

WASTE EXTRACTOR IN COASTAL AREAS BY USING RF MODULE

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Abstract:

This paper proposed an innovative RF Controlled waste extractor Robot. Sanitation is crucial and perceptible when it comes to coastal areas of public places because huge number of people visits beaches and parks every day. This includes children and senior citizens too, which further increases the risk of spreading of diseases due to dirty environment and rotten garbage. RF Controlled Garbage Cleaners can be a big relief for this task of cleaning garbage from the places like beach. Two high performances, high efficiency electrical motor drives the vehicle chassis and one electrical motor drives the cleaning mechanism. Chain and socket-based system transmit the power from the electrical motors to the wheels. The system is driven by a microcontroller powered circuitry PCB. Another PCB consists of directional push buttons used to transmit directional commands through RF. The receiver circuit receives these commands and the microprocessor processes these commands to drive the motors as well as the lifter mechanism motor accordingly. The lifter mechanism consists of a chain sprocket arrangement to drive the garbage lifter. Collectively these three electrical motors can be wirelessly driven by a Radio Frequency based Remote control. Cleaning mechanism of this waste extractor is also equipped with a wire mesh, which separates the beach sand from the garbage.

Keywords — RF controlled waste extractor, Chain and socket-based system, PCB, electrical motors

I. INTRODUCTION

The process of beach cleaning requires good management methods, adequate human resources, and funds. Solid litters cleaning methods are very different than oil spill cleaning methods. The beach cleaning process may be done using machinery such as sand cleaning machines that rake or sift the sand or/and other chemicals such as oil dispersants. This beach cleaning may be done by Professionals Company, civic organizations, the military or volunteers such as the Great

Canadian Shoreline Clean-up and Marine Conservation Society. There are two types of beach cleaning, mechanical and manual. Mechanical beach cleaning consists of cleaning done by machines to rake and sieve the top layers of the sand at a much faster pace than manual cleaning. Mechanical beach cleaning additionally presents the possibility for organic material to be removed along with the man-made waste.

II. WORKING PRINCIPLE

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 etc. 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 is 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.

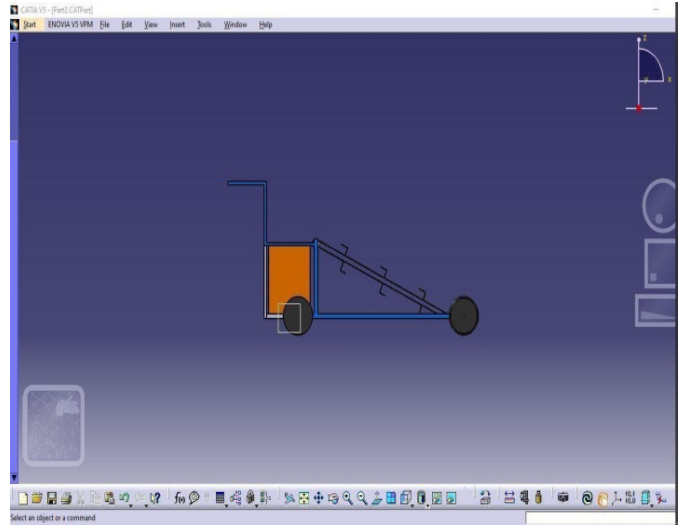


Fig 2: side view of robot model

B) Raw Material And Standard Material

A. Page Layout

Your paper must use a page size corresponding to A4 which is 210mm (8.27") wide and 297mm (11.69") long. The margins must be set as follows:

- Top = 19mm (0.75")
- Bottom = 43mm (1.69")
- Left = Right = 14.32mm (0.56")

Your paper must be in two column format with a space of 4.22mm (0.17") between columns.

Table 1: Specifications of a model

SR. NO	PART NAME	MAT	QTY	DECREPTION
1	Frame	Ms	1	C Section 750x 400x 600 Mm
2	Motor	Std	2	0.25 Hp 500 Rpm
3	Shaft	Ms	3	Dia 20mm X 350mm
4	Housing	Ms	2	Dia 95 Mm X 62 Mm
5	Bent Link	Ms	3	Dia 10 Mm X 240 Mm
6	Pulley	Ci	2	400 Mm
7	Pedestal Bearing	Ci	4	P204
8	Chain	As	4	25h
9	ANGEL	MS	1	35 X 35 X 5 Mm
10	NUT BOLT WASHER	MS	10	M10
11	Welding Rod	-		

III. DESIGN AND EXPERIMENTATION

A) DESIGN: waste extractor is designed in 3d using CATIA software and the designed model is shown in below fig1&2

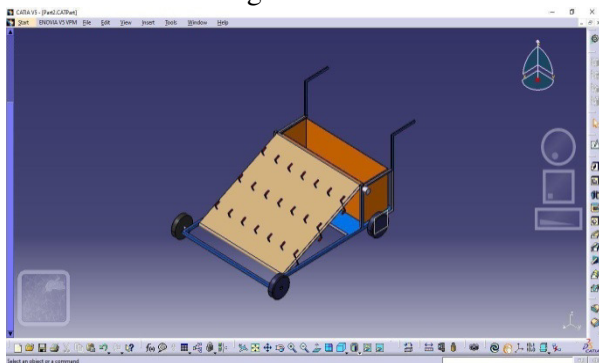


Fig 1: design model

C) CALCULATIONS

Force calculations in terms of friction

1) $F = \mu * R$
 $\mu =$ Coefficient of friction = 0.72
 $R =$ weight of the machine = 30/4 =7.5
 $F = \mu * R$
 $= 0.72 * 7.5$
 $F = 5.4 \text{ N}$

