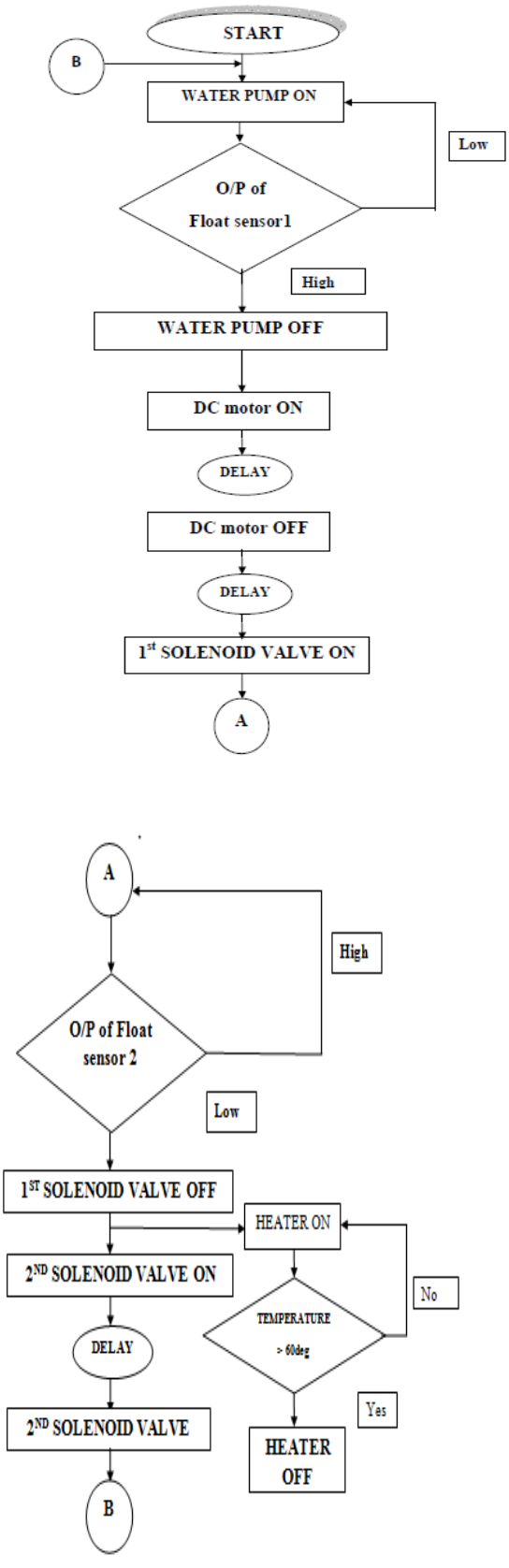

Fig. 3 System Block Diagram

V. CONCLUSION

In this paper we create a system which can recycle the waste water to a particular level of purity so as to use that water for industrial applications. Thus this project and avoid Pollution. In this project, a simple and practically and automatically operative system is being developed. This is definitely helpful for the highly water based companies and industries.

VI. FUTURE SCOPE

Improve performance: The task of researchers is to rapidly improve existing wastewater processes and systems. This involves work on improving the effectiveness and the costs of biological treatment, developing global management solutions for wastewater systems, preserving the natural environment and fresh water resources and, lastly, managing sludge quantities, quality and processing [13].

Preempt the great changes**:** By 2020-2025, wastewater treatment plants will have become bio-refineries. They will use new, more intensive and more specific biological treatment processes to treat wastewater and recover it as reusable water, bio-energy and biomaterials.

Improved risk prevention: The adaptation of our plants to the foreseeable tightening of regulatory requirements and the commitment to improving their performance are also targeted by our research work [14]. We perform qualitative and quantitative assessments of the environmental and health impacts of our wastewater treatment activities, especially with regard to emerging pollutants and carbon footprints.

The different parameters of water can be measured like Turbidity, PH & Temperature for the betterment of the process and the society. [15]

The android based application can also be made for auto-controlling the above system [16].

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