

## Design and Development of Eco-Friendly Floor/Road Cleaner Machine

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**ABSTRACT:** This paper is related to design and development of most effective machine that is manually operated mechanical pollution free road cleaner. The Road cleaner is used to keep our mother earth clean. So that we feel fresh while walking on streets. Generally, in era of modern technology, different devices such as electric motors, diesel engines and robots are being used to clean floor, road. These methods make much pollution, maintenance and very tough to carry out. The main objective of this paper is to spread this idea of our prototype road cleaner to each one which aims to. Hence, the present work is aimed to design and develop a manually operated road cleaning machine which is eco-friendly, cost effective, portable and less maintenance

Cleaning has become a basic need for all human beings and it is unavoidable in our daily routine process. The conventional floor/road cleaning machine is most widely used in railway stations, airports, hospitals, Bus stands, colleges etc. also this machine needs electrical energy for its operation. It is not user friendly as well as eco-friendly. In summer time there is power crisis and most of the floor/roads cleaning machines are not used effectively due to this problem particularly. In our project we are using easily available materials with low cost. It is the better alternative for conventional machine.

Hence this project is very useful in our day to day life. It is very simple in construction and easy to operate and a little bit cheap, anybody can operate this machine easily. The overall cost of this machine is also cheap. Such type of machines is widely used for this purpose but they are working under different principles and the cost is very high. In recent years, floor cleaning machines are getting more popular for cleaning large area in minimum time. However in India, which is a developing country requires large type of such machines to satisfy the cleaning needs.

**Keywords;** Eco-friendly, Floor Clean, Sweeper Roller, Effortless, Manually Operated, Eco-Friendly, Human Powered.etc.

### I. INTRODUCTION

Cleaning machine is very much useful in cleaning around us like road, ground, our colleges campus, outside ground and public place etc. In modern days interior as well as outside cleaning are becoming an important role in our life.

Cleaning of waste is a very important one for our health and reduces the man power requirement. Many of road cleaning machines are available but we had developed a machine which is very simple in construction and easy to operate. Anybody can operate this machine easily. Hence it is very useful in cleaning the cricket ground, any large area space.

### II. LITERATURE SURVEY

**M. Ranjith Kumar 2015 [1]** - "Design and Analysis of Manually Operated Floor Cleaning Machine"-The authors has been designed and analyzed manually operated floor cleaning machine. From his research he concluded the stress level in the manually operated machine is within the safe limit.

**Sandeep. J. Meshram 2016 [2]** - "Design and Development of Tricycle Operated Street Cleaning Machine" – He has developed the street cleaning machine by tricycle operated. In this research article he framed a model especially for rural area. He concluded that the cleaning is less effective where the street seems to be very rough and damaged.

**Liu 2013 [3]** – "A Technical Analysis of Autonomous Floor Cleaning Robots Based on US Granted Patents," – He carried out a technical analysis of residential floor cleaning robots based on US granted patents. They observed that the macroscopic analysis of patents and patent

bibliometrics or patent maps, is useful tools to make an overview for designated technical topics and they observed that the Samsung is the top one patentee in cleaning robot after macroscopic of view.

**Imaekhai Lawrence 2012 [4]** – “Evaluating Single Disc Floor Cleaners” - The evaluation has shown how the use of multiple assessment techniques can provide a comprehensive appraisal of the design, usability and musculoskeletal loading upon the operator. They suggested that the trials with a larger number of subjects would certainly strengthen the conclusions.

**Abhishek Chakraborty 2013 [5]** – “Design of Dust Collector for Rear Wheel of Four-Wheeler” – They reported that the most significant cause of road dust to the total suspended particulate burden is vehicle traveling on paved and unpaved surfaces. Consequently data directly relating dust to road accidents are rare, but in a study if dust is the cause of 10% of these accidents casualties then the cost could amount to as much as 0.02% of GDP in some developing countries and total about \$800 million annually.

**Working Principle**

The experimental setup of our project consists of a frame on which the rotating bigger wheel (main wheel) and the supporting wheel which is fixed with the rolling brush are mounted with the help of bearings and a collection box is attached to it for collecting the waste.

The machine works on transferring the motion of rotation of one wheel to another. The bigger wheel which is the main wheel is used to move the machine and thereby it rotates the brush which is connected to the main wheel with the help of a smaller wheel at the end of the rod screwed with the brush. When the main wheel rotates the smaller wheel rotates 10 times the speed of the main wheel due to their diameter difference. The sweeping brush is attached to the axle connecting the small wheel in order to sweep the dust and waste particles from the floor surface. The Brush moves in the opposite direction to that of the main wheels and the brush sweeps the dust and waste present on the floor and also it collects the waste into the collecting Box.

The waste which is collected in the collecting box can be easily removed by just inverting the frame upside-down.

**Specifications**

**Specification of Chasis**

Specification	Length Bar	Breadth Bar
Material	M.S.	M.S.
Length	1200 mm	750 mm
Breadth	40 mm	40 mm
Height	40 mm	40 mm
Thickness	3 mm	3 mm
Mass	1300 gm	700 gm
Number	2	2

**Specification of wheel**

Material of the tire	Nylon
Material of the rim	Cast Iron
Diameter of the wheel	350 mm
Diameter of the central bore	11 mm
Diameter of the tire	50 mm
Mass of the wheel	2 kg
Number of the wheel	2

**Problem Identification**

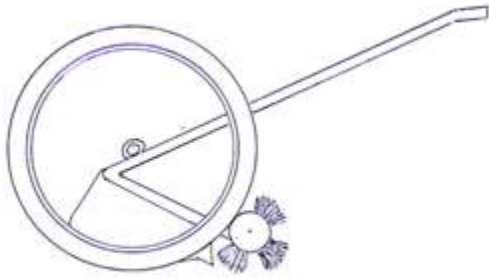
During the manual cleaning operation some dust and dirt particle may remain on the floor and due to the action of air. The dirt and dust particle transfer from one surface to another surface which create the problems during cleaning which tends to increase manual effort. Due to which desire cleaning of the surface is not gain and because of that it takes more time.

