

Automatic Solar Operated Lake Cleaning Floating Machine

Arvind Kumar*, VasanthaKumar, Manjunath Ichchangi, Imran Mokashi, D Dritha Kumar, Dinakara M S, Prashanth Kutinha

*Department of Mechanical Engineering, Bearys Institute of Technology, Mangalore, Karnataka, India

ABSTRACT

This paper is focus on design and fabrication of Automatic solar operated lake cleaning floating machine. This project basically concentrated to clean the lake. Based on the current problem in the lake, we designed and fabricated a floating machine. Our project is remotely operated lake cleaning machine, aim to be preventing human accident and minimize error during the operation. Also, in order to minimize the emission, we used electric energy as an energy resource for our project.

Keywords : Lake Cleaning, Unmanned, Eco-Friendly, Garbage

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I. INTRODUCTION

Lake pollution is a major issue in India. Over a thousand of aquatic animals and plants are affecting by pollution. Lake is major source of fresh water for human beings, plants and animals. By executing the plan and based on the implementation, we found problem that are occurs in river and lake in India^[1]. We get an idea about a remote-control system from this paper, where the sewage cleaning machine is remotely operated. In order to diminish the spreading of diseases to human. It moreover progresses the rack of life and tangible quality nourishment items. Within the proposed systems, the machine is working with inaccessible control to clean the sewage. Consequently, this framework maintains a strategic distance from the impacts from the sewage waste^[2]. Utilizing methods would be efficiently Because it frequently covers an expansive domain of exercises and joined with

credibility to getting influenced by distinctive afflictions from the diverse type of microorganisms display within the sewage whereas cleaning with human contact^[3]. This venture is a programmed oceanic vehicle that can be remotely worked for cleaning the water bodies. By utilizing Robots, but we are making it by inaccessible control without using the robot, hence making within affordable price^[4]. The extent is centered on the plan of an electric driven vehicle that can recover control using solar vitality innovation. In this project they implemented solar power has energy to drive the vehicle^[5].

By investigating a few of the journal papers, we came across the thought to develop our venture. The automatic solar operated floating machine is utilized to clean the squanders, Plastics and other squander flotsam and jetsam from the lake for the clean water asset. Nowadays, IC engine is used to clean the lakes. But in IC engine will emit a lot of pollutant particles

for the environment, due this IC engine are more toxic to the environment. So we designed a solar operated floating machine, in order to reduce the pollution. In this project, we used a solar panel that will convert solar energy into electrical energy. Also, our project is remotely operated and fully automated (up to 100 seconds), it will prevent human accident error during the operation.

II. OBJECTIVE

To design and fabricate Automatic solar operated lake cleaning floating machine. To reduce pollution which is being thrown from human beings to lake. To reduce the human effort and time consumption in collecting garbage from the lake. To make an eco-friendly and economically reliable machine.

III. METHOD

Methodology is a project planning procedure in which all the project's major and minor processes, whether logical or creative manufacturing application steps, are systematically defined. Methodology is one of the most important aspects of project planning, as it considers all conceivable factors and their impacts on the project's outcome for the most efficient and effective project management.

The following is a list of the methods or practices used in this study:

A. Literature Review

The journal papers were evaluated in order to understand and study the most recent developments in the field of waste management and garbage collection in lakes. A literature review survey can assist us in gaining a basic overview of the overall activity in our specific field. It also aids us in implementing more advanced work in our research.

B. Designing

In this method we have designed our project which is "Automatic solar operated lake cleaning floating machine" by using solid edge software to know the

actual dimensions of the machine. The design made on software will be useful in the fabrication part where we will know exact idea how the project will look like. Design also important for the assembly part of the project where we need to connect the working part.

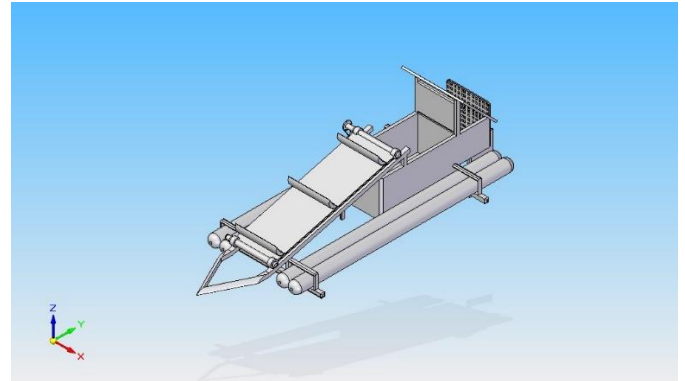


Fig 3.1: Isometric view of Automatic solar operated lake cleaning floating machine

