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CAD Modelling and Manufacturing of Cleaning Machine used for Waste Collection on Beach

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***Abstract:** As the difficulties faced in keeping the beaches clean manually, come up with device which not only gathers the waste (sticks, on degradable waste) but also separates, which is easy for waste removal. The waste is collected over conveyor blade along with the sand which falls of through the holes on the conveyor back to the sand bed; separation of waste takes place through Density difference. It consists of one hopper where the different waste gets collected which facilitates easy disposal of waste.*

***Keywords:** Beach cleaner, conveyor blade, density difference*

I. INTRODUCTION

For the purpose of cleaning the beach, some cleaning machine must be used in coastal area beaches so manufactured a cleaning machine which is helpful in cleaning the beaches. The motor is responsible for driving mechanism of conveyor. The strainer attached to the conveyor will collect the wastages from the surroundings and transferred to storage bucket through conveying belt.
With the continued expansion of industries, the problem of sewage water must be urgently resolved due to the increasing sewage problems from industries of the surrounding environment. The wastes produced from the industries are very harmful to human beings and to the environment. Second Important thing is waste management system by which worker can maintain all his health and work good through application maintain that reporting worker don't need to wait and get in to drainage. One more very useful and important advantage of machine is that the worker to replace the manual work in beach cleaning by semi mechanical beach cleaner.

II. METHODOLOGY

A. Problem Statement

To minimize the problem of wastage in river, lake, sea due to the plastic, electronic items, thermocol, metal etc. This causes huge amount of water pollution which effects on aquatic animals as well as human life. It is also used in small scale industries to remove the solid wastage from water with minimum cost.

B. Scope

1) To develop a New Automatic operated Machine of Beach Cleaning machine
2) This concept allows us to achieve our goal as well as better space management.

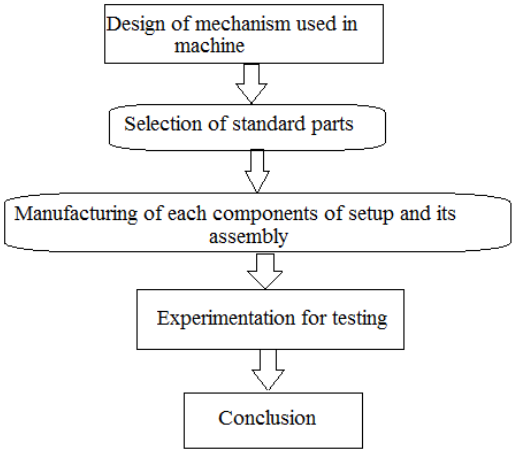

Figure 1: Methodology.

III. WORKING PRINCIPLE AND MODELING OF SETUP

The Beach cleaning machine is a mechanized way of driving the vehicle by remote control. A 12Volt battery energizes the motor. The turning, moving forward, backward, and strainer/conveyor is controlled by remote control. The motor drive is used to run the rear axle and front axle as individual motors are coupled with wheels which in turn drive the wheels. The extra one motor is also coupled to a gear drive, which in turn is coupled to a belt pulley drive. The belt drive is used to run the roller which carries the conveyor. The conveyor is provided with meshed bucket which rolls around and picks up the waste by digging the sand and filters the sand by raking principle while the machine is driven forward motion. The speed of conveyor is a function of the speed of the motor fitted. The waste material collected by the meshed bucket is dropped into the hopper placed next to the rear axle. The hopper has mesh of suitable size which facilitates easy separation of materials depending on sizes of materials.

The device is place across a beach and sea so that only beach sand can get through the lower basement. Floating waste like bottles, plastic cans, covers any kind of waste is lifted by lifters which are connected to the chain. The chain revolves with the sprocket wheel which is driven by the motor. The energy provided to the motor is electrical energy. When motor runs the chain starts to circulate making the lifter to lift up. The wastage material are lifted by lifter teeth and stored in collecting box. Once the collecting box is full, the waste materials are removed from the box. There is 45 to 50 degree bend plate which is assembled at the bottom of the box. It is mainly used to leveling the beach surface. The material which we are going to use is M/S Mid-Grade which is easily available in market with less cost compare to others.

