



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 6, June 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.542



9940 572 462



6381 907 438



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Automated River Cleaning Machine Using Arduino

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ABSTRACT: This system emphasizes on design and fabrication of the river waste cleaning machine. This work has been done looking at the current situation of our national rivers which are dumped with crores of liters 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 systems like “Namami Gange”, “Narmada Bachao” and many major and medium systems in various cities like Ahmadabad, Varanasi etc. By taking this into consideration, this machine is being designed to clean the river water surface. Nowadays almost all the manufacturing process is being automated in order to deliver the products at a faster rate. Automation plays an important role in mass production. In this system we have fabricated a self-operating river cleaning machine. The main aim of the system is to reduce the man power, time consumption for cleaning the river. In this system we have automated the operation of river cleaning with help of a motor and chain drive arrangement..

KEYWORDS: Image Processing, Arduino Uno ,River Cleaning, Conveyor.

I. INTRODUCTION

Lakes are an important feature of the Earth’s landscape. They are extremely valuable ecosystems and provide a range of goods and services to humankind. They are not only a significant source of precious water, but extend valuable habitats to plants and animals, moderate the hydrological extreme events (drought and floods), influence microclimate, enhance the aesthetic beauty of the landscape and offer many recreational opportunities. Lakes have a very special significance in India. Pollution: For the last two decades, there has been an explosive increase in the urban population without corresponding expansion of civic facilities such as adequate infrastructure for the disposal of waste. Hence, as more and more people are migrating to cities the urban civic services are becoming less adequate. As a result, almost all urban water bodies in India are suffering because of pollution and are used for disposing untreated local sewage and solid waste, and in many cases the water bodies have been ultimately turned into landfills. Although, there is a plethora of policies and acts for the protection and restoration of urban lakes and wetlands, urban waterbodies are in extremely poor condition. Their numbers are declining rapidly. For example, at the beginning of 1960s Bangalore had 262 lake, now only 10 hold water. Similarly, in 2001, 137 lakes were listed in Ahmadabad city, and over 65 were reported being already built over (Excreta Matters, 2012).

II. METHODOLOGY

A. Block Diagram

The figure shows the various parts of a River Roomba. First comes the camera which makes use of digital signal processing to detect the surroundings which is being depicted by blocks in the figure. Then the Arduino Uno which receives the input then transmits it ahead to convey it to the device. And finally, the device that is the River Roomba carries out the function that it is supposed to.

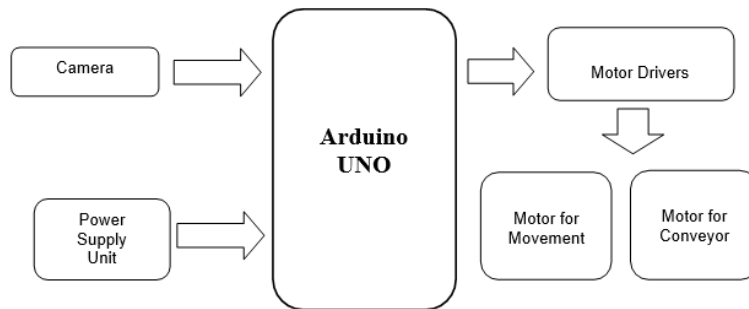


Figure 1- Block Diagram of System

The “River clean-up machine” is to be used in those places where there is waste debris in the water body which are to be removed. This machine consists of waterwheel driven conveyer mechanism which collects & removes the wastage, garbage & plastic wastage from water bodies. This also reduce the difficulties which we face when collection of debris take place. A machine will lift the waste surface debris from the water bodies, this will ultimately result in reduction of water pollution and lastly the aquatic animal's death due to these problems will be reduced. It consists of a Belt drive mechanism which lifts the debris from the water. The use of this system will be made in rivers, ponds, lakes and other water bodies to clean the surface water debris from bodies. Similarly, they are a lot of problems of water pollution under Godavari River, Nasik which affect the acoustic, human life & the beauty of Godavari River. Nowadays, even though automation plays a vital role in all industrial applications in the proper disposal of sewages from industries and sewage cleaning is still a challenging task.

