

Automatic Floor Cleaner Machine

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Abstract-

Cleaning floors is an essential activity in homes, offices, hospitals, and industries. Traditional floor cleaning requires manual effort, which can be time-consuming and tiring. The Automatic Floor Cleaner Machine project focuses on designing and developing a simple and cost-effective machine that can assist in cleaning floors efficiently with minimal human effort.

This report explains the design, construction, working principle, advantages, limitations, and future improvements of the automatic floor cleaner machine. The system uses a mechanical frame, wheels, a motor-driven cleaning brush, and a simple mechanism that allows the machine to move and clean simultaneously. The aim of this project is to demonstrate automation in the cleaning systems.

This paper presents the design and development of an automatic floor cleaner machine using mechanical transmission systems. It integrates components such as DC motor, belt drive, bevel gear, and cleaning mechanism for efficient operation.

Cleaning is an essential activity in daily life, but conventional methods require significant human effort and time. This paper presents the design and development of an automatic floor cleaner machine using a mechanical and electromechanical system. The proposed system integrates components such as frame structure, wheels, DC motor, cleaning brush, battery, shaft and belt mechanism, bevel gear, chain sprocket, fiber sheet, pipes, and water tank. The machine is designed to perform both dry and wet cleaning efficiently with minimal human intervention. The mechanism ensures effective motion transmission and uniform cleaning performance. The developed prototype is cost-effective, energy-efficient, and suitable for household and small industrial

applications.

Keyword- Frame structure, Wheels, DC Motor, Cleaning brush, Mop, Battery, Shaft and belt mechanism, Bevel gear, Chain sprocket, Fiber sheet, Pipes, Water tank.

Introduction-

In modern society, automation plays a vital role in reducing human effort and increasing efficiency. Floor cleaning is a repetitive and time-consuming task traditionally performed manually. The development of automatic floor cleaning machines helps overcome these limitations by providing efficient and consistent cleaning.

Recent research shows that autonomous and semi-automatic cleaning systems reduce labour cost and improve cleaning efficiency. This project focuses on designing a mechanically driven automatic floor cleaner that uses simple and economical components.

In modern society, automation has become an important part of daily life.

Many household and industrial tasks are now performed using automated machines.

Floor cleaning is one such activity that can benefit greatly from automation.

Manual floor cleaning using mops or cloth requires physical effort and takes a lot of time, especially in large areas such as schools, hospitals, shopping malls, and offices. Automatic floor cleaner machines help solve this problem by performing cleaning tasks more efficiently and consistently.

The purpose of this project is to design a small-scale automatic floor cleaner machine that can demonstrate the concept of automated cleaning. The machine is

designed using basic mechanical components such as wheels, a frame, and a motor-driven brush. It helps students understand mechanical design, automation, and practical problem solving.

Literature Review

Various researchers have developed robotic cleaners. This system focuses on cost-effective mechanical design.

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Problem Statement-

Traditional cleaning methods:

- Require more human effort
- Consume more time
- Provide inconsistent cleaning

Hence, there is a need for a low-cost automatic cleaning machine that performs efficient cleaning with minimal supervision.

Objective-

- To design a compact and efficient floor cleaning machine
- To implement mechanical power transmission systems
- To perform both wet and dry cleaning
- To reduce human effort and cleaning time
- To design a simple automatic floor cleaner machine.
- To reduce human effort in cleaning floors.
- To develop a low-cost and efficient cleaning system.
- To demonstrate the use of motors and mechanical components.
- To improve cleaning efficiency using rotating brushes.
- To study the working principle of automated cleaning machines.

System Components-

A. Frame Structure

The frame structure provides mechanical support to all components. It is made of lightweight material such as mild steel or aluminium for strength and durability.

B. Wheels

Wheels enable movement of the machine. They are connected to the motor through shaft and transmission mechanisms.

C. DC Motor

The DC motor acts as the prime mover. It converts electrical energy from the battery into mechanical motion.

D. Cleaning Brush / Mop

A rotating brush or mop is attached to the shaft to clean the surface effectively.

E. Battery

The battery supplies power to the motor and pump system, making the machine portable.

