



Design of mechanically operated floor cleaning machine

¹Y. Srinivas Reddy, ²G.Venkatesh, ³K.Bhanu Prakash, ⁴Md .Areez Ahamad,
⁵G.Siva Harsha Vardan, ⁶A.Surendra

¹Assistant Professor, ^{2,3,4,5,6}UG Scholar, Dept. Of Mechanical Engineering
^{1,2,3,4,5,6}PACE Institute of Technology & Sciences (Autonomous), Ongole, Andhra Pradesh

ABSTRACT - This initiative focuses on the design of new products. Floor cleaning has recently become more popular, as has the development of manually powered floor cleaning equipment. Conventional floor cleaning equipment is primarily used in airports, train stations, medical facilities, bus stops, shopping malls, and other commercial environments. These devices are not user-friendly because they require electricity to function. India experiences power outages during the summer, making it difficult to use most floor cleaning machines efficiently. This is especially true for bus stops. Thus, the creation of a low-cost, user-friendly floor cleaning machine is required. The goal of this project is to develop a manually operated floor cleaning machine to replace traditional floor cleaning methods. The floor cleaning machine was analysed using appropriate software that was sold commercially. The materials that are typically utilised were taken into consideration for the floor cleaning machine's components.

I. INTRODUCTION

Proper cleaning and disinfection will help and protect people's health. Additionally, cleaning and disinfecting can prevent pest infestations by reducing residues that attract and breed bees, pests, and more. Life of floors, walls, etc. it can also be extended due to regular cleaning and maintenance. In recent years, most people prefer to travel by

train or bus, so these places are filled with cake toppers, cold drink bottles, etc. Therefore, regular cleaning of bus and train stations should be done. No cleaning method is suitable for all areas and all areas, effective cleaning depends on the type of cleaning equipment, cleaning method and ease of use of the equipment. Cleaning jobs are physically demanding, and there has been a need for developing systematic ergonomic evaluation methods of new products. In recent years, floor cleaning robots have become increasingly popular among busy and aging populations due to limited labor. But, in India, there is a lot of unemployment, there is a need to develop washing machines and less people. Therefore, the objective of this work is to design, develop and evaluate a manually operated floor cleaning machine. A manually operated floor cleaning is developed with major list of objectives;

1. To achieve simultaneous dry and wet cleaning in a single run.
2. To make the machine cost effective. Easy to operate.
3. Requires no training to operate/ fast.
4. No external power requires.
5. Lower Maintenance Cost and Time.
6. Required less cleaning time.

7. High Cleaning Capability.
8. Clean more space in less time.
9. To reduce the maintenance cost of the manually operated floor cleaning machine as far as possible.

Keeping clean is a must these days. Washing machines are very useful in cleaning floors, outdoor floors in hospitals, homes, auditoriums, bus stops and public places etc. Many researchers have worked hard to review washing machine designs for better results, but many researchers simply operate their washing machines. The machine can be operated with the help of an external source such as electricity, but the machine is designed to be operated manually without the need for electricity or other sources. electricity. To achieve the above objective, the manual power is transmitted from the chain base to the gear through the chain mechanism, and then the power is transmitted to the bevel gear, thus turning the wheel and doing the floor cleaning activities. The machine works completely manually without any external power supply. The construction and design are smaller and more reliable for everyone [1]. It can clean both dry and wet floors and can be easily moved from one place to another because of its light weight and simple design. In addition to that, one of the benefits is being environmentally friendly. The components used in the design of this floor cleaning machine are steel rods, bevel gears, wheels, wooden frames, bearings, rods, wipers, chain bases, equipment. Housekeeping often involves messy, unsanitary, time-consuming and unpleasant tasks such as cleaning floors..

II. LITERATURE SURVEY

[i] Pawan Kumar Ramkisson and Anshu Prakash Murdan, "Smart Standalone Floor Cleaner on Android Device" Nowadays, household and commercial washing machines are very common. However, robots that provide cleaning and mopping tasks with autonomy and remote control are very affordable. This paper presents the design and implementation of an intelligent automatic floor cleaner and Android-based controller. The implementation is based on the Arduino MEGA

microcontroller, a tablet cleaning system with a mobile application and a wireless connection. The Android app has a secure user interface and connects to the robot cleaner via Bluetooth. It can be used to control the movement of the robot, to guide it to space or to mop in a certain direction. Users can fully control the robot in standalone or remote control mode. The cleaning system was implemented with five main components, namely power module (rechargeable DC battery), motor system (drive wheel, rotating brush, vacuum fan, water pump), communication module (Bluetooth Control, HC 06 Bluetooth Module) and software module. (Android remote control). After deploying and testing the prototype, it was found that the robot works on a well-planned basis and is equipped with most features of domestic and commercial cleaning machines.

