Solving the Problem of Floor Cleaning with the Help of Multi-Functional Sweeping & Mopping Machine

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Abstract— In India the technique that is mostly used by the people for floor cleaning is the conventional technique in which firstly, the sweeping of the floor is done with the help of a broom stick and secondly, the mopping of the floor is done with the help of a cloth and a water bucket for wetting the floor. This technique of floor cleaning is totally outdated compared to the present century lifestyle and requires too much time and effort. This paper aims to suggest a better way of floor cleaning with the help of an innovative design of a machine that can integrate sweeping and mopping function so that it can be done together. The new machine consists of a microfiber roller connected to a 12 Volt 120-rpm high speed motor followed by a dust collector, a water storage tank with controllable water flow, two microfiber mops attached to a 12 Volt 120-rpm high speed motor each, a rigid metal frame, a 360-degree maneuverable handle and a heater unit with fans to blow hot air on the floor for drying it. The machine has lots of applications and can be used to clean floors in houses, hospitals, government buildings, malls and educational institutions. This machine also aims to prove that floor cleaning in an easy and effortless way is possible.

Key words: Sweeping & Mopping Machine, Floor Cleaner, Sweep & Mop Together, Multi-Tasking Floor Cleaning Machine

I. INTRODUCTION

India is a huge country. It has a population of almost 1.351 billion [1]. Almost every house or an organization has a floor cleaning in charge whether it is a housewife, house maid or an externally paid worker. Also, regular floor cleaning is necessary because dust and dirt gets accommodated on the floors. Still the people are not upgrading their way of floor cleaning and are doing it the same old conventional way. Human beings are one of the smartest species on this planet still we are not trying to solve this issue of old floor cleaning technique. So, to solve the problem a new innovative design of floor cleaner machine is proposed in this paper that can save time and effort if implemented.

The problem was identified when I was sitting in my home on a sofa watching television and saw my mother doing floor cleaning work. She first did brooming of the floor and then did mopping. The hard work that was being done for a simple task like floor cleaning was unacceptable. This was not just the problem in my own house but it was experience by many people in India. So, I decided to solve this problem with the help of my knowledge. Efforts have been made by many already to solve this problem but none are accepted on a large scale. Some of the work that was studied explained the construction of an autonomous floor cleaning robot with transport drive mechanism so that it can move on the floor and do the cleaning operation. The robot did sweeping and mopping function in a different way. Instead of sweeping, the use of vacuum creating mechanism was done to pick up the dust and dirt from the floor and for mopping a liquid arrangement was made to wet the mop cloth attached to the machine [2]. This machine was a problem solver of the identified problem but due to the autonomous nature of the machine, its cost was high and not many people were able to afford it. So, this way of floor cleaning was not so popular among the people. Another work explained a floor cleaning machine that worked on the similar way as explained above but had a controlled water spray arrangement and different design. Also, the vacuum motor was provided a filter cloth that filtered the dust and dirt and prevented it from going in the motor and used a microfiber cloth for efficient mopping of the floor [3]. There was a similarity in most of the work done in solving the problem. Almost all the work studied had automatic systems of working which increased the overall cost of the machine and made it hard for the user to buy and implement it. And the ones that were manual worked on a totally different technique and were highly inefficient and impractical. So, the machine that has been proposed in this research paper is not only cost effective but also solves the problem is unique way.

II. DESIGN & WORKING

The challenge was to design a machine that sweep and mop together saving time and effort of the user. To get some inspiration about the design, some previously done work were studied findings from the work done by M R Khan, N M L Huq, M M Billah and S M Ahmmad, "Design and Development of Mopping Robot-'HotBot'" (2013) proved to be very useful [4].

For sweeping function, a microfiber roller was used which was followed by a dust collector. The microfiber roller connected to high speed 120-rpm motor. This helped to entrap all the debris from the floor and collect it into the dust collector. The work done by Glenn Allen Bradbury, Brent Michael Willey, Dec. 19, (2013) helped to design the emptying mechanism of the dust collector [5]. To do the mopping function, two microfiber circular mop are connected to the 120-rpm motor which is supplied a controlled water flow from the water storage tank of 5 liters capacity. Also, the machine has a heater unit to dry the floor properly after the mopping is done. The hot air from the heater also helps to kill germs from the floor surface.

