

Design and Analysis of River Water Cleaning Machine

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Abstract: This project emphasis on Design and Analysis of the River Water Cleaning Machine. The work has done looking at the current situation of our national rivers which are dump with crore litters of sewage and loaded with pollutants, toxic materials, debris etc. The government of India has taken charge to clean rivers and invest huge capital in many river cleaning projects like “Namami Gange”, “Narmada Bachao” and many major and medium projects in various cities like Ahmadabad, Varanasi etc. By taking this into consideration, this machine has designed to clean river water surface.

Nowadays almost all the manufacturing process is being atomized in order to deliver the products at a faster rate. Automation plays an important role in mass production. In this project we have fabricated the remote operated river cleaning machine. The main aim 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 help of a motor and chain drive arrangement. Some needs of automation are described below. Here using RF transmitter and receiver are to control the cleaning machine. Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics form an attractive medium for low cost automation.

Keywords: Motor, solar panel, Bluetooth circuit, Conveyor, Collector, relays.

I. INTRODUCTION

The Over two thirds of Earth's surface is covered by water; less than a third is taken up by land. As Earth's population continues to grow, people are putting ever-increasing pressure on the planet's water resources. In a sense, our oceans, rivers, and other inland waters are being "squeezed" by human activities so their quality is reduced. Poorer water quality means water pollution. This invention relates to skimmer boats, i.e., work boats for collecting and disposing of floating solid waste materials in harbors and waterways.

The invention is more specifically directed to highly maneuverable vessels equipped with means for picking up floating debris, means for storing the debris on the vessel, and means for discharging the debris from the vessel to a storage area, which may be ashore or which may be another vessel such as barge. Many work boats and vessels have been proposed for collection of floating solid waste and other debris. These may typically be formed as a catamaran-type hull, i.e., a pair of pontoons or sponsors, or as a monohull, with paddle wheel or screw driver propulsion, and an operator station. In one typical trash skimmer design, one or more hydraulically powered open mesh conveyors are positioned between the pontoons of a catamaran-type twin-hull vessel.

The problem of flooding and climate change has become outrageous because of its recent trends in our environment today. This has become a cause of major concern to the world, especially the developing countries.

Water running through a water drainage system mostly carries along waste materials most which are non-biodegradable which not only cause flooding but also climate change. Overflow of water drainage system occurs when there is a blockage of an end of the drainage system forcing the water to find its way elsewhere apart from the mapped out drainage system, therefore the running water spills over the horizontal height of the drainage systems spreading to regions alongside the drainage system, thereby causing problems such as pushing down of structures such as fences, water logging of farm lands and residential building, etc.

The impurities present in water can cause hazardous and disease. As long as the draining system is considered the function of the main drainage system is to collect, transport and dispose of the water through an outfall or outlet. Impurities in drainage water can be only like empty bottles, polythene bags, papers, etc. It's an Industrial Working Prototype of Entirely Solar Powered Water Cleaning Mechanism which Can auto collect floating garbage and solid waste from the water surface and collect it into its floating bin. It can be programmed, scaled up to any size and can operate remotely. The system is indigenous and efficient to tack river cleaning cause.

- a. It's reduces the human efforts.
- b. It's works fast than Man Power.

III.LITERATURE REVIEW

1] *Haller 2009; Lembi 2009* used “management techniques for plants” This technique was used for some specific floating derbies and plans as well.

There are limitations to the size of waste. And the development of the technique is under limiting stage.

No further development for this technique is mentioned.

2] *Y. Sharma; Dec (2011)* “universal reverence to water” have stated that, in many religions of the world water is used to celebrate the occasion which causes pollution of water. This is hazardous for aquatic lives and make the water unusual.

Due to which the concept of removing waste from water is arrived

3] *H. Larsen, N.H. Ipsen and L. Ulmgren* In many countries, one of the many reasons the major reason behind water pollution is use of fertilizers in agricultures.

To make the country pollution free the principle instead implemented is “best environmental practice”
The capability of people to make choice for corrective action implementation is mention.

4] *Ute S. Enderlein, ussRainer E. Enderlein and W. Peter William* stated that there should be strictly ban on the hazardous compound production as well as their imports which indirectly will help prohibiting the pollution in countries

The toxic compounds may directly attack on human as well as aquatic lives.
However some amount of compound is essential in water.

5] *S. Veenstra, G.J. Alaerts and M. Bijlsma* ICWE in the International Conference on Water and the Environment in the year January 1992, have stated that, in the newly industrializing cities economic growth is the very basic factor of consideration.

More attention on pollution carrying capacity of environment is preferred. Basic west water treatment plant transferred 1m of west water in to 1-2lit of concentrated sludge.

