

SIMPLE LOW COST VACUUM CLEANER

I.Harish¹, B. Harish², A.Harish Kumar³

^{1,2,3}UG Students, R.M.D Engineering College, Chennai

ABSTRACT: Automation has the predominant influence on renovation of most of the household tasks to modernized automated household tasks which saves labour resource by means of time. Most of the household tasks are mechanized in current scenario. Cleaning is one of the most essential work. Technical improvement in computational efficiency, artificial intelligence and robotics provide a strong platform for mechanization. One such technology is ingenious floor cleaner. This crafty floor cleaner can reach the crooks of the cleaning space in an impressive manner. The low cost cleaners can be deployed in assisting labour in floor cleaning works at homes, hotels, restaurants, offices, hospitals etc.,

Key Words: Vacuum cleaner, Plastic bottles, Deodorant cans, Meshes, Flexible pipes

INTRODUCTION

A vacuum may be a device that uses a vacuum pump to make a partial vacuum to suck up dust and dirt, usually from floors, and from other surfaces like upholstery and draperies. The dirt is accumulated by either a vacuum bag. Vacuum cleaners, which are utilized in homes also as in industry, exist during a sort of sizes and models small battery-powered hand-held devices, domestic central vacuum, huge stationary industrial appliances which will handle several hundred litres of dust before being emptied, and self-propelled vacuum trucks for recovery of huge spills or removal of contaminated soil. Specialized shop vacuums are often wont to suck up both dust and liquids.

The birth of the vacuum is thanks to variety of advancements in science and technology caused by the economic Revolution. By the mid-1800s factories were producing tens of thousands of manufactured items along side plenty of pollution. Dirt and soot were everywhere. that time scientist Pasteur made several significant discoveries which led him to theorize that infectious diseases were caused by microorganisms or "germs." Thus the event of the scientific theory and therefore the reaction against industrial pollution caused people to focus for the primary time on hygiene and cleanliness. Daniel Hess appears to possess been the primary to patent a vacuum. Hess, a resident of West Union, Iowa, called his invention a sweeper, not a vacuum. The machine have a spinning brush like other sweepers, the machine also possessed an elaborate bellows mechanism on top of the body to get suction. The air is cleansed because it passes through the device. A Vacuum cleaner or a Hoover is a device, which is used to clean and remove dust from the floors. The vacuum cleaner suction is caused by a difference in air pressure. A fan driven by an electric source reduces the pressure inside the machine, then atmospheric pressure pushes the air into the machine. Along with the air, dust particles are literally sucked inside it, then the dust

particles are deposited in the bag which is present inside the machine. Nowadays, vacuum cleaners have developed in many models like canister (cylindrical cleaners), pneumatic, back pack, hand held, robotic, cyclonic, central and constellation.

WORKING PRINCIPLE

A Vacuum cleaner works just like taking a sip of juice from a straw. Since the matter has a tendency to occupy space, the juice will flow upward and into your mouth as long as you continue to suck. Now apply this theory to a vacuum cleaner. A vacuum cleaner has a motor inside it that does the same job as your mouth as seen in figure 1

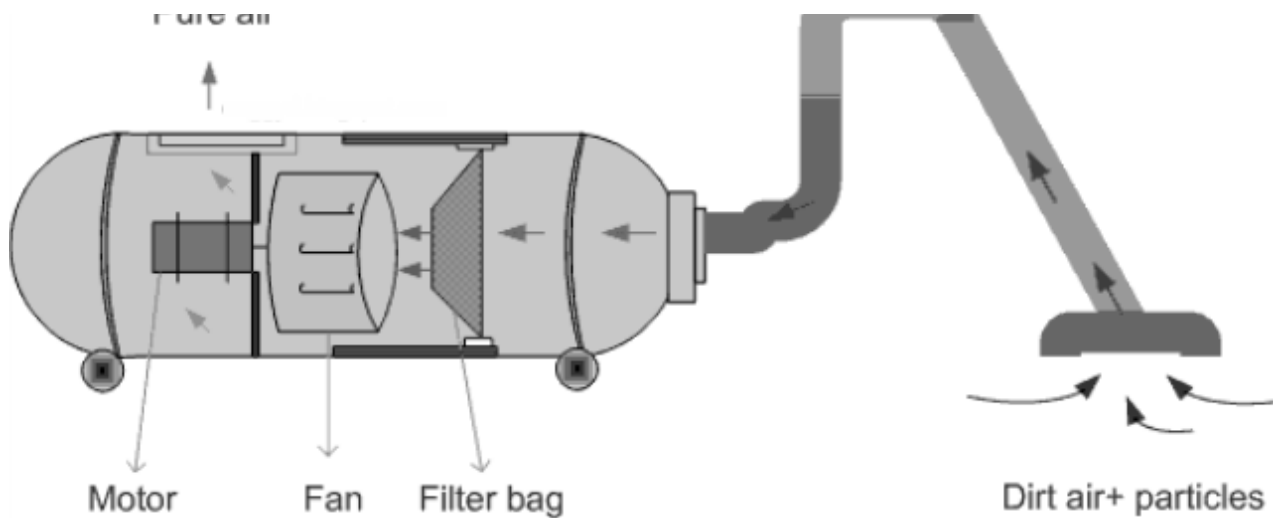


Figure 1 Block diagram of vacuum cleaner

The fan of the motor makes a vacuum and begin to suck in air through the suction nozzle at the top of a pipe. Any dust that comes within range of the suction of the nozzle gets comes into the pipe and is collected during a dust collection bag.

