

Aeration And Cleaning Of Lake Water Using Solar Energy

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Abstract— This research targets to fabricate aerator and lake cleaner, a floating boat model as automatic garbage collector to counter accumulation of garbage in the lake which has no flow effectively and efficiently. The method of implementation is design and construction. This approach consists of the identification of needs, analysis of the aspects required specifically, hardware and software engineering, developing, and testing. In this project the proposed concept is to replace the manual work in lake or lake cleaning by automated system. Now-a-days even though automation plays a integral role in all industrial functions in the acceptable disposal of sewages from industries and commercials are nevertheless a challenging task. To overcome this problem and to save human life we have implemented two applications in one machine. We designed our task to use this in environment friendly way to manipulate the disposal of wastages and to extend the dissolved oxygen level. Various dissolved gases and dissolved metals such as hydrogen sulfide, iron, and VOCs are removed.

Keywords—Dissolved oxygen, Garbage, Aerator, Automatic.

I. INTRODUCTION

Nowadays the major issue is caused by the pollution to mankind. Water pollution is normally due to the industrial development, populace expand and urban discharge into rivers and lakes of wastewater, increased or a great deal less treated. The garbage substances can clog water flow, induce the water emerge as dirty, smelly and regularly over waft so then effect floods. When such surroundings are occurred insects and bacteria starts breeding in this condition. This kind of filth contaminates surface waters and hence ecosystem is affected badly. It degrades quality of water which directly affects aquatic life, to avoid this aeration is necessary. Aeration is the system by way of which the location of contact between water and air is elevated both by means of natural techniques or with the aid of mechanical gadgets. Aeration brings air and water in shut contact through using exposing drops or skinny

sheets of water to the air or with the resource of introducing small bubbles of air (the smaller the bubble, the better) and pushing them upward by the use of water. The scrubbing method caused by means of the turbulence of aeration physically removes dissolved gases from water and permits them to escape into the surrounding air. Aeration can increase fish and different aquatic animal habitat, prevent fish-kills and enhance high quality of domestic and industrial water components and limit therapy cost.

Anil K Dwivedi [1]- Here agricultural outflow, industrial effluvia and sewage emission which are a number of sources of pollution and their possible outcome has been studied in bunch. Explanation of unique variety of non-coastal water with quite a few prescribed standards are given. Magnitude of range of elements and their plausible to pollute the water are intentionally clarified and pronounced in this paper. Finally, the degradation of water quality and their consequences on water existence are been established as a water pollution influence in nutshell. Dr.Akash Landge, et al [2]- The principal goal of the project is to reduce the man power, time consumption for cleaning the river. In this project we have automated the operation of river cleaning with assist of a motor and chain force arrangements. Here the usage of RF transmitter and receiver are to manipulate the cleansing machine. Automation can be achieved via computers, hydraulics, pneumatic, robotics etc. automation can be fulfilled of these sources, for low price automation pneumatic form in compulsive medium. Savita Dixit, et al [3]-This study is designed to verify the effectiveness of synthetic aeration cum ozonizer unit installed at Lower Lake, Bhopal for appraisal of water quality. Various physicochemical parameters like pH, DO, Biochemical OD, Chemical OD, nitrate, phosphate and bacteriological status have been studied to investigate the extent of deterioration in water quality of Lower lake. Mragank Sharma, et al [4]- chief feature of the automatic drainage device is to collect, transport,

as properly as dispose the solid waste in the waste bucket through the help of claws. Debris in sewage consists of bottles, polythene bags, etc. These debris in water can block the drainage system. Ganesh UL, et al[5]- The Drainage system cleaner is a machine which helps to defend the environment from extraordinary sorts of environmental dangers via the promotion waste management by using the elimination of debris from the drainage system. These wastes when no longer removed end up settling in residential places where these wastes are burnt there by causing local weather alternate in any other case flooding is caused via blockage of waste in sewages. The focus is to pursue aeration and cleanliness on surface water in the lake. In lakes the flow of water is not running that is the water is always still. Due to the human activities the garbage is poured in the lake and this filth is saturated which drops the quality of water and there is decrease in aquatic plants and animals. To prevent this degradation of water life and water quality there was a need of fabricating such a machine that can achieve both the purpose of aeration and surface water cleaning with minimum components and fabricating into small scale machine. The machine will generate its own power by means of solar energy to operate its function. Therefore the machine will be independent rather than depending upon different kind of non-renewable energy. This machine is created by considering the nature it will be environment friendly.