B. Flowchart

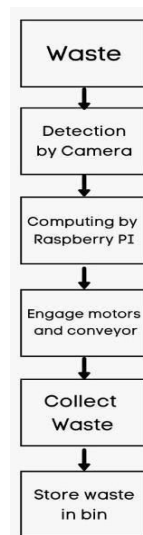


Figure 2- Flowchart

C. Design

C.1-Product Views

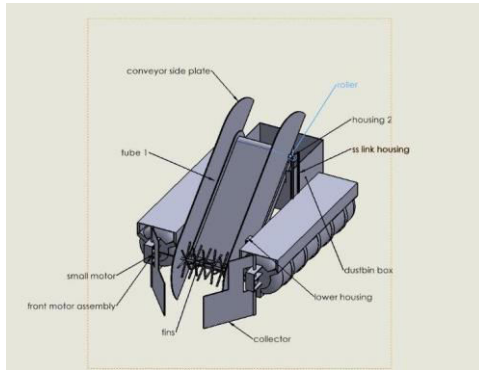


Figure-3-Main View

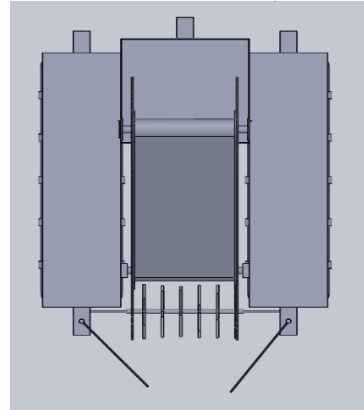


Figure-4-Top View

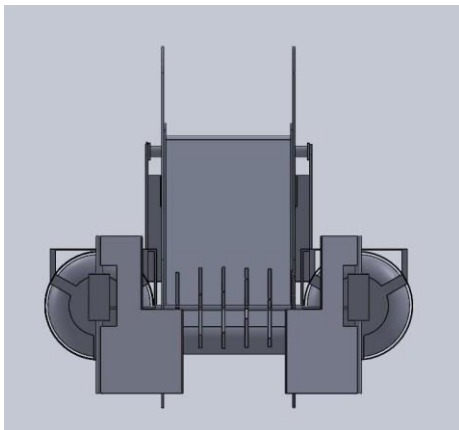


Figure-5-Front View

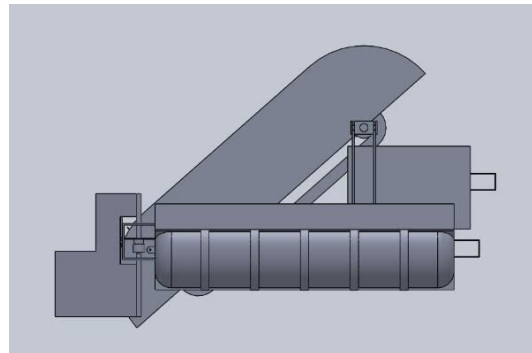


Figure-6-Side View

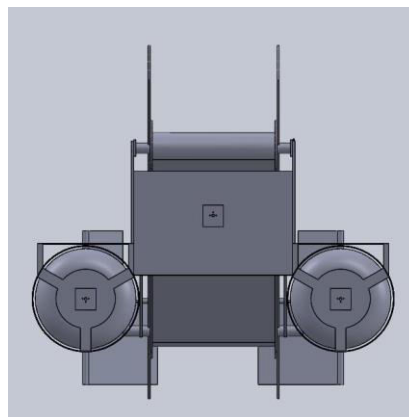


Figure-7-Behind View

C.2- Motor Design

Figure-8-Top View of Motor

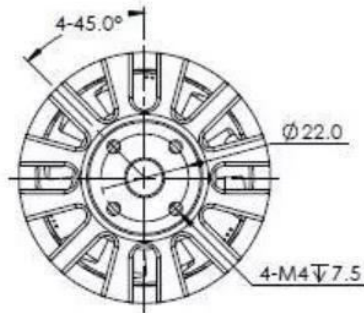


Figure-8-Top View of Motor

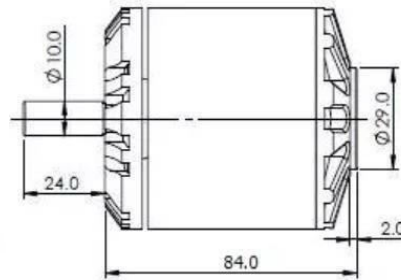


Figure-9- Side View of Motor

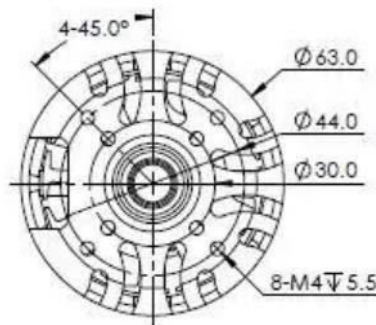


Figure-10- Bottom View of Motor

D. Specifications

D.1-Motor Specifications

- N6384 BLDC Motor
- Voltage: 48V
- No Load Current: 1.6A
- Max Load Current: 85A
- Output Power: 4KW
- Torque: 8 Nm
- Speed: 130 RPM/V
- Efficiency: 85 %
- Shaft Size: 10mm
- Dimensions: 63x84mm
- Weight: 1050g