The two rollers are connected apart from each other through belt drive on which perforated buckets are mounted through riveting joint. As system is allowed into drainage, the roller starts rotating the buckets will move inside the drainage which will goes up to material inside the drainage block. The bucket will pick up the wastage material and floating material from drain block. The bucket allow water to flow out as being perforated and only waste part will collected into storage collector behind the belt drive.

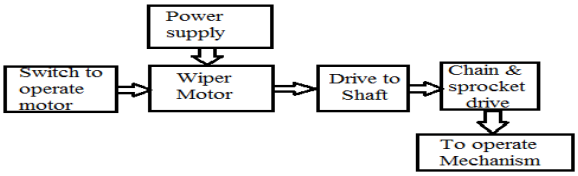

Figure 2: Flow of power & motion to run the mechanism of machine.

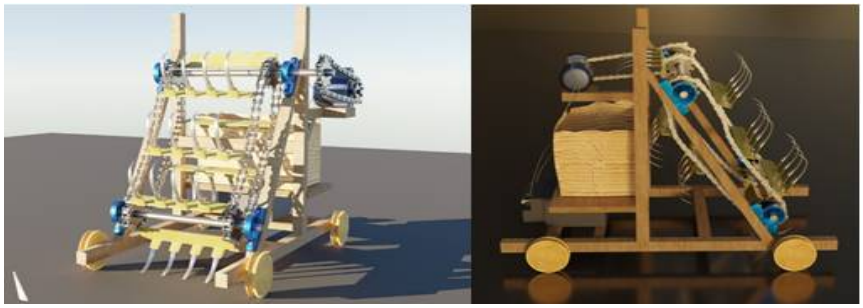

Figure 3: CAD model views of cleaning machine.

IV. MAIN COMPONENTS OF CLEANING MACHINE

1) *DC Motor:* A wiper motor is a DC motor with two permanent magnets that serves as a field for the motor, arranged around the armature where the power is connected to the commentator of the armature with two brushes, the armature is a set of electromagnetic coils that is each connected to its own two segments in the commentator so that the power is connected to only one coil at a time to generate a magnetic field in the armature, this field will oppose the field of the permanent magnet field, where the one field will push the other away and make the motor to turn. DC Wiper Motor of 12V 55Rpm is commonly used as wiper motor for cars, but it can also be used in the field vehicles and projects that require high power. The motor speed is 55rpm and because of the bearing used it has no problem with longer operation times. The motor has 6mm screw holes for mounting and its gear is designed to be on left side of the motor.
2) *Motor Driver:* Basically this means using this chip you can use DC motors and power supplies of up to 16 Volts, that some pretty big motors and the chip can supply a maximum current of 600 mA per channel.

3) *Battery:* Commonly available rechargeable alkaline battery is used for providing supply to the cleaning machine so that can be recharged and discharged for many more times. In this cleaning machine, 12 V and 7A current battery is used to provide the drive to shaft to run conveyor through chain drive
4) *Pedestal Bearing For Shaft:* A block usually refers to housing with an included anti-friction roller bearing. The housing is bolted to a foundation through the holes in the base. Bearing housings is used here of solid type having sealing arrangements may be provided to prevent dust and other contaminants from entering the housing.
5) *Chain Drive:* Chain drive is a way of transmitting mechanical power from one place to another. It is used to convey power to the wheels of a cleaning machine. Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. In this machine, spigot pin assembled through outer or inner link type chain is used.
6) *Frame:* It is used support whole parts of cleaning machine. It is made by using 1 ½ inch M.S rectangular pipes to sustain the load of components and garbage.
7) *Waste Collector:* It is used to collect the garbage over the beach. It has box like structure and is made of M.S. sheet of 2 mm thickness & of size 30 inch x 24 inch x 18 inch to handle approx.30 kg garbage.

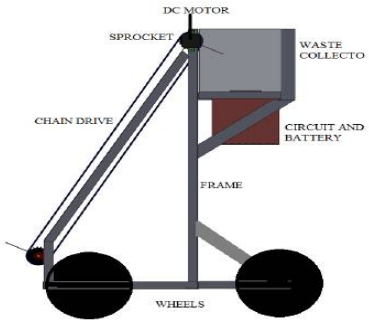

Figure 4: Components of cleaning machine.