Force calculations using torque

Voltage = 12v, Current =7.5amp

2) Power = $V * I$
 $P = 12 * 7.5$
 $P = 90 \text{ Watts}$

3) $P = \frac{(2 * \pi * N * T)}{60}$

$N = 500 \text{ RPM of motor}$

$P = \frac{(2 * \pi * 500 * T)}{60}$

$T = 1.71974$

Wheel radius = 0.17 m
 $T = \text{force} * \text{wheel radius}$
 $1.71974 = F * 0.17$
 $F = 10.1 \text{ N}$

Hence the $F = 10.1 \text{ N}$ is the overall force acting on the robot

D) EXPERIMENTATION

This research work consists of a wheel which is operated by motor. It is having two Direct current Motor. The machine used for operating the model is a drive which is of chain type and is having

a collector plate. The model is having two shafts. The Shafts are used for the purpose of hoisting and to balance the chain drive sprocket. The parts resting on the structure is the important feature of the model. The steel pipe with connection of dc motors will run the model even in irregular surfaces. The collecting tank is used to stock the debris satisfying the principle of the machine.



Fig 3: chain drives and sprockets



Frame acts as a skeleton of a vehicle, in this c section frame of mild steel material is used and should in a right angled, which supports and gives more results of output. Conveyor process should be attaches to frame in this vehicle we are using the

chain sprockets are used to lift the trash and chain sprocket are run by using the dc motor

Selection of Chain Drive and Sprocket

Determine the

1. So, $S1 / S2 = T2 / T1$, Ratio velocity ratio of the chain drive Ratio of Velocity = $S1 / S2$ of Velocity = 1

2. Choose the least number of teeth on the smallest pinion or sprocket. Least number of teeth on the Sprocket = 18

Choose the least number of teeth on the smallest pinion or sprocket. Wheels

A wheel rotates on a bearing which is axial. The wheel is the key part of the wheel and axles. Wheels combining with axles are used to transport or move a heavy weight, support a load and perform labor in machines.

E) RF MODULE

In this beach cleaning waste extractor by using radio frequency plays a key role to run the vehicle and to lift the trash. Here we are using to DC motors to run the vehicle and to run the chain drives. This Module is much cost efficient where long range RF communication is required. This module does not send data using UART communication of PC or microcontroller directly because there is lots of noise at this frequency and its Analog technology. We can use this module with the help of encoder and decoder ICs which extract data from the noise. The range of transmitter is about 100 meters at maximum supply voltage and for 5 volt the range of transmitter is about 50-60 meter with using a simple wire of single code 17cm length antenna.

RF Transmitter Features:

- Frequency Range: 433 MHz
- Output Power: 4-16dBm
- Input supply: 3 to 12-volt dc
- RF Receiver Features:
 - Sensitivity: -105dBm
 - IF Frequency: 1MHz
 - Low Power Consumption

- Current 3.5 mA
- Supply voltage: 5 volts

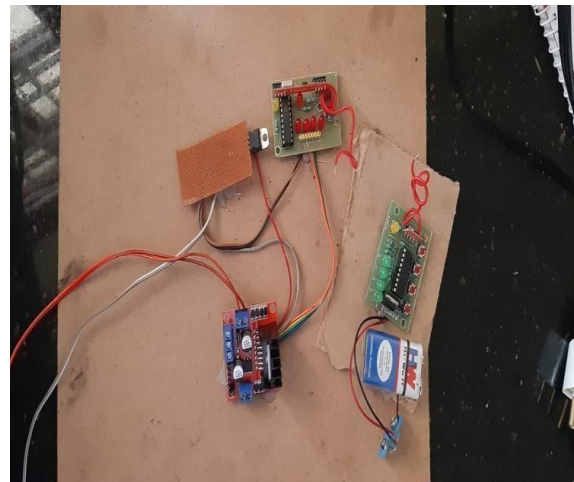
Pin Description of RF Tx

1. GND - Ground supply
2. Data In - This pin accepts serial data from encoder
3. Vcc - +5 Volt should be connect to this pin
4. Antenna - A wrapped connect to this pin for proper transmission of data

Pin Description of RF Rx

1. GND – Ground
2. Data In - This pin gives output serial data to Decoder
3. Data In - This pin gives output serial data to Decoder
4. Vcc - +5 Volt should be connect to this pin
5. Vcc - +5 Volt should be connect to this pin
6. GND – Ground
7. Antenna - A wrapped connect to this pin for proper Reception of data

Fig 4: Rf module



F) Working:

The device is placing across coastal. Floating waste like bottles, plastic cans, covers any kind of waste. Etc. 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 is 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 is M/S Mid-Grade & 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 be collected into storage collector behind the belt drive.



Fig5: waste extractor by using RF module

IV) RESULTS

This method has many advantages such as trash collection does not require any fuel input, running cost is very less, this is a non-conventional form of energy and therefore, very useful in the present scenario of energy crisis. As coin has two faces in the same way there are also some disadvantages such as radio waves which are harmful to the human.

V.CONCLUSIONS

This system help to clean in coastal areas so it keep the sand clean and save the ocean life from garbage pollution This system does not need more human labor for the waste water cleaning and this can reduce the direct contact of the human labor with the waste water so there is no hazard for the human labor. Also, this method is automatic so the working time is less as compared to the conventional method. Because of this project as there is no direct contact of the worker with garbage so the health of worker will be good and he will be able to work for a longer duration. This system is fabricated with emphasis on the use of local materials and local production.

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