A Literature Review on “Design & Development of Floor Cleaning Machine”

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Abstract—The purpose of this project is to clean the floors in colleges, hospitals, auditoriums, malls and workshops. The aim of this project work is to design and develop process for cleaning the floor having wet and dry surfaces. It is very useful for cleaning the wet as well as dry floors. In modern days interior decorations are becoming an important in our life cleaning of floor is very important for our health and this floor cleaning machine reduces the effort required for cleaning. Hence this project is very useful in our day to day life. It is very simple in construction and easy to operate, anybody can operate this machine easily. This floor cleaning machine consist of moisture cotton mop, swiping brushes, wipers and vacuum cleaner for reducing the cleaning time. 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 floor area in minimum time. However in India, which is a developing country requires large type of such machines to satisfy the cleaning needs.

Key words: Floor Cleaning Machine, Vacuum Cleaner, Wiper

I. INTRODUCTION

Cleaning is essential need of this generation. Basically in colleges, industries, hospitals number of users are more for them regular floor cleaning is required. Different techniques are used to clean the different types of surfaces. The reasons for floor cleaning are:

1) Due to slips on the floors accidental injuries may occur.
2) To beautify the floor.
3) Debris and obstructions are to be removed.
4) Allergens and dusts are to be removed.
5) Surface wear to be avoided.
6) To make the environment sanitary (kitchens).
7) Traction should be maintained at optimum level, so that no slip will occur.

The dust or water present on the floor is scrub by the front two brushes. This dust and water is collected by the vacuum cleaner and the detergent water is sprayed on the floor the mope present in the middle section of the chassis perform rotary motion on the floor which cleans the dirt or dust. The remaining water on the floor is wipe by the wiper present in end of the cleaning machine.

II. LITERATURE REVIEW

A. SANDEEP. J. MESHRAM ET AL [2016]:-

“Design and Development of Triycle 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.

1) It is found that the existing street 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 health problem as the person directly comes in contact with dust. Also, the shoulder problem due to continuously sweeping occurs.

2) A tricycle operated street cleaning machine seems an alternative concept for avoiding such problems enlisted in first point.

3) The tricycle operated machine can work very efficiently with respect to covering area, time and cost of street cleaning process compared with the existing machineries. Also it is economical.

4) It was seen while testing of machine, that the cleaning is less effective where the street seems to be very rough and damaged.

B. M. RANJITH KUMAR ET AL [2015]:-

“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 that the stress level in the manually operated machine is within the safe limit.

C. MOHSEN AZADBAKHT ET AL [2014]:-

“Design and fabrication of a tractor powered leaves collector machine equipped with suction-blower system”- The authors explained about the fabrication of leaves collector machine by tractor powered with suction blower system. He has framed the machine by using chassi, pump, blower, gearbox, hydraulic jack. They concluded total power consumption of that machine is around 14634 W.

D. IMAEKHAI LAWRENCE ET AL [2012]:-

“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.

E. ABHISHEK CHAKRA BORTY ET AL [2013]:-

“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 study if dust is the cause of 10% of these accidents fatalities then the cost could amount to as much as 0.02% of GDP in some developing countries and total about $800 million annually.
F. M. Ranjit Kumar [2015]:
“Design and Analysis of Manually Operated Floor Cleaning Machine” in this the author explains that manually operated floor cleaning machine is an alternative for an automated floor cleaning machines during power crisis. Body is pedal operated to achieve dry and wet cleaning simultaneously.

G. Prof. Dr. A. Muniraj:
“Design & Analysis of Manually Operated Eco-Friendly Road Cleaner”. He has developed the manually operated eco-friendly road cleaner. In this he conclude that 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. The manually operated eco-friendly road cleaner is successfully designed, analyzed and fabricated. This project works implements the manually operated eco-friendly road cleaner for road cleaning that reducing 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.

H. Anup Mendhe [2017]:
“Multipurpose Floor Cleaning Machine”. He reported that the multiple applications provide a wide range of functions in which we can clean the pipe, scrubbing of surface for proper cleaning of the floor, remove dust and dirt from the road, provide a pick and place mechanism by which obstacles can be removed. This project is very helpful for the society and play a vital role in cleanliness of the country. The main motive of the project is to cover the aspects of cleanliness in the society. The multiple applications provide a wide range of functions in which we can clean the pipe, scrubbing of surface for proper cleaning of the floor. This project is very helpful for the society and play a vital role in cleanliness of the country.

I. Sahil Bharti [2015]:
“Design and Development of Cleaning System”. In project a mechanical setup is designed with the synergies of pneumatics and electronics to provide efficient cleaning system both at ground and as well as window levels. This contemporary design helps to overcome the limitations of the existing technologies and surpass them in terms of robot capability, modularity and payload. By integrating on the modular design the wall climbing robot are expected to attain superior intelligence to other small robots in similar caliber.