[II] R. Hari Krishnan, B. Akash Naik, Ganesh. G. Patil, Prashant Pal, Shashank Kumar Singh, "AI Based Autonomous Room Cleaning Bot", 2022 *International Conference on Futuristic Technologies (INCOFT)*, pp.1-4, 2022.

Every day, technology is advancing rapidly. Even for simple tasks like monitoring, cleaning, etc. we use machines. We seem to depend on them, rely on them, and have an irrational desire to have machines forever. For example, one of the machines we use is a cell phone. Everywhere we go, we see people walking around with their eyes glued to their faces, or their devices held to their ears, talking to the person on the other end. of the phone. We have almost completely replaced all aspects of communication, transportation, and other aspects of society with newer methods and tools. This has brought new techniques and tools for various tasks in various fields. Most of the work is done with the help of machines to save time and labor costs. Thinking about projects like this, with an emphasis on saving time and money and doing things with the utmost efficiency. This robot is fully automated and uses the concepts of object detection and room mapping to move around the room and clean the floor.

[III] Vimal Kumar M N, Suresh R, Arun Prasath C, Rajan S, Balaji vigneshwer B G, Staines Wilson D, "A Versatile Robotic Device Designed to Perform Cleaning Tasks on Floor Surfaces", 2023 *International Conference on Sustainable Communication Networks and Application (ICSCNA)*, pp.570-575, 2023. Cleaning the floor and the house is a daily routine. Vacuum cleaners are easier to clean, but they are big, noisy and expensive, which makes them inconvenient. These vacuum cleaners are not suitable for Indian style homes as they take up more space and cost more. This study aims to develop a compact and affordable residential floor cleaning robot with other functions that work through mobile connectivity. This floor cleaning robot uses Arduino as the main component and is also equipped with ultrasonic and infrared sensors. This technology allows the robot to navigate using a smartphone without requiring a strong internet connection. This robot is also equipped with a powerful DC motor for mopping and a vacuum pump with 600 PSI suction power to remove dust. It uses a combination of sensors, algorithms, and programming to navigate your home, avoid obstacles, and efficiently clean floors.

[IV] A. K. Bordoloi, F. Islam, J. Zaman, N. Phukan and N. M. Kakoty, "A floor cleaning robot for domestic environments", *ACM International Conference Proceeding Series*, vol. Part F132085, pp. 1-5, 2017. Although many cleaning machines have entered the market, cleaning robots are still a challenge to the floors of the home with various dust and dynamic obstacles. This paper considers a mobile robot with sweeping, vacuuming, and vacuuming to effectively clean the floors of the home. The robot can avoid collisions and dynamic obstacles by combining information from two sensors: a sharp infrared sensor and an ultrasonic sonar sensor. It can be used in special control procedures and manual operation. In autonomous mode, the robot moves in a zigzag pattern following an edge detection algorithm. It can be operated using the Android app in manual mode. In the test setup, the cleaning efficiency of the automatic and manual modes was 85% and 92%, respectively. It is

possible to clean the floors close to the walls with a cleaning speed of 180 cm² / second, and an average distance of 16 cm.

[V] Jafar Shadiq, Bayu Aji Prayoga, Rita Wahyuni Arifin, S. Sumardiono, Ari Nurul Alfian, "A Floor Cleaning Based-Robotic Combines A Microcontroller and A Smartphone", 2022 *Seventh International Conference on Informatics and Computing (ICIC)*, pp.1-5, 2022. The automatic floor cleaning robot system controls the floor cleaning process through an Arduino Uno machine, which moves with wheels as the basis for the robot's movement. This floor cleaner is still working by hand, so the floor cleaner is still working by hand. To overcome this problem, an automatic floor cleaning robot based on microcontroller and smart control was developed. This means taking advantage of the beauty of the facilities and paying attention to the cleanliness of the room environment. Design of automatic floor cleaning robot based on microcontroller and smart control using Arduino Uno as system controller. Connect to Blynk for remote control and processing, then use the motor driver 1 as a robot driver so that the cleaning robot can move according to the user's commands. When the robot is working, three ultrasonic sensors are used to determine the distance between objects on the left and right front. The module will charge the 12V to 5V battery as the drive current for the Arduino and the motor driver.