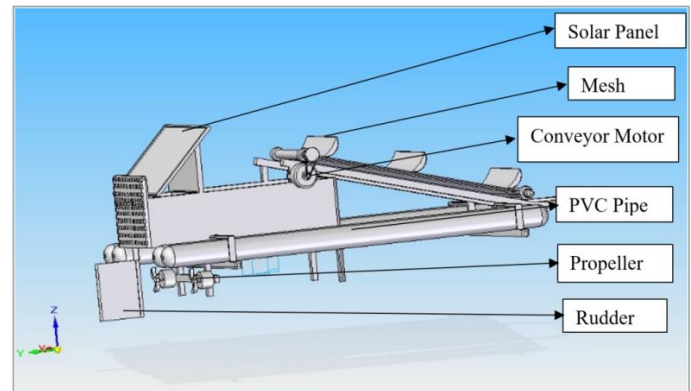


Fig 3.2: 3D Model of the project

TABLE 1. DESIGN CHARACTERISTICS OF SOLAR OPERATED UNMANNED LAKE CLEANING MACHINE

COMPONENTS	SPECIFICATIONS
Battery type	Lead acid
Battery specification	6v, 5ah
Battery connection for controller	series
Battery connection for conveyor	parallel
Object detector	Arduino UNO, ultrasonic sensor and GSM SIM 900a.
Propeller motor	DC 10000 RPM 12V
Conveyor motor	DC 800 RPM
Solar Panel type	Polycrystalline

SolarPanel specification	12v, 20 Watt
Bearing	2 bolt flange bearing
Mesh	Stainless steel
Chassis	Mild Steel
Controller	HH707K
Directioncontrol motor	DC 12V Gear motor
Conveyor Belt type	Incline Rubber net Conveyor
Propeller	Plastic material
Propeller dimension	6 inch
Machine dimension	52 x 36 x 26 inches

Battery

We used 4 Rechargeable 6v 5amp lead acid battery two are connected in series arrangement and other two connected in parallel. Each battery carries a weight of 0.73kg. Lead acid battery are economical,in order to reduce the cost we used this.



Fig 3.3: Rechargeable lead acid battery

Propeller Motor

We used 12volt DC motor with 10000 rpm for propeller to move the machine.we required only high RPM motor .low torque will not affect movement of the machine .the propeller is attached to the motor shaft.



Fig 3.5:Propeller



Fig 3.4:DC

12volt 10000

RPM motor

Conveyor

Conveyor are used to lift the garbage's present in the water. We used rubber net conveyor, it will give more friction compared to belt conveyor and also stable compared to the chain conveyor. It's 1.2 metre length and width, 0.34 metre. Also used mesh to support the conveyor to take garbage's.



Fig 3.6: Mesh



Fig 3.7:Rubber Net

Conveyor motor and chain sprocket arrangement

12 V DC motor is used for conveyor system. In which motor and rotating shaft are connected by chain and sprocket arrangement. The specification of DC motor is 800rpm and torque is 6kgcm.



Fig 3.8:12 volt DC motor



Fig 3.9: Chain sprocket arrangement

PVC pipe

PVC pipe are used for floating the machine. We used four pipes of 4 feet and 4 inchdia.it will give stability in the water for floating the machine. Theentire weight will distribute to this four pipe.



Fig 3.10: PVC Pipe

Solar panel

A Solar panel 12V,20Watt is used for our project. Type of the solar panel is polycrystalline solar panel is connected to the battery.it is helpful to recharge the battery.



Fig 3.11:Solar panel

Obstacle Detection Circuit

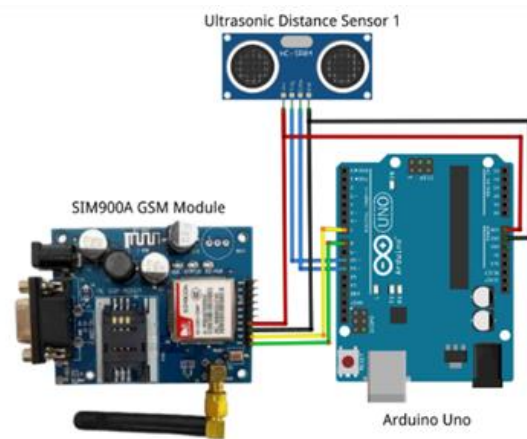


Fig 3.12:Obstacle Detection Circuit

It is a combination circuit the ultrasonic sensor used will detect the obstacles and send message to the receiver or mobile

Hardware RequirementsObstacle Detection Circuit

1. Arduino UNO
2. UltraSonic sensor HC-SR04
- 3.GSM SIM 900a Modem
4. Jumper Wire

Website

To make public aware of lake cleaning by creating website and to publishing lake cleaned data on the website. If any queries, they can contact with us after going to contact page.