D.2- Motor Features

- Waterproof
- Practical and Long-term usage
- Low Energy Consumption

E. Interfacing Diagram

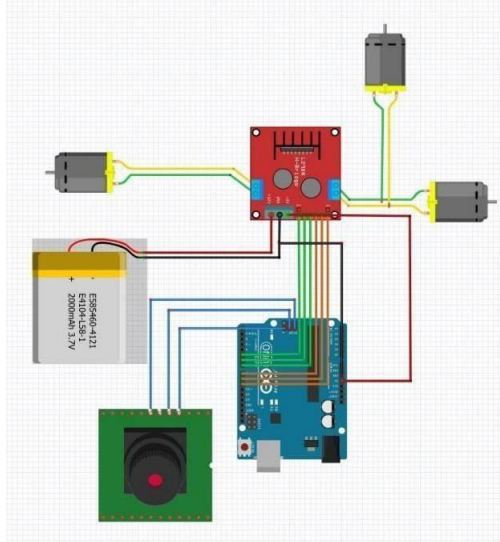


Figure-11-Interfacing Diagram

III. SIMULATION RESULTS

A. Proteus Simulation Results

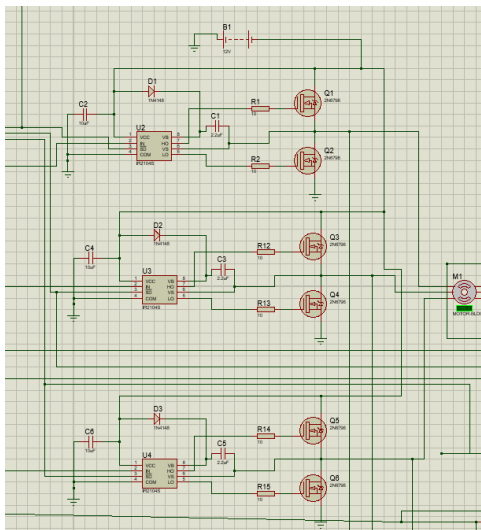


Figure-12-ESC with Motor

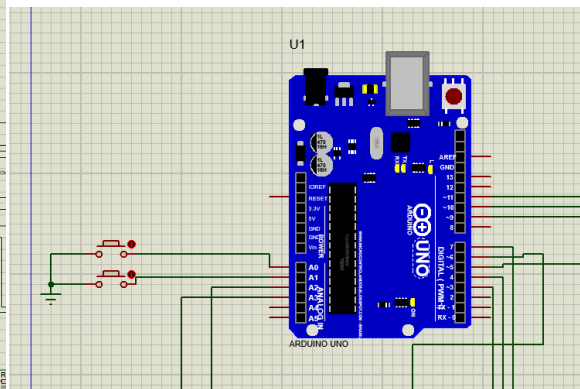


Figure-13-Arduino Connection

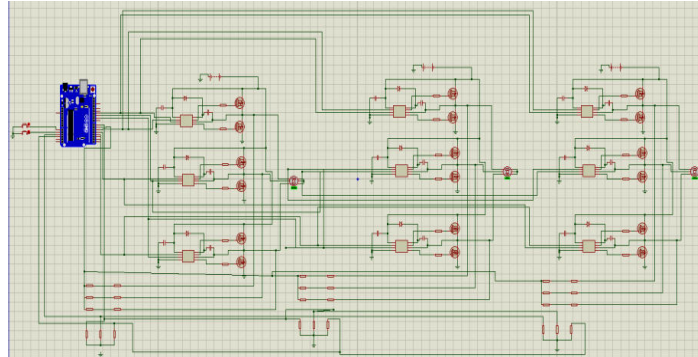


Figure-14-Complete Circuit Simulation

B. Stress Analysis using MATLAB

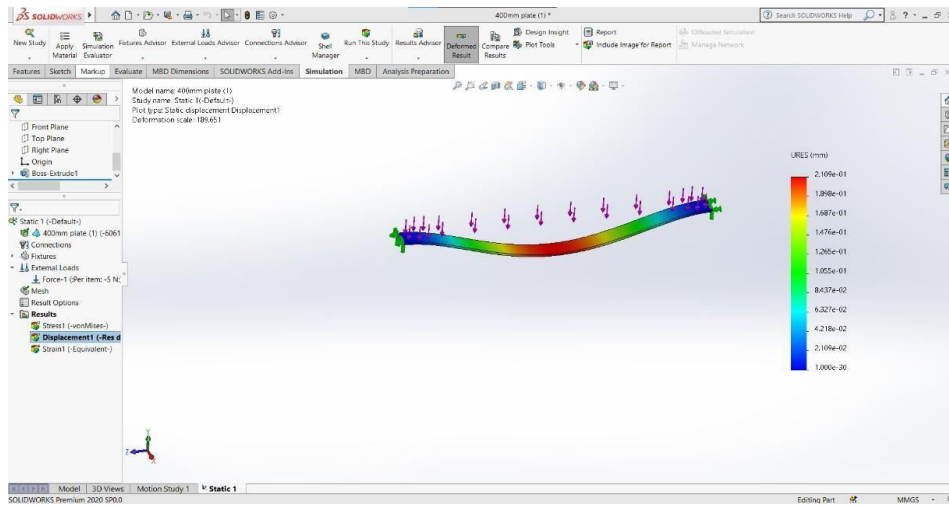


Figure-15- Displacement Analysis for The Support Plate

