

RESEARCH ON DESIGN AND FABRICATION OF DC OPERATED CARRY BAG COLLECTOR

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Abstract: Growing concerns about plastic pollution and environmental sustainability have spurred the development of innovative solutions for waste management. This research paper presents the design and Fabrication of DC bag collector, which aims to solve the problem of plastic waste. The collector uses a combination of mechanical and electrical components to efficiently collect bags from the environment. The carry bag collector device is an innovative result designed to address the growing problem of carry bag pollution in the terrain. This device is a compact and movable device that uses a suction medium to collect carry bags and other debris. The device is equipped with a DC power source which provides power to the suction medium. The collected waste is stored in a collector from where it can be fluently removed for recycling. The carry bag collector device is an effective and ecofriendly way to keep the terrain clean and reduce the dangerous goods of plastic waste. Its compact design and ease of use make it suitable for use in homes, services. Parks, and strands.. We had examined how this device works, its environmental impact, and how it can contribute to a cleaner and further sustainable future. Overall, this paper aims to give precious perceptivity into the significance of addressing plastic pollution and how the plastic bag collector device can play a significant part in mollifying this problem.

Keywords: Environmental problem, Ecosystems, Biodiversity, Single-use carry bags, Decomposition time, Landfills, Innovative solutions, Carry bag collector device, Suction mechanism, DC power source, Waste collection, Recycling, Eco-friendly, Terrain cleanliness, Plastic waste, Sustainable future, In-depth analysis, Environmental impact

INTRODUCTION

We all have concerns about how waste is disposed of and produced in our homes and communities. For a long time, waste transportation has been done wrong, whether in the city, town or city. However, the increasing number of people, changing lifestyles and consumption patterns, the great expansion of business and transportation, loss of time and variability have become a matter of concern. Today's communication and business world and the overuse of innovation. In fact, waste management has become a real challenge, with recommendations not only for human health and well-being, but also for the environment.

Plastic started to be created in 1907 and is used in many ways in our daily lives because it is cheaper and more useful than other materials. Nowadays, plastic, which is included in almost everything from cash to electronics, is used in many areas such as packaging, construction, development, technology transportation, machinery and healthcare. But the need for sustainable plastic waste management (PWM) poses a real threat to our environment and environment. In total, approximately 8.3 billion metric tons (BMT) of plastic were shipped from 1950 to 2015, of which 80% (6.3 BMT) was treated as plastic waste. Of this 6.3 BMT of waste, 9% is plastic and its part in our lives is reused, 12% is incinerated and 79% is thrown into landfills, oceans or bodies of water. There are two ways to deal with plastic waste. The first is the "recycling or reprocessing" of different types of plastic waste into fabric. Now is the time for "hot waste plastic". Combustion is expensive and can cause pollution if the correct equipment is not used.

Plastic waste has many advantages in terms of environment and health. Garbage thrown into landfills mixes with soil and nearby waterways, causing water pollution and eventually finding its way into the supply chain. Unmanaged waste, including plastic, causes pollution. During the expansion, plastic waste blocked water pipes, causing water and groundwater pollution. Plastic in food and water can cause health problems such as genetic diseases and damage to endocrine systems. According to the United Nations Security Council, all of the plastic waste produced is still found in soil today, making it important to manage plastic waste.

The "Law on the Management of Plastic Products" was amended in 2021 to first define waste as plastic products intended to be separated or reused for the same reason in the recent past. The United Nations defines single use plastics (commonly known as consumable plastics) as plastic containers that are commonly used and designed to be used but have recently been discarded or reused. These include essential bags, food containers, bottles, straws, bars, glasses and cutlery. Disposable plastic is the most common type of plastic because it is easy to use and very useful. Although it is cheap, durable and sterile and suitable for transportation, its reuse is the most problematic. Because plastic containers take up less space in landfills, they use less energy and water and produce less waste than paper containers. The key properties of this waste plastic make it a popular fabric for industry.

To address this waste problem the paper highlights the potential benefits of implementing such a system in urban areas, including reduced plastic pollution and improved waste management practices

LITERATURE REVIEW

1. **1984 John et.al. DESIGN OF LEAF AND TRASH ASSORTMENT"** An article titled "**Design of Leaf and Trash Assortment Equipment**" by John et al discusses the development of a piece of equipment that is designed to clean up leaves and other debris from lawns and flower beds. The main goal of the invention is to simplify the job of cleaning up after trees, bushes and other plants shed their leaves during the fall season. This tool can help you save time and effort while reducing the amount of waste in your garden and helps maintaining the appearance of greenery and landscaping of the place

2. **Journal of Student Research" ISSN: 2167-1907, "Smart Solar Powered Vacuum Cleaner."** A smart solar-powered vacuum cleaner is a revolutionary cleaning device that utilizes solar energy to keep your environment clean. This vacuum cleaner is perfect for outdoor cleaning tasks such as cleaning swimming pools, gardens, patios, and driveways. The smart solar-powered vacuum cleaner contains a powerful suction motor that pulls in dirt and debris from the surface, and a filter that removes dirt from the air that is blown out of the device. It has a large capacity battery which is charged by solar energy. meaning that the device can clean for extended periods without the need for a power outlet. The vacuum cleaner has intelligent features like sensors that adjust the suction power based on the type of surface being cleaned or the amount of dirt and debris present, ensuring efficient cleaning and reducing the amount of energy used.