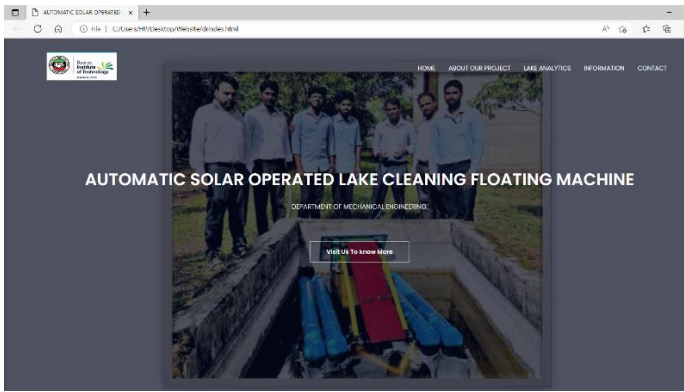


Fig 3.13: Home page of website

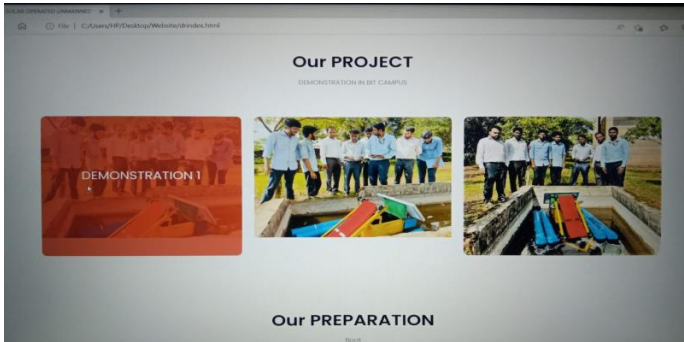


Fig 3.14: Home page of website and project demonstration page

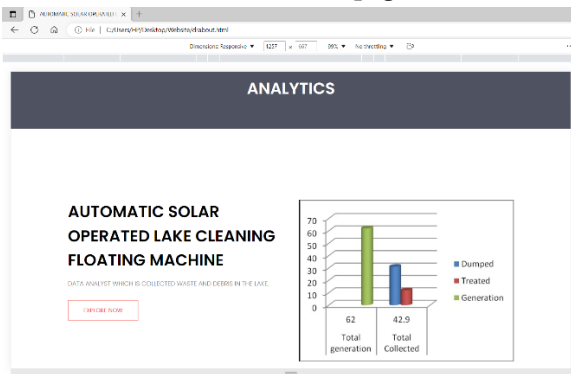


Fig 3.15: Analytics page

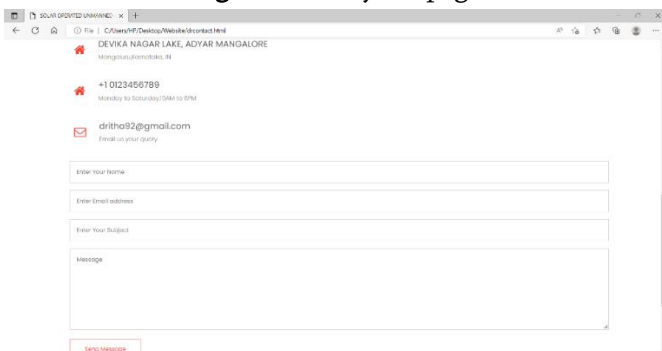


Fig 3.16: Contact page

C. Fabrication

For project to be accomplished and model to be created fabrication part plays very vital part in our project. Fabrication is the continuous process carried out in

order to create something. Basically, fabrication involves welding, Joining and assembling the parts based on the design of our project "Automaticsolar operated lake cleaning floating machine".



Fig 3.17: Isometric view of Automaticsolar operated lake cleaning floating machine.

D. Final Result

Final goal of our project fabrication work has successfully been completed. We have successfully conducted the test of our project and met required objectives.

E. Advantages

- As it is cleaning the lake it's make sure that it's eco-friendly and protecting living organism from danger.
- As our project is remotely controlled it reduces human error, Risk of life and Accidents during the operation.

F. Disadvantage

- There is still some disadvantage such as weight balance of the system as we used mild steel it will apply more weight on the pipes. Also, when wind hit the machine, there will be less stability.

IV. CONCLUSION

The design and fabrication of "Automatic solar operated lake cleaning floating machine" was built. We successfully completed the project. The project is environmentally friendly, reduced human effort and also reduce human error. The overall cost is high, but can be reduced with changes in material used. Low maintenance required.

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