TYPES OF VANUUM CLEANER

There is a special sort of vacuum available as per design, configurations, technologies within the market.

1. Upright
2. Canister
3. Drum
4. Wet/dry
5. Pneumatic
6. Backpack

7. Hand-held
8. Cyclonic
9. Robotic
10. Central

PROPOSED MODEL

We have proposed a low cost, simple homemade vacuum cleaners. In this pandemic situation, it is necessary to keep our home clean. It is impossible to clean the entire home for 2 to 3 times in a week. But it is possible if we had a simple vacuum cleaner. Due to our country's economic status it is impossible to have a vacuum cleaner in everyone's house. So, we have created a low cost vacuum cleaner which can be done easily by everyone in their house with simple things. In this project we have made an attempt to build a simple vacuum cleaner by organizing the simple materials that are available in our surrounding environment. The simple materials we used here are Plastic bottles, Deodorant cans, Meshes, Flexible pipes.

MATERIALS USED TO BUILD A VACUUM CLEANER

We want to take any two empty plastic bottle (one for mechanical support and another for the body of the vacuum cleaner) and a small plastic bottle for making the nozzle, a deodorant bottle for making the fan ,a scissors for cutting ,a DC motor, a mesh(filtrate) , a glue gun or M-seal for holding them together , a small bending pipe for sucking of dust particles and a battery for electric source.

STEP-1 CUTTING OF THE PLASTIC BOTTLE

Plastic Bottle is a container for dust. All the parts like a motor, filter, battery are fitted inside the bottle. We take that one empty drink bottle as per figure 2a.

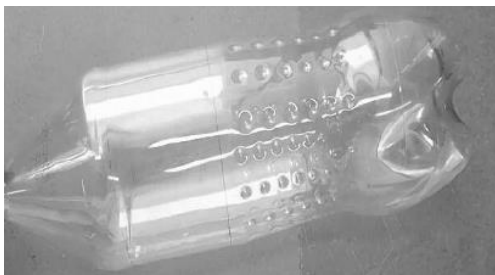


Figure 2a: Plastic Bottle



Figure 2b: Cut section of the Plastic Bottle

First, we want to cut the plastic bottle and the deodorant can. The bottle will be used both as the body and the bag while deodorant will be used for the fan. Cut the plastic bottle in half as seen in figure 2b, this should be

fairly easy. Next, we should take the deodorant bottle and cut off the top and bottom to produce a nice flat sheet of metal. We might want to use a hacksaw for this.

STEP-2 MAKING OF VACUUM CLEANER FAN

Simply we had taken the Aluminium sheet which is obtained from the deodorant bottle. Just taken the above-cut plastic bottle and put above the sheet. Sketched around the open circumference of the bottle with a marker pen. Now cut the marked piece out of the aluminium sheet to make an awesome round disc. Using steel ruler drawn four sets of vertical lines to split the round disc into eight equal parts meeting at the center of the disc. Then made a hole at the centre of a round disc with the help of hammer and nail.

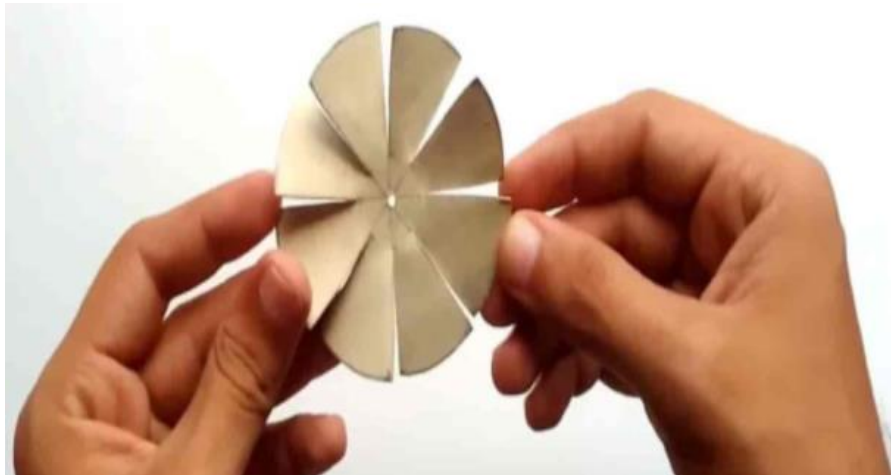


Figure 3: Vacuum Cleaner fan

Left a small space from the hole which can produce eight “wings” linked by a small segment of the disc. Had cut this all wing with the help of Scissor. Then twisted the wings at exactly the identical direction to create our own fan blades is indicated in figure 3.