II. EXPERIMENTAL DETAILS

The main function of our project is to collect trash and unwanted weeds from the lake and improve the quality of water, so for that, a tilting conveyer is designed with a 70 degree and two impellers are on both side of the machine to agitate the water. The conveyer consists of chain sprocket mechanism mounted on shaft. On chain sprocket ‘L’ shaped flappers are mounted to take the trash inside boat. A PMDC gear motor is used for rotating the conveyer. Motor is powered by 12V battery and battery is charged with solar panel to make whole equipment eco-friendly. In this system we are combining both factors such as aeration and cleaning of water. The whole system will be operated via remote controller. The solar panel used for conversion of solar energy into electrical energy produces maximum power output of 20W and voltage is 10v. Dimensions of the panel are 48.5x30 cm.

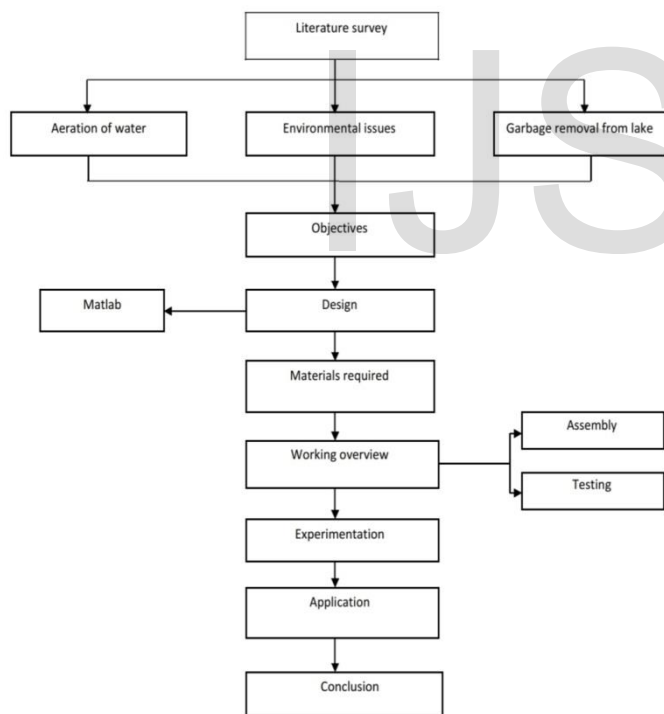


Fig. Basic Methodology

Sr No.	Part Name	Material	Quantity
1	Net	Nylon	1
2	Sprocket	MS	4
3	Chain	MS	2
4	Pedestal Bearing P-204	(Std)	4
5	Shaft	MS	4
6	Dc Motor	Std	3
7	Stud	Std	2
8	Solar Panel 3 Watt	Std	2
9	Battery 12V, 7Amp	Std	1
10	PVC pipe for Boat	PVC	7 m
11	MS Sheet	MS	1 Sqm

12	Circuit For Remote Control	-	1
13	Impeller	MS	2

Fig. List of Components

III. FABRICATION OF MODEL

Fabrication is done into various stages. At initial stage the conveyer frame was made using mild steel sheet metal of 16 gauge i.e. 1.29 mm thickness. It was precisely cut by Shearing machine. Holes were drilled for inserting shafts. The frame was bended into the rectangular form by Hand press machine. The sheet metal is bend into 'L' shaped flappers, so that the waste can congest on flappers.

The flappers are welded on thin metal bar which is attached through welding on chain. Sprocket chain mechanism is used as a conveyer bed to clog waste into the bin. This is powered by motor which runs at 15 rpm. Floating frame is made up of PVC pipes of diameter 100 mm. 4 elbows are used to get it into curved rectangular form. This rectangular frame is 1200 mm × 800 mm of frame area. Additional 2 PVC pipes are installed inside the frame for better floating, having length of 915 mm and one below the conveyer frame of same length. With mild steel 2 impellers are made. Its circumferential diameter of 350 mm is achieved by cutting it meticulously by Roller machine. Impellers will be adjacent to the frame and will be responsible for the back and forth as well as side movements and shall also act as aerator Impellers have their own independent motors. Impeller and motor are connected with V belt pulleys to transmit power between both shafts. Motor have power of 30 W and runs at 100 rpm, this is connected to pulley via shaft having 75 mm diameter. Another pulley of 50mm diameter is mounted on impeller shaft and are bind by V belt to motor shaft pulley. The battery which is power house of this system is of 12 V, 7 Amp. It will be charged by solar panel.

IV. RESULTS AND CONCLUSIONS

Solar based aeration and cleaning machine is easy, effective, economical and environment friendly system to tackle the global crisis of the drainage cleaning. It has many advantages over present day technologies to clean spilled water. It can effectively clean and increase the dissolved oxygen level of water. The machine can run on solar energy that there is no need of power supply. Hence human efforts are reduced and hence collecting garbage can get faster and efficient response. The hazardous effects of plastic inorganic are thus effectively reduced. Hence, Solar based aeration and cleaning machine promises to be an important tool against global crisis of pollution.

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