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Design & Fabrication of Solar Powered Scrap Collector

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Abstract: This work introduces a novel method that helps in providing an effective way of garbage collection. Due to the difficulties faced in keeping the beach clean manually, we have come up with an equipment which not only collect the waste but also separates, which is easy for waste disposal. The machine mainly consists of a battery and a solar panel which drives the entire process. The waste is collected through the filter by which sand passes through the filter and the waste material is collected and the sand gets out of the filter. It works through Bluetooth and it is also quite easy to run it so that all that work can be done at high efficiency with zero cost investment in fuels.

Keywords: Effectiveness, Efficiency, Disposal, Solar Panels, Bluetooth.

I. INTRODUCTION

Deposition of waste is a major problem in the world due to the increase in population. Especially materials like plastics deposition are a big threat to the environment since they take more time to decay comparing with other degradable materials. Comparing to the urban places, plastics that are being thrown on the coasts of beaches increases the plastic garbage level. This causes land pollution and also harmful to the environment and us. Due to this, the fertility of the sand on the coast is reducing and thereby causes the soil pollution as well as land pollution. This affects the nature and causes various problems. Plastic is overall used in the world heavily due to the versatile nature, less weight, flexibleness, resistant to moisture, strength to weight ratio, and relatively inexpensive. The traits which made it direct overall atmosphere, which slowly creates such a large craving and heavy usage of polymer and materials made of plastics. Durable property and slower degradation of plastic materials which plays major role in plastic products all over the world. Our tremendous use of plastic, with unquestionable deeds, increase in munch through, dumping, trashing and in so doing, polluting due to less space available for dumping, turn out to be an amalgamation of the deadly environment. The dangerous effects of garbage on marine ecosystems are well known from aquatic animals and other coastal animals swallowing plastics and other metals. For the purpose of cleaning beach, some cleaning machine must be used so we have manufactured a cleaning machine which is helpful in cleaning the beaches. Our project based on scrap collection that will collect the debris and garbage from the beach. It will be powered on the eco-friendly power source that is solar-cells panel and the garbage collecting box will be perforated so that the sand collected during the collection of garbage should be filtered out and it will sustain the fertility of the soil without causing any harm to it. Thus, by this machine we will be able to keep the surroundings of the coastal areas clean.

A. Different Equipment used in Assembling of the Bot

As the bot is capable of moving on its own certain specific equipment were used in the assembling of the bot. they are listed as following:

1) Battery



Battery used in this project generates a voltage of 12v and a current of 7.5Ah. this was the most suitable size as it weighs around 2kg. The purpose of using battery was to store the solar energy and also to charge it by the electric current as this is the main power source for the motors that are being used.

Voltage regulation

Cycle use : 14.4 – 5.0V(25°C)

Standby use : 13.6 – 3.8V(25°C)

Initial current : less than 2.1A

2) Motors



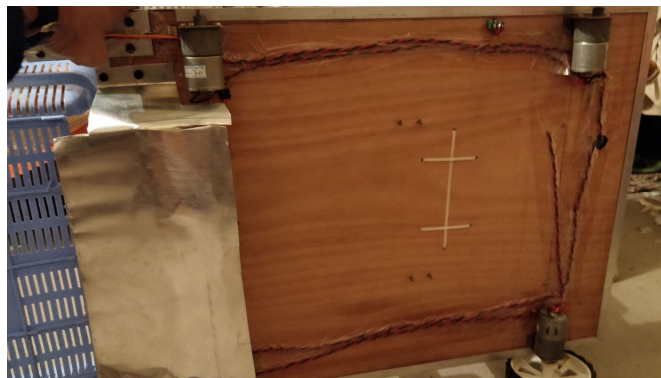
We have used DC sourced 12v, 30 rpm motors of high torque placed individual on each wheel to provide enough power to take run our vehicle in any feasible place in loaded garbage condition. As the required bot has to run on sand and near the beaches so it must be capable enough to run on it that's why high torque is required.

3) Wheels



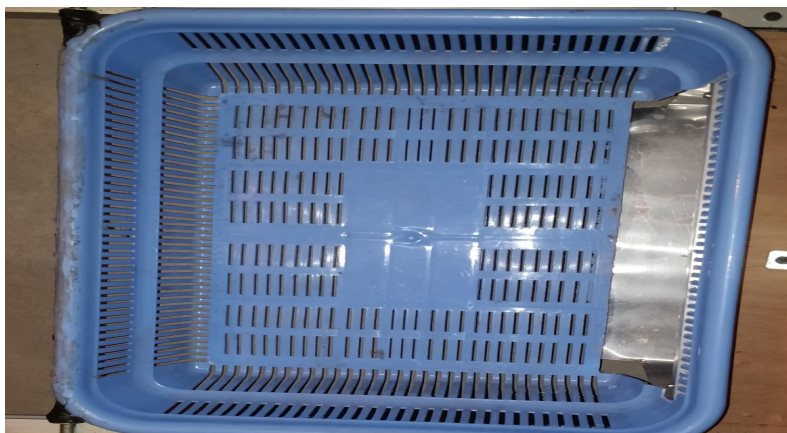
We used plastic wheel because they are light in weight and are of adequate size and are capable of handling required weight of our project. They are very useful in operation of vehicle as they are required to run on sand where ground surface is full of fine particles and pebbles etc. So as it should not be stuck in the sand surface.