6] *Ganesh U L, et.al. [1]* Showed the usage of mechanical drainage cleaner to replace the manual work required for drainage cleaning system. Drainage pipes are very dirty. Sometimes it is harmful for human life while it is need for cleaning drainage system. To overcome this problem, they implemented mechanical semi-automatic drainage water cleaner To overcome this issue, the mechanical semi automatically operated drainage waste cleaner is made which makes water to flow effectively due to regular filtration of wastages.

II. COMPONENTS OF RIVER WATER CLEANING MACHINE

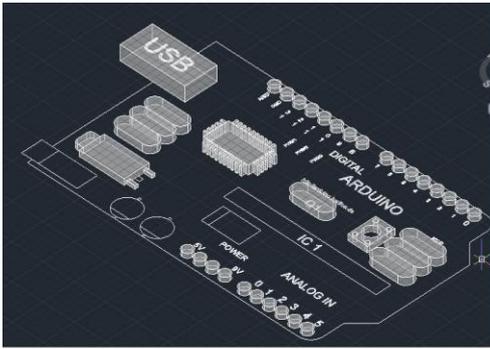
1. Arduino board
2. Bluetooth Model
3. Battery's
4. Solar Panel
5. Blucontrol Android APP
6. DC Motors
7. Conveyor Belt

1. ARDUINO BOARD

Features of Arduino

- Microcontroller: AT mega328.
- Operating Voltage: 5V.
- Input Voltage: 7-12V.
- Digital I/O Pins: 14 • Analog input pins: 6.
- DC current per I/O Pin: 40mA.
- DC current for 3.3V Pin: 50mA.
- Flash Memory: 32KB.
- SRAM: 2KB.
- EEPROM: 1KB.
- Clock Speed: 16MHz.

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 Nano farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.



Tech specifications

Microcontroller	ATmega328
Architecture	AVR
Operating Voltage	5 V
Flash Memory	32 KB of which 2 KB used by bootloader
SRAM	2 KB
Clock Speed	16 MHz
Analog IN Pins	8
EEPROM	1 KB
DC Current per I/O Pins	40 mA (I/O Pins)
Input Voltage	7-12 V
Digital I/O Pins	22 (6 of which are PWM)
PWM Output	6
Power Consumption	19 mA
PCB Size	18 45 mm

2.SOLAR PANEL

The 18V-5Watt solar panel is used in the machine.
 The solar panel is generating the 18V DC supply.
 Solar output is given to the DC Regulators.
 The DC Regulators is regulated the voltage and it is given to the Battery.

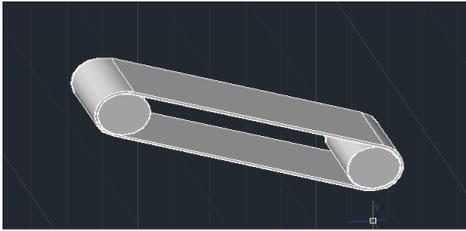


Material: Polycrystalline Silicon
 Max. output voltage : 7.2Volts
 Max. Power:3W
 Size:230x140mm

2. CONVEYOR BELT

In the River Water Cleaning Machine we have used the polyvinyl Conveyor Belt.
 The conveyor belt is controlled by the arduino system with using motor driver circuit.
 The conveyor collects all floating garbage from water

Surface and collects it into the dustbin.



Specifications of conveyor belt

1. Belt Capacity: 14 kg
2. Belt Speed: 5-35 ft/min
3. Belt Width: 10*60 mm
4. Belt Length: 457 mm
5. Roller Dia: 10mm

3. BATTERY

Selection of battery is based on criteria i.e Maintenance – Free Sealed Lead-acid Battery. In the machine we have used two battery 12V & 6V. (1.2Amp.)The 12V battery supply is given to the Regulator through Motor.

Battery Will charge on the solar energy or Battery Charge.

SPECIFICATIONS:

Voltage:	6 Volt
Capacity:	4.5 Ah
Type:	Sealed Lead Acid Battery
Length:	2.76"
Width:	1.85"
Height:	3.98"
Warranty:	1 Year
Rechargeable:	Yes

4. MOTORS

The Blucontrol android app it's send's the signal to the arduino system. The arduino system controls all the DC motors with using driver Ckt.

There are three DC motors used in the River Water Cleaning Machine. First motors are used to control the direction of machine. The Blucontrol android app it's send's the signal to the arduino system. The arduino system control the all DC motors with using driver Circuit.