III. EXISTING METHOD

In recent years, traditional floor cleaning machines are widely used in airports, railway stations, shopping centers, hospitals and many shopping areas, because cleanliness is one of the important aspects in health and government legislation. To maintain these areas, cleaning the floor is the main task. Conventional floor cleaning machines can be used to carry out floor cleaning in the areas mentioned above. Generally, floor washing machines are used in India, especially in summer when power problem occurs in many places. Therefore, without electricity, it is difficult to clean the floor using old floor cleaning machines .

IV. PROPOSED METHODOLOGY

In recent years, traditional floor cleaning machines are widely used in airports, railway stations, shopping centers, hospitals and many shopping areas, because cleanliness is one of the important aspects in health and government legislation. To maintain these areas, cleaning the floor is the main task. Conventional floor cleaning machines can be used to carry out floor cleaning in the areas mentioned above. Generally, floor washing machines are used in India, especially in summer when power problem occurs in many places. Therefore, without electricity, it is difficult to clean the floor using old floor cleaning machines

V. HARDWARE DESCRIPTION:

1.BELT PULLEY MECHANISM:

Pulleys are used for power transmission in mechanical engines such as cars, trucks and buses. It is also used in wind turbines and agricultural equipment. It is also designed for rotating movements in large machines weighing several tons, such as windmills, washing machines, refrigerators and cranes. There are different types of pulleys in terms of design and function. The open belt drive wheel is in a gear that rotates in one direction and the shafts are parallel. Cross drive kicks help deliver more power, but at lower speeds. Sometimes the belt breaks and the handle turns into a screw. The conical flywheel is faster than the other two flywheels. Speed kicks and loose-joint switches mounted on a shaft run freely and do not supply power. This special pulley is ideal for moving power to multiple engines from a single



source.

Fig 1: Belt Pulley Mechanism

2.BEARINGS :

Balls are "parts that help something turn." They support the rotating shaft in the engine. Machines that use bearings include cars, airplanes, engines, etc. It is also used in household appliances that we use every day, such as refrigerators, washing machines, and air conditioners. Bearings support rotating shafts in wheels, gears, turbines, rotors, etc. in this machine to have better spinning. Reduce friction and spin better. It protects the parts that support the rotation and maintains the correct position of the rotation axis.



Fig 2: Bearings

3.Tank: It stores the water in it. While doing wet cleaning it provides water as per the requirement.



Fig 3: Water Tank

4.Frame: It is a Main part of machine which holds all other parts on it. It is made up of mild steel because it satisfies all the conditions required and also it is easily available in the market.

5.Mop: In professional cleaning, a wet mop or wet mop is used as a second step in surface cleaning. Brush a damp mop over the surface to dissolve and absorb oil, dirt, and dry water. A layer of tissue or microfiber paper and the surface of wet mops. Dry mops or dust mops are designed to remove dry, dirty materials such as dust, dirt, and grime from

floor



Fig 4:Mop

6.Hot air blower: It is an electromechanical device that blows ambient or hot air to speed the evaporation of water to dry the floor. It works by passing air across a heated element to elevate the temperature of the air.

VII. RESULT



Fig 5 :Upper view of Fabricated model



Fig 6:Side view of Fabricated model

VI. CONCLUSION

This machine is made with a manual process, it has the advantages of environmental protection, low

surfaces.

cost, low labor and time. This is a good choice in the current situation because we see the problem of energy or lack of energy to focus around the world. It can be easily operated with both hands and there are few problems. Mechanical floor cleaners can replace room cleaning and reduce labor. It works very well and allows a floor cleaner with an environmentally friendly and economical way to get anywhere. These machines are very cheap to maintain and easy to operate, with benefits related to cleanliness and reducing environmental pollution.

REFERENCES :

- 1) Imaekhai Lawrence ,Evaluating Single Disc Floor Cleaners: An Engineering Evaluation ISSN 2222-727 (Paper) ISSN 2222-2871 (Online) Vol 3, No 4, 2012.
- 2) Liu, Kuotsan, Wang Chulun, A Technical Analysis of Autonomous Floor Cleaning Robots Based on US Granted Patents, European International Journal of Science and Technology Vol. 2 No. 7 September 2013, 199-216.
- 3) M. Ranjit Kumar (1),N. Kapilan (2), Design and Analysis of Manually Operated Floor Cleaning Machine, International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV4IS040912 www.ijert.org Vol. 4 Issue 04, April-2015.
- 4) Uman Khalid1 , Muhammad Faizan Baloch1, Smart Floor Cleaning Robot (CLEAR), Faculty of Electronic Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Pakistan.
- 5) D Karunakaran, B. Abhilash, V. Ananda prasanna, Design and fabrication of hybrid floor cleaner, international journal of engg research & Tech(IJERT) ISSN:2278- 0181,Vol.5 Issue 04,april 2016.