4) Plyboard



It is the base of our project as all the thing we have used is fixed on this ply board we have selected it thinking about the adequate size as size of this ply board is (2*1.5ft). all the things like wheels motor are bolted in to ply board. Size consideration are done on the basis of weight of overall project and also the space required by the thing used on the ply board.

5) *Perforated Fin*



Perforated fins garbage collecting bin is used because it will also pick sand with the garbage so now to filter out the sand from the bin these fins are used as when the vibrator will vibrate it the sand will filter out and only garbage will remain on the collecting bin.

6) *Vibration Motors*



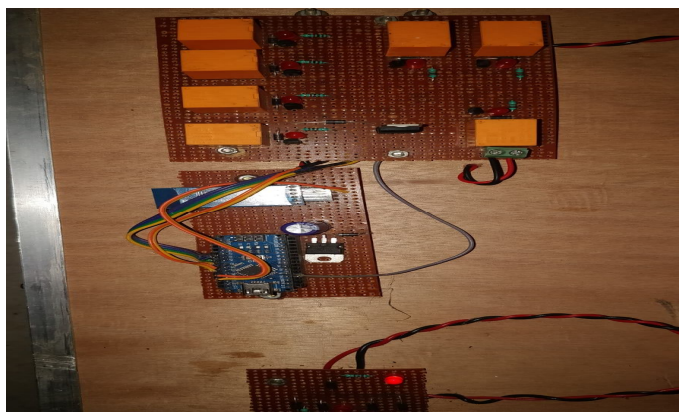
It gives vibration in our bin in transverse direction so that all the unnecessary small material such as sand, small gravels and other particles can get filtered out during the operation of vehicle so that only valid Garbage is collected.

7) *Solar Panel*



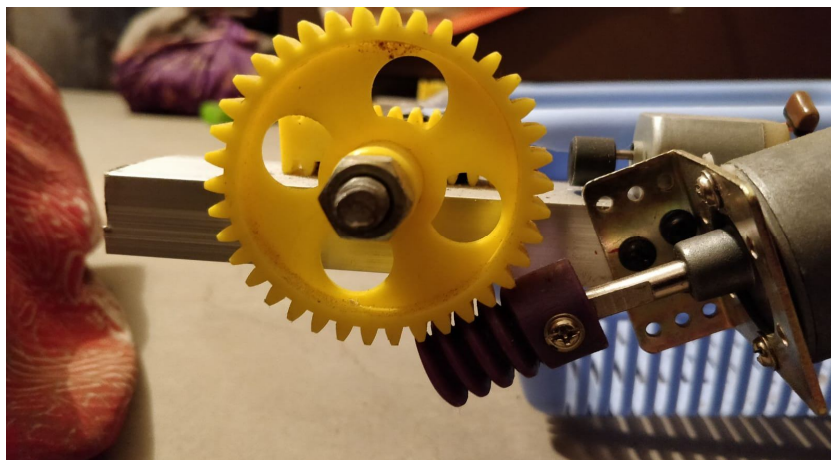
Solar panel is used to make it efficient in working as it doesn't require any fuel burning it is convenient to use and produce no emission at all. This solar panel has a capacity of producing power of 50W and its operating voltage is 12V.

8) Arduino Circuit



Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button - and turn it into an output - activating a motor, turning on an LED, publishing something online etc. In our project Arduino circuit, which is operated wirelessly through Bluetooth connectivity, is used and with programming language the wheel movement and the bin movement is assigned.

9) Gears



Worm gear arrangement is used to transfer the motion coming from motor to the bin so that it can be lifted and dispose the collected garbage at a desired place.

The same 30RPM motor is used that carries rotational motion now to change the direction of motion and to reduce its speed small to big gear ratio is used.

10) Transformer



This transformer has 240 primary windings and centre tap secondary winding. It acts as a step-down transformer and reduces AC – 240V to AC-12V. it can give outputs of 24v, 12V and 0V. A transformer transfers energy on the principle of mutual induction, by inductive coupling between its windings and it's a static device. Its core is made up of high permeability silicon steel. steel has permeability many times compare to free space and it serves to reduce magnetizing current greatly and confine the flux to path which couples the windings.

II. CONCLUSIONS

It is totally automatic in nature and can be used while sitting near it around its Bluetooth range. As this project doesn't use any kind of fuel so it is having zero emissions that means the cost on fuel is zero and additional to that it is very easy to operate that reduces the human labor too. It can work for 4-5 hours continuously on a single full charge and also moves with an adequate speed depending upon the load it is carrying. It can carry a garbage load of 1 kg approx. as it is a smaller prototype model.

III. ACKNOWLEDGMENT

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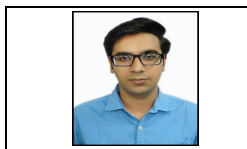
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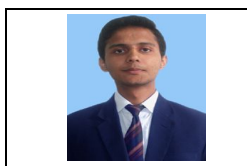
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