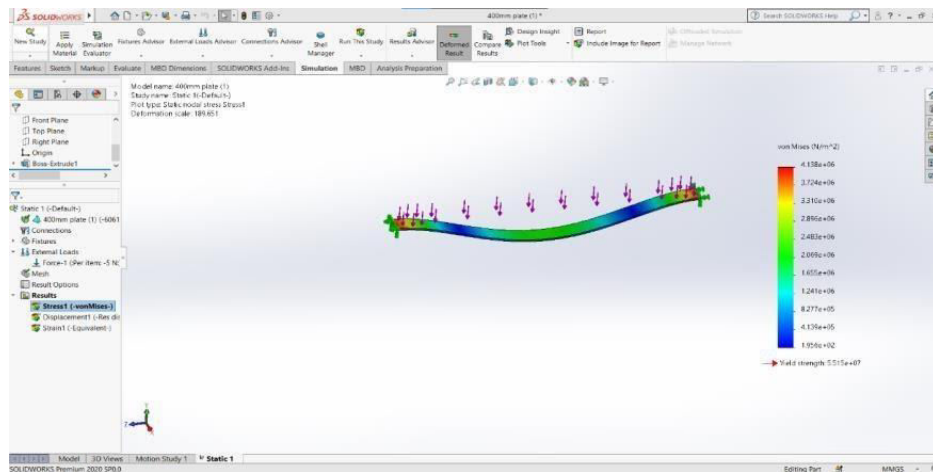


Figure 16. Stress Analysis for The Support Plate

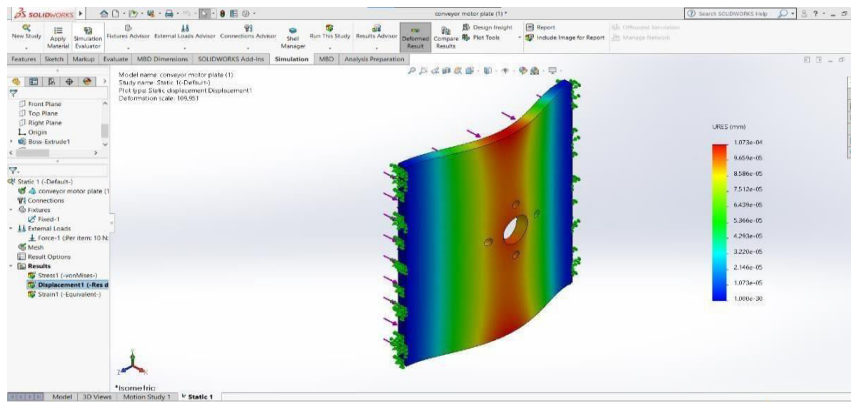


Figure 17. Displacement Analysis for The Conveyor Motor Mount Plate

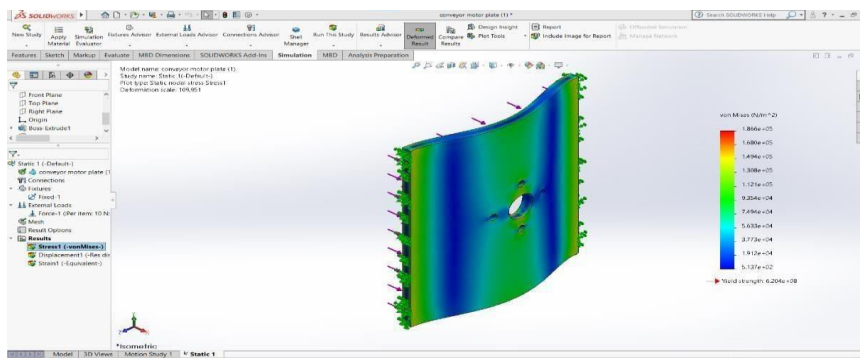


Figure 18. Stress Analysis for The Conveyor Motor Mount Plate

- The above figure shown is about the stress and displacement analysis of the particular parts at a specific force.
- The results show the deformation of the part at the given applied force , which give us the detailed analysis of the material strength and durability at that particular position