Next motors are used to control CONYOR BELT

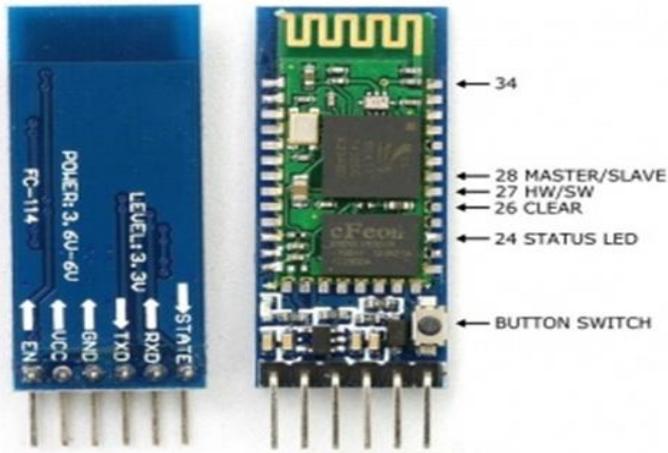


4. BLUCONTROL [ANDROID APPLICATION]

- Android is an open source operating system which means that any manufacturer can cause it in the phones for free of costs.
- It was buildable truly open.
- Android is built on the open Linux Kernel. Furthermore, it utilizes a custom JAVA virtual machine that was designed to optimize memory and hardware resources in a mobile environment.

Android Application on Mobile Phones

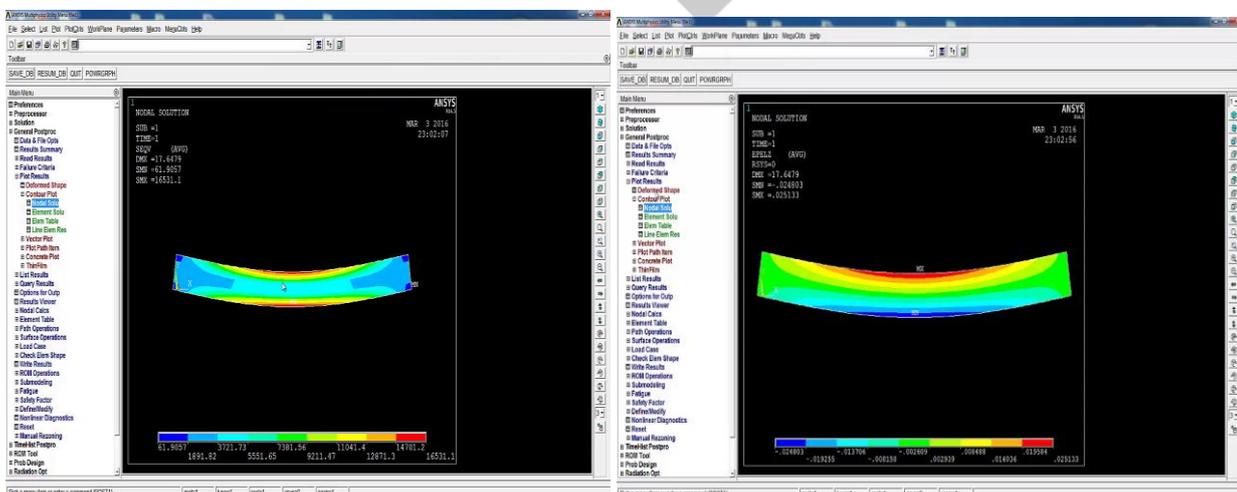
- An android app is meant for phones with an android Based operating systems. They can be downloaded from the Android app Market which is pre-loaded on every android phone.
- Blue control APP and Bluetooth SppAPP are some examples.



V.CONSTRUCTION OF RIVER WATER CLEANING MACHINE



ANALYSIS OF RIVER WATER CLEANING MACHINE:



For the min and max loading conditions, when solid debris are around 12 kg, the value of nodal displacement is 1.471 mm and for 14 kg of load, the value of nodal displacement is 1.954mm.

VI. ADVANTAGES AND APPLICATIONS

ADVANTAGES

- 1) It is a non-conventional river cleaning system.
- 2) It's initial & maintenance cost is low.
- 3) Skill Worker not required driving the system.
- 4) Environment friendly system.
- 5) Easy in operation.

APPLICATIONS

- 1) It is applicable to reduce water pollution in rivers & ponds.
- 2) It is useful to remove the sediments present in swimming pool to keep it clean.

VII. CONCLUSION

This project design and analysis of river water cleaning machine is fabricated on the basis of literature and research on different journal and paper relevantly available and fabricated in accordance so it can provide flexibility in operation. This innovation is easy and less costly and has lot of room to grow more economical. This project "River water Cleaning Machine" is designed with the hope that it is very much economical and helpful to river and Pond cleaning. On the basis of its design and estimating cost and availability it is very cheap and very useful for the society.

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