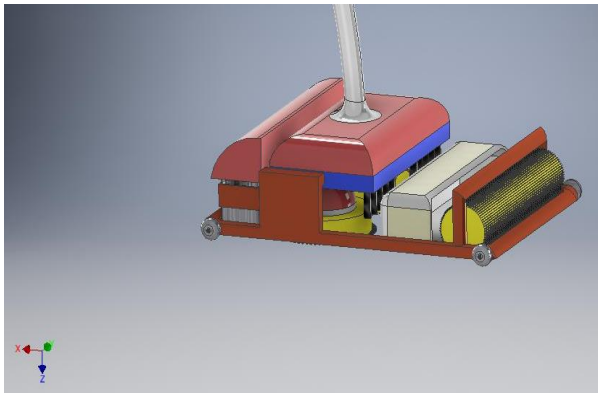

Fig. 1(A): Top View of the New Floor Cleaning Machine

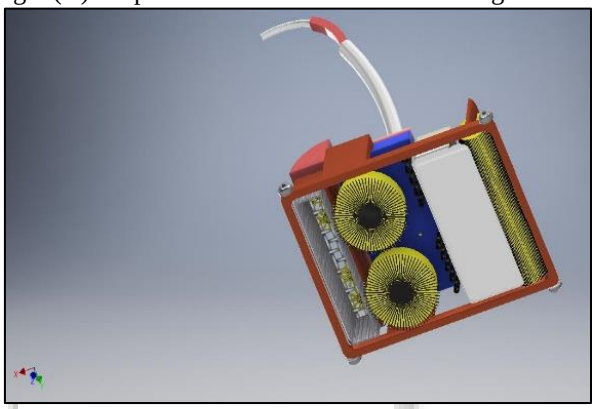

Fig. 1(B): Bottom View of the New Floor Cleaning Machine

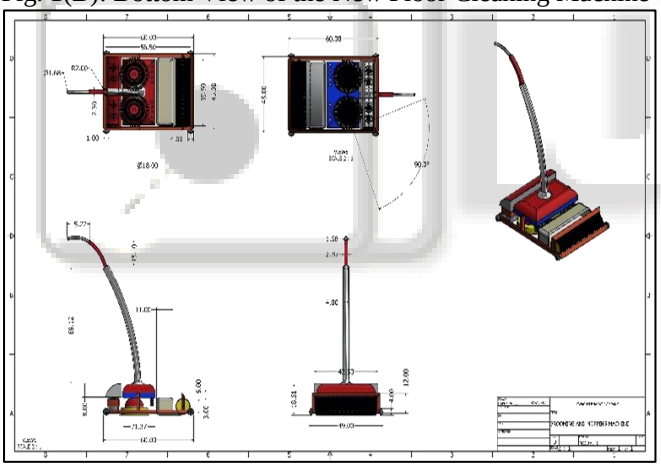

Fig. 2: Dimensions of the New Floor Cleaning Machine

The design was created with the help of 3-dimensional modelling software Autodesk Inventor 2017. The new design is expected to be of 45cm in width, 60 cm in length and 18cm in height.

III. CALCULATIONS

The new technique is expected to save time used by almost 50% compared to the conventional cleaning technique because of the integration of the sweeping and the mopping function together.

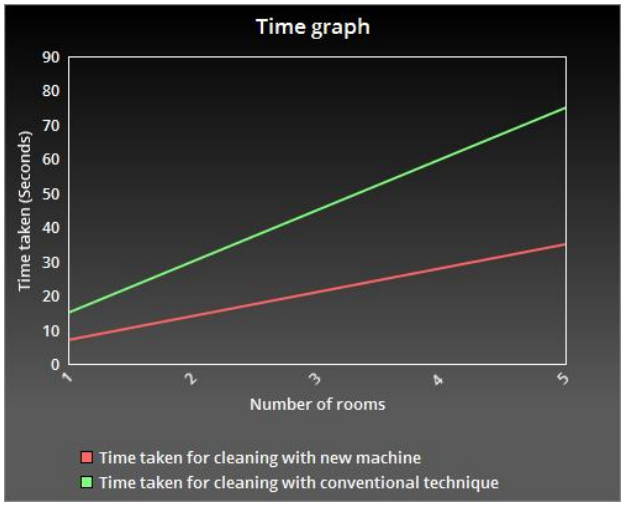

Fig. 3: Comparison of Time Taken In Conventional Vs New Technique

The above graph shows that time required for cleaning and mopping a 10 square feet room is around 15 minutes. While the time required for cleaning and mopping with our model is almost 50% less for a 10 square feet room and is around 6-7 minutes.

	Parts	Cost (Rupees)
1	Metal frame	2000
2	Three motors	3000
3	Two circular microfiber pads	500
4	Microfiber roller	500
5	Handle	200
6	Dust collector	200
7	Controlled flow water tank	600
8	Heater unit	1000
	Total Cost	8000

Table 1: Estimated Cost

IV. RESULTS

The results expected after the implementation of the new floor cleaning machine are as follows:

1) Time spent for floor cleaning is reduced by 50% after the implementation of new floor cleaning machine.
2) Makes floor cleaning in an easy and fast way possible.

V. ADVANTAGES

The proposed new floor cleaner machine has a lot of advantages compared to conventional cleaning technique:

1) Optimizes effort and energy required in floor cleaning.
2) Saves time used for floor cleaning purpose.
3) Promotes awareness about cleaning.
4) Increases work rate of the user.
5) Optimizes water usage.
6) Makes the floor germs free.
7) Simple and unique design.
8) Smoother cleaning operation.
9) Maintenance cost is less.
10) High reliability.

VI. CONCLUSION

So, we can say that floor cleaning in an easy way is possible and India needs to change its way of floor cleaning. The new

floor cleaning machine is not only better than the conventional cleaning way but also make life of people easier and saves time and effort as well.

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