C.Image Processing

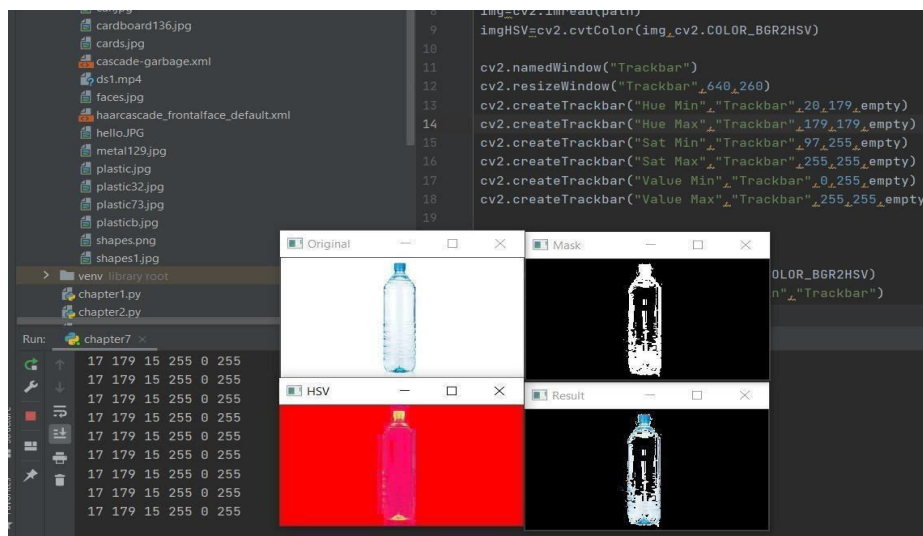


Figure 21. Image Processing of a Plastic Bottle

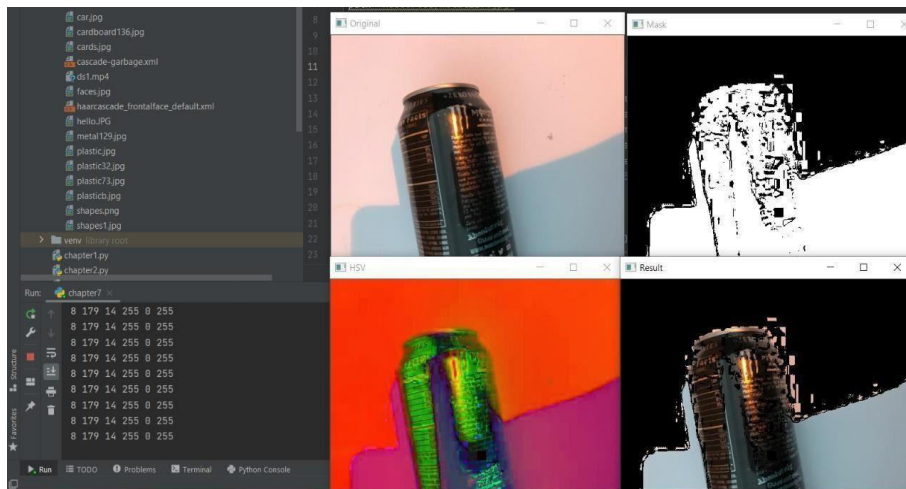


Figure 22. Image Processing of Metal Can

- The first dialogue box, shows the original image captured by the camera.
- The second dialogue box shows mask around the borders of the object. Making a mask around it, tracing the lines and borders of the object.
- The third dialogue box is the HSV image of our original image, HSV stands for hue, saturation and value. You could see beside the image there are certain numerical values being printed, those are the HSV values generated while processing the image for better detection.
- The final image is the result generated after all the processing which would be used as input for the brain of our project, since computing power is limited therefore the image has to be processed.

IV. CONCLUSION AND FUTURE WORK

This system Remote Operated River Cleaning Machine, “River Roomba” is designed with the hope that it is very much economical and helpful to river and Pond cleaning. On the basis of it design and estimating cost and availability it is very cheap and very useful for the society.

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