3. **U.S Patent, Sep. 28, 2010", "VACUUM CLEANER WITH A DIVIDER."** The above patent describes a vacuum cleaner that includes a divider in the suction path to separate dirt and debris from larger objects that may be picked up during cleaning.

Components Description :-

A. Collection Tank:-



Fig. Littered Single Used collector Device

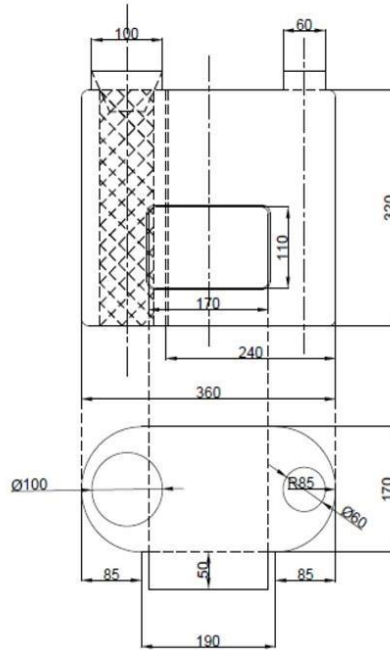


Fig. Diagram of Littered Single Used Collector Device

Specification :-

Material Polyethylene Plastic

Length = 360mm

Width = 170mm

Height = 320mm

Motor Inlet Diameter = $\text{Ø}100\text{mm}$

Hose Inlet Diameter = $\text{Ø}80\text{mm}$

The main function of container is to store the collected waste. In container there is a vacuum filter which is essential for separating heavy, solid objects and plastics from dust.

C. Flexible Hose:-



Specification :-

Hose Pipe Inlet Diameter = \varnothing 50.8mm
Hose Pipe Outlet Diameter = \varnothing 46.8mm
Length = 5feet
Material = PVC (Polyvinyl Chloride)

The main function of the flexible hose in a vacuum cleaner with a plastic collector is to provide a conduit for the flow of air, debris, and particles from the cleaning head to the plastic collector or the dustbin. The flexible hose is typically made of durable materials such as plastic or rubber, which allows for flexibility and ease of maneuverability. It connects the cleaning head to the main body of the vacuum cleaner and allows for the vacuum cleaner to reach different areas and surfaces for cleaning.

E. BLDC (Brushless direct current)Motor:-



Specification:-

KV : 2200

Dimensions:	27.5	x	30mm
Max Efficiency		Efficiency:	80%
Max Current		Current:	4-10A (>75%)
No. Of Cells:		Capacity:	12A/60s
Weight:		Cells:	2-3 Li-Poly
			47g

The main function of the motor in a plastic collector is to generate suction, which pulls in air and debris through the cleaning head and flexible hose. The motor typically drives a fan or impeller that creates a low-pressure zone, causing air to flow into the vacuum cleaner.

Battery:-



Specifications:-

Lithium battery

Capacity: 2200 mah

Cell quantity :- 3

Voltage :- 11.1

Battery use for the consideration of power requirements for the collector's operation and standby mode.

Impeller :-



3D printed impeller 100mm . An impeller is a rotating component typically used in pumps or fans to increase the flow and pressure of a fluid. In the context of a carry bag collector, an impeller use to create suction inside the collector

ESC (Electronic speed controller) :-



Specifications:-

Item	Name:30A	Brushless	ESC
Input	Voltage: (2-3S	Lixx	red)
Drive	Current: 30A	(Max:	40A/10S)
Size			50x23x8
BEC:5V/3A			
Weight: 25g			

ESC (electronic speed controller) :-

Using an electronic speed controller (ESC) in a DC-operated carry bag collector can help regulate the speed of the collector's motor, providing more precise control over its operation.

This servo tester or ESC Tester is offered 3 modes to check Servo or ESC, and other devices. The Manual Mode allows you to turn the knob to different speeds and check the reaction time. The Neutral mode makes the servo go back to the neutral point

Digital Multi Servo Tester (ESC) :-**Specifications:-**

Operating Voltage: DC 4.8-6V

Dimension & Weight:-

Length: 35mm;

Width: 30mm;

Height: 15mm;

Weight: 8gms

Methodology:-

- 1) CONCEPT GENERATION
- 2) SELECTION OF MATERIAL
- 3) DESIGN
- 4) FABRICATION
- 5) TESTING
- 6) ERROR RECTIFICATION

CONCLUSION

The whole product is fabricated as per the requirements. It is eco-friendly and can be easily moved from one place to another for the purpose of collecting the carry bags and debris, thereby reducing the man power, time consumption and the time to dispose the collected carry bag in efficient manner. By adopting this simple technique for the application of collecting the carry bags we can greatly reduce the time and human effort. This project is collecting the carry bags in the garden, roadways, pathways etc. The human power is reduced and time consumption is reduced for collecting the carry bags. It is cost effective and easy operating mechanism compare to other carry bag collecting instruments and machines. It is eco-friendly and energy efficient and does not cause any pollution in the society. A greater number of carry bags are found lying roadways, pathways and garden, by using this device we can easily remove and stored the carry bags from the ground thereby reducing the human effort and time.

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