STEP: 3 FIXING MOTOR TO FAN BLADE

Take a 12 DC Motor from the online shop or local stationary shop and make a hole for motor wire in plastic bottle cap then attach this bottle cap behind the motor with the help of the glue gun. Put the fan blade on the shaft of the motor and Fix it by glue gun so it will possess good strength. Assembly of the fan blade and motor is ready to rotate as seen in figure 4.



Figure 4: Fan fixed with motor

STEP: 4 MAKE HOLE ON BOTTOM OF BOTTLE

Make a small hole at the bottom of the plastic bottle with the help of a heated edge of soldering iron or drill machine as shown in figure 5. This all small are help to escape exhaust air. Without this hole, our vacuum cannot generate and our vacuum cleaner will not work.



Figure 5: Soldering made at the bottom of bottle

STEP: 5 ATTACH FAN ASSEMBLY AND PLACING THE MESH

Insert the glue behind the plastic bottle cap then place this assembly at bottom of the bottle and stick with them by pressing. Take the wire of motor from the small hole already made as seen in figure 6a. We need filter medium to collect the dust in bottle. This filter is a piece of net fabric or any cloth we can use as seen in figure 6b.

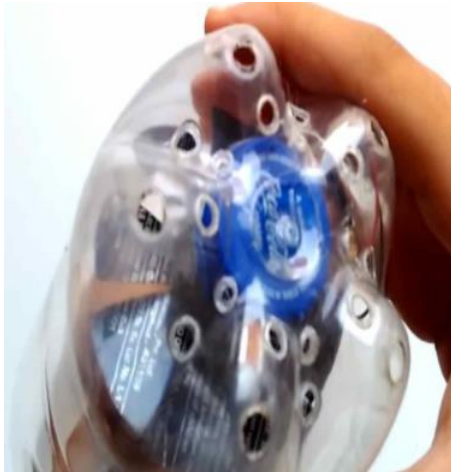


Figure 6a: Attachment of fan assembly

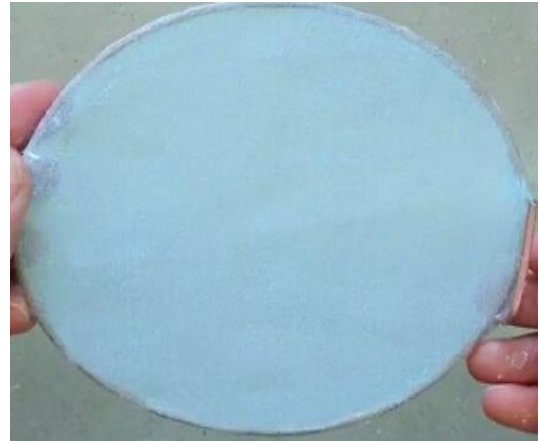


Figure 6b: Mesh

STEP: 6 MAKING SUCTION PIPE

Suction pipe is the main design of vacuum cleaner. If the Suction pipe we made very long than it can not suck the dust inside it. So pipe must be average size.



Figure 7: Suction Pipe

If we want long pipe then we need to put bigger motor to create high suction inside the bottle. Take the pipe having diameter equal to diameter of bottle top. Make the nozzle from any cutting of top of plastic box as shown in figure 7. (e.g. Vaseline box). Fix the bottom and top portions of the bottle. So, that it can be easily removable for collecting the dust from the vacuum cleaner and put it in the dust bin.

STEP: 7 POWER SOURCE

Finally, wire up the motor and attach to a plug assembly to connect it to the mains. The last thing is to connect the wires that are in the bottom of the battery for electric supply. So the current starts to flow and the vacuum cleaner starts to work.

BENEFITS OF OUR VACUUM CLEANER

- They are Small and handy
- They are Lightweight.
- They are easy to use and great for quick cleanups.
- Can clean many things a larger vacuum shouldn't.
- They are powerful and versatile.
- It is easy to maintain

CONCLUSION

- Health plays an important role in our life.
- Someone says "Have life so have the world". So make your health better than live your life in your own way. Achieve your goals which you really want in your life.
- So our project Simple, Low cost Vacuum Cleaner can give you a good and clean environment for us to live in. We hope that in future we will bring some more new technologies in our project

REFERENCES

- [1]"Fascinating facts about the invention of vacuum cleaner by Daniel Hess in 1860". The Great Idea Finder.
- [2]Hess, Daniel (10 July 1860) "Carpet-Sweeper" U.S. Patent 29,077
- [3]McGaffey, Ives W. (8 June 1869) "Improved-Sweeping Machine" U.S. Patent 91,145
- [4]"Our History". Bissell. Retrieved 5 April 2010.
- [5]a b Gantz, Carroll (Sep 21, 2012). The Vacuum Cleaner: A History. McFarland. p. 45
- [6]a b Wohleber, Curt (Spring 2006). "The Vacuum Cleaner". Invention & Technology Magazine. American Heritage Publishing. Retrieved 8 December 2010.
- [7]"Sucking up to the vacuum cleaner". BBC News. 30 August 2001. Retrieved 6 December 2010.