F. Shaft and Belt Mechanism

Used for transmitting power from motor to cleaning brush and wheels.

G. Bevel Gear

Bevel gears are used to change the direction of power transmission (e.g., vertical to horizontal).

H. Chain and Sprocket

This mechanism ensures efficient torque transmission between motor and wheels.

I. Fiber Sheet

Used as a base platform for mounting components due to its lightweight and corrosion resistance.

J. Pipes and Water Tank

Water tank stores cleaning liquid, and pipes supply water to the cleaning area for wet mopping.

Design and Construction-

The design of the automatic floor cleaner machine focuses on simplicity and stability. The frame is constructed using lightweight materials that support the entire structure. Wheels are attached to the frame to allow smooth movement across the floor.

The motor is mounted on the frame and connected to the cleaning brush through a shaft or belt mechanism. When the motor rotates, the brush spins and removes dirt from the floor surface.

A handle or support rod may be added to help guide the machine during operation. The machine is designed to maintain balance while moving and cleaning simultaneously.

Experiment Setup-

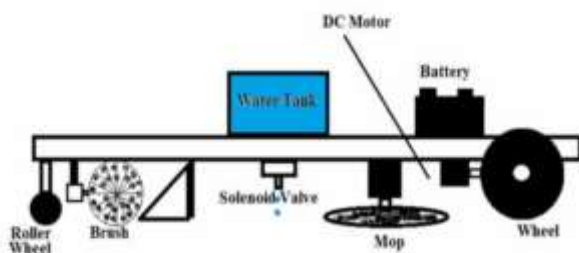


Figure 1. Experimental setup of automatic floor cleaning machine.

Working Principle

The working of the automatic floor cleaner machine is as follows:

1. The battery supplies power to the DC motor.
2. The motor rotates the shaft using belt drive or chain sprocket mechanism.
3. The rotational motion is transferred to:
 - Wheels for movement
 - Cleaning brush/mop for

cleaning

4. Water from the tank is sprayed through pipes onto the floor.
5. The rotating mop scrubs the surface and removes dirt.
6. Bevel gears help in transmitting motion at required angles.

The system performs simultaneous movement, water spraying, and cleaning, improving efficiency.

The working principle of the automatic floor cleaner machine is based on the conversion of electrical energy into mechanical motion

At the same time, the wheels allow the machine to move forward. This combination of movement and brushing enables the machine to clean the floor efficiently.

When power is supplied to the motor, the motor begins to rotate. This rotation is transferred to the cleaning brush through a shaft or belt drive system. The rotating brush scrubs the floor surface and removes dirt, dust, and stains.

Motor drives shaft which rotates brush and wheels. Water is supplied through pipes for cleaning.

Actual Model -



Fig 2. Automatic floor cleaning machine

Testing and Results-

The model shows effective cleaning with reduced effort and consistent performance.

After assembling the machine, several tests were conducted to evaluate its performance. The machine was tested on flat floor surfaces to check its movement, cleaning efficiency, and stability.

The results showed that the machine was able to move smoothly and clean dust and light dirt effectively. The rotating brush helped remove dirt from the floor surface, demonstrating the working principle of the automatic cleaning system.

Advantages-

- Reduces human effort
- Time-saving
- Low cost and simple design
- Portable and easy to operate
- Suitable for wet and dry cleaning

Applications

- Household cleaning
- Hospitals and offices
- Workshops and industries
- Educational institutes

Results and Discussion-

The developed model demonstrates efficient cleaning performance with uniform motion. The mechanical transmission system ensures smooth operation with minimal energy loss. The combination of brush rotation and water spraying improves cleaning effectiveness.

The model shows effective cleaning with reduced effort and consistent performance.

Future Scope

- Integration with sensors for automation
- IoT-based remote control system
- Solar-powered operation
- AI-based navigation system

Conclusion-

The system is efficient and reduces manual effort. Future improvements can enhance automation.

This paper presents the design and implementation of an automatic floor cleaner machine using mechanical and electrical components. The system is efficient, economical, and easy to fabricate. It significantly reduces manual effort and enhances cleaning

performance. Future improvements can make the system fully autonomous.

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