**Objectives**

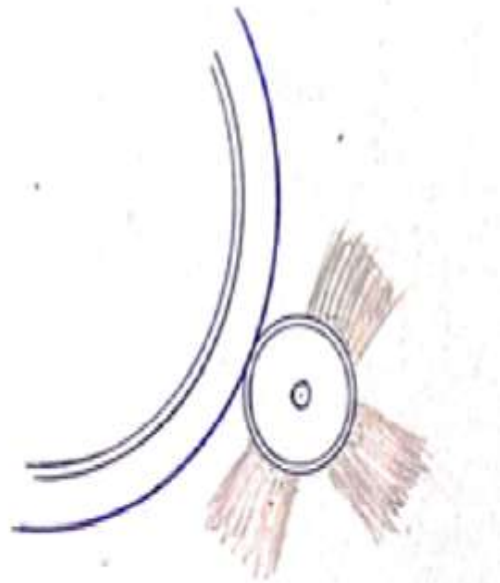
1. To develop a machine that helps in easy and quick cleaning.
2. To provide the alternative method for road cleaning.
3. To reduce human efforts.
4. To save the time.
5. To reduce the cost anyone can use and easy to operate.

**Design**

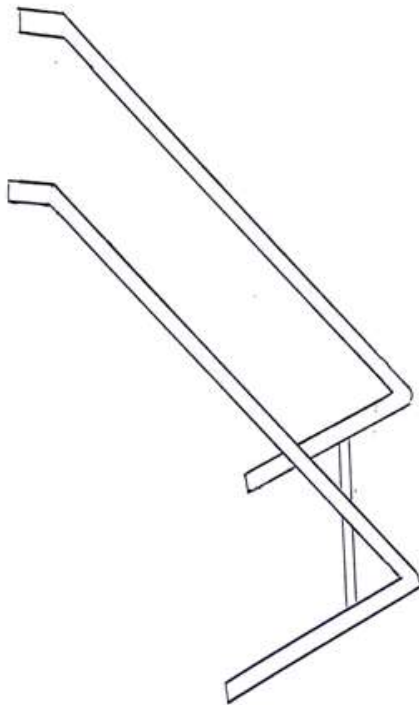
In the design of the road cleaning machine is very compact as compare to other cleaning machine are available in the market but has the attractive design and high durability and cheap cost as compare to other road cleaning machine.



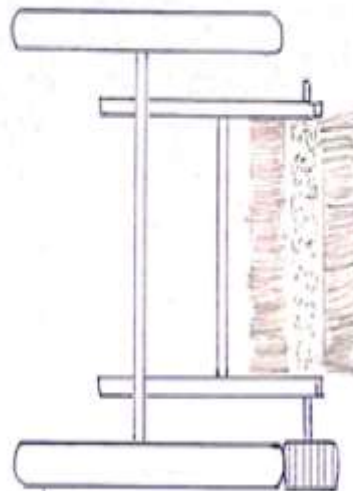
**FIG: SIDE VIEW OF MACHINE**



**FIG: WHEEL ATTACHED TO BRUSH**



**FIG: FRAME OF THE MACHINE**



**FIG: TOP VIEW OF BASE**

**Components used in road cleaner**

- 1) Wheels
- 2) Shaft:
- 3) Small rubber gripped tyre for Brush:
- 4) Bearings

- 5) Brush
- 6) Sheet Metal for Collecting box.
- 7) Square Pipe for frames

### Applications

**Around Hospitals** – cleaning machines are used in hospitals for cleaning in order to obtain hygienic surface.

**Roads** – To maintain the desired cleaning surface finish.

**Colleges** – it is mainly used to clean the dust which is collected on the surface in campus.

### Future Modification

#### 1. Decrease the size of wheel

The wheel size can be decreased by using gear/sprocket-chain arrangement and by doing so the total size of the machine gets compacted.

#### 2. Plastic Brush can be changed to coir brush

The plastic brush which is not long lasting can be avoided by using a coir brush which is more efficient for the machine.

#### 3. Mopping of floor can be made by extra cloth attachment

Now since the machine does only the sweeping work we can modify the machine by giving an extra attachment of cloth for mopping the floor.

### III. CONCLUSION

The manually operated eco-friendly road cleaner is successfully designed, analyzed and fabricated. This project works and implements the manually operated ecofriendly road cleaner for road cleaning that reduces the cost, human efforts as well as time. It is the best alternative for automated road cleaning machine during power crisis. It is found that the existing road cleaning machines uses petrol and diesel. It can cause pollution and also the vibration produced in the machine causes noise pollution. While manual cleaning may cause healthy problem as the person directly comes in contact with dust. Also, the shoulder problem due to continuously sweeping occurs. A manually operated eco-friendly road cleaner is an alternative concept for avoiding such problems. The manually operated eco-friendly road cleaner can work very efficiently with respect to covering area, time and cost of road cleaning process compared with the existing machineries. Also it is economical. It was seen while testing of machine, that the cleaning is less effective where the road seems to be very rough and damaged. It can provide job to the uneducated person who is in

need for such jobs as human energy is needed to drive the machine.

### REFERENCE

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