J. Ajay P. John [2017]:
“Implementation of an Automated Smart Robotic Floor Cleaner”. In this project he introduced an automatic floor cleaning robot capable of performing both vacuum and mopping. It follows an “S” path in order to assure complete and perfect cleaning. The use of passive IR sensors is replaced with ultrasonic sensor and is the major feature of this robot. GSM module helps to enhance its performance by proper communication between user and robot. Moreover in certain scenario, it is necessary for the robot to run more than once through the floor to ensure complete cleaning. Also future researches and updates can be ensured to keep the robot developed by more efficient path routing method and research on using other sensors for detecting waste and obstacles can be able to bring more improvising too. Also, automatic charging process using wireless can be implemented as well as the advancement in speed change mechanism.

K. Aishwarya Pardeshi [2017]:
“Automatic Floor Cleaner”. In this project she conclude that the setup of hardware with a combination of software gives better accuracy and reduces the work load. Man power is minimized. It have Low cost. It is a Time Consuming Device Making a small machine brings a flexibility to do work.

L. Uman Khalid [2015]:
“Smart Floor Cleaning Robot (CLEAR)”. This project work shows the implementation of IEEE Standard 1621 IEEE Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments in terms of smart floor cleaning robot. The project shows a better and simple approach to provide an overview of design of a simple robotic cleaners control design using gadgets and instruments easily available in Pakistani market. This robot (CLEAR) is specially made on the basis of modern technology. CLEAR has all the features which are required for a vacuum cleaner. It can work automatically and manually. It has the feature of the scheduling and it can auto drain itself. CLEAR has many competitors who are selling same product in high prices. This is first locally manufactured smart vacuum cleaner with all the features up to the standards of IEEE. Features of this robot can be enhanced with addition of mapping and high suction. As it has scheduling feature which can be operated with computer only, android and windows app can be made to make it little more user friendly. The target audience with all the features is middle and upper class of Pakistani community. It can also be used for the industries where cleaning with the help of human is toxic, vacuum cleaner can easily be used.

M. Manreet Kaur [2014]:
“Design and Development of Floor Cleaner Robot (Automatic and Manual)”. He reported that the project research facilitates an efficient floor cleaning with sweeping and mopping operations. This robot works in two modes automatic and manual for user convenience. This proposed work provides the hurdle detection in case of any obstacle.
that comes in its way. The obstacle detection range is 1ft. RF modules provide wireless communication between remote and robot and their range is 50m. If there is hurdle in the way of robot, it sends the information to the remote which gets displayed on the LCD. An automatic water sprayer is attached which sprays water for mopping purpose for the convenience of user. User can also operate this robot manually with the help of remote. It reduces the labor cost and saves time also and provides efficient cleaning. In automatic mode, the robot operates autonomously. The operations such as sweeping, mopping and changing the path in case of hurdle are performed automatically.

Nonetheless, there are still new ideas to improve the developed system and to add new functionality to it. Instead of RF module, X bee pro series module can be used to improve the range of wireless communication. GSM module can be used to send message that, the robot has done the cleaning task. Camera can be used for navigation purposes. Vacuum cleaning can also be done with sweeping and mopping. Further, the robot can be made to move randomly in any direction and its speed can be controlled.

N. MANYA JAIN [2017]:-

“Automatic Floor Cleaner”. This research facilitates efficient floor cleaning. Since in project the floor cleaner is incorporated with different devices like DC motor(s), ultrasonic sensors etc., so it will be easy to handle it also saves time and will work automatically for cleaning purpose at homes and offices.

With simple algorithm and program, the cleaner will be able to cover large floor areas as well as find its way into and out of small corners. As the cleaner traverses the room, the sweeper installed in it will manage to pick up a significant amount of dirt. Manual Sweeping might not be that effective as it will not be picking up everything in as it is not in sight but using the automatic floor cleaner it can be done easily.

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III. CONCLUSION

After studying the various research papers of floor cleaning machines we have concluded that there are certain limitations in floor cleaning machines which can be worked upon. For example cleaning machines are made with an aim to clean only dry surface of the floor. This means that they are only sufficient in the summer and winter season but not in rainy season this is the major issue for cleaning the floor surface but during the rainy season floor cleaning machines are required which can perform the tasks when the surface contain moisture or little amount of water on the surface of floor. So we are developing the machine which can work in both dry and wet conditions. This machine called as dry and wet floor cleaning machine. This machine can remove the dust in summer season and also it can remove and clean the dirt, water from floor in rainy season.

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