V. CONCLUSIONS

Cleaning machine helps in cleaning the beaches with safety, effective & fast manner which would be earlier cleaned by manual workers and they are being affected by the hazardous garbage, and thereby saves the ocean life from pollution. The cost of this system is overall less. This machine works on a basic chain and sprocket system hence the maintenance will be very low and it can be used in a remote location. This machine works with wide range of operation like removing seaweed, dead fish, shells, wood, and virtually any unwanted debris. It can work on both wet and dry sand.

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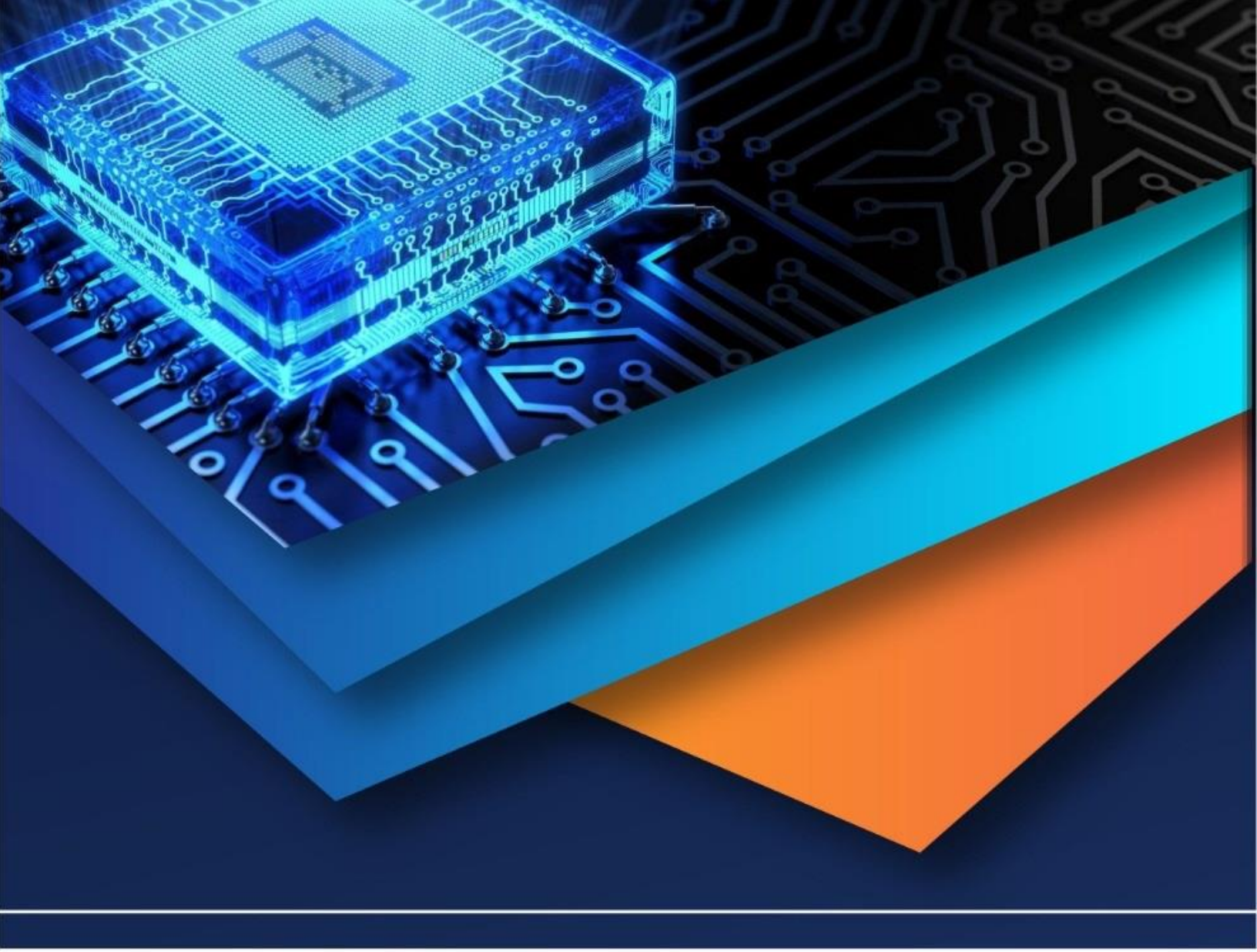

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