

Automatic Floor Cleaner (The Wireless Wiper)

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Abstract— The object of the invention is to improve the floor drying capacity of a movable automatic floor cleaner with integrated fresh liquid section and soiled liquid section with a fresh liquid line leading from the fresh liquid section to a liquid dispensing point and a soiled liquid line leading into the soiled liquid section with a suction nozzle on the floor side. The liquid dispensing point sprays fresh liquid beneath the automatic floor cleaner and is arranged in front of the suction nozzle in the direction of movement of the automatic floor cleaner which also comprises an integrated suction fan connected on the suction side to the soiled liquid section via a hose and on the exhaust side blows the air taken in through an exhaust air hose. This is attained in that the exhaust air hose terminates in a nozzle on an air guide with an exit aperture blowing the exhaust air in the direction towards the floor area behind the suction nozzle in the direction of travel.

1. INTRODUCTION

Wiping the floor is one of the basic house hold activity ranging from small home to hospitals, schools, institutions, halls, hotels, malls, office buildings, factories, industries etc. This forms the vital factor as its ends in CLEANLINESS. Floor cleaning now a day's involves manual efforts using mops for small ones to big machines for large areas. As a result, the existing mechanism used for surface cleaning is a total consumption of time, money & over all manual energy. Big machines badly need skilled labour, maintenance efforts. And all these points brought outs a cheap, portable, cost effective, time saving machine from our side. This is a prototype and can be enhanced in the near future for sure with lot of facilities as per the need. The treatment needed for different types of floors is very different. For safety it is most important to ensure the floor is not left even slightly wet after cleaning or mopping up.

Sawdust is used on some floors to absorb any liquids that fall rather than trying to prevent them being spilt. The sawdust is swept up and replaced each day. This was common in the past in pubs and is still used in ome butchers and fishmongers. It used to be common to use tea leaves to collect dirt from carpets and remove odours. Nowadays it is sill quite common to use diatomaceous earth, or in fact any cat litter type material, to remove infestations from floors.

There are also a wide variety of floor cleaning machines available today such as floor buffers, automatic floor scrubbers and sweepers, and carpet extractors that can deep clean almost any type of hard floor or carpeted flooring surface in much less time than it would take using a traditional cleaning method.

2. BODY PARTS

Our product is a very simple one whose parts make its maintenance efforts easy. They are as below,

2.1 Wireless control

- a. Receiver fixed in electrical circuit.
- b. Transmitter
- c. Motion – Direction control and various operations in the machine.

2.2 Receiver circuit

Wireless communication is the transfer of information between two or more points that are not connected by an electrical conductor. The most common wireless technologies use electromagnetic wireless telecommunications, such as radio. With radio waves distances can be short, such as a few metres for television remote control, or as far as thousands or even millions of kilometres for deep-space radio communications. It encompasses various types of fixed, mobile, and portable applications, including two-way radios, cellular telephones, personal digital assistants (PDAs), and wireless networking.

2.3 Transmitter circuit

A radio receiver is an electronic device that receives radio waves and converts the information carried by them to a usable form. It is used with an antenna. The antenna intercepts radio waves (electromagnetic waves) and converts them to tiny alternating currents which are applied to the receiver, and the receiver extracts the desired information. The receiver uses electronic filters to separate the wanted radio frequency signal from all other signals, an electronic amplifier to increase the power of the signal for further processing, and finally recovers the desired information through demodulation. The information produced by the receiver may be in the form of sound (an audio signal), images (a video signal) or data (a digital signal).

2.4 Tank

- d. Mixture of 1 water & floor cleaning chemical up to 1 litre
- e. This mixture fluid is used for both surface as well as brush cleaning

A water tank is a container for storing water. The need for a water tank is to supply constant flow of water to ground which also wet the brush. The supply is carried out via tube.in this tank we can also mix chemicals or detergents to the water.

Electronics circuit box – controls 3 motors (A, B, C) and the drier setup.

It contains relays and receiver circuit.

2.5 Relay

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal

2.6 RF Receiver Circuit

Radio receiver design includes the electronic design of different components of a radio receiver which processes the radio frequency signal from an antenna in order to produce usable information.

DC motor & Stepper motor

- f. Totally 3 motors – A, B, C
- g. Actuated by the remote control
- h. Motor ‘A’ – Controls the rotation of the cleaning brush (RPM)
- i. Motor ‘B’ & ‘C’ – motion control (direction) of the four wheels

2.6.1 DC Motor

A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition and therefore it's current. The current in the rotor is switched by the commutator to also be stationary in space. This is how the relative angle between the stator and rotor magnetic flux is maintained near 90 degrees, which generates the maximum torque.

DC motors have a rotating armature winding (winding in which a voltage is induced) but non-rotating armature magnetic field and a static field winding (winding that produce the main magnetic flux) or permanent magnet. Different connections of the field and armature winding provide different inherent speed/torque regulation characteristics. The speed of a DC motor can be controlled by changing the voltage applied to the armature or by changing the field current. The introduction of variable resistance in the armature circuit or field circuit allowed speed control. Modern DC motors are often controlled by power electronics systems called DC drives.

2.6.2 Stepper motor

A stepper motor (or step motor) is a brushless DC electric motor that divides a full rotation into a number of equal steps. The motor's position can then be commanded to move and hold at one of these steps without any feedback sensor (an open-loop controller), as long as the motor is carefully sized to the application. Switched reluctance motors are very large stepping motors with a reduced pole count, and generally are closed-loop commutated. By using this stepper motor direction of the machine is controlled.

Rotor consists of the following,

- j. Cleaning brush

- k. Four wheels – movement controlled by the dc motor

- 1. Spring type down doors that helps in cleaning the brush by holding it when water starts flow.

A rotating part of a mechanical device, for example the DC electric motor is fitted with nylon brush. This brush is an adjustable brush in which we can move up and down.

A brush is a tool with bristles, wire or other filaments, used for cleaning, grooming hair, make up, painting, surface finishing and for many other purposes. It is one of the most basic and versatile tools known to mankind and the average household may contain several dozen varieties. It generally consists of a handle or block to which filaments are affixed either parallel- or perpendicular-wise, depending on the way the brush is to be gripped during use. The material of both the block and bristles or filaments is chosen to withstand hazards of its application, such as corrosive chemicals, heat or abrasion.

A wheel is a circular component that is intended to rotate on an axial bearing. The wheel is one of the main components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labour in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel and flywheel. Common examples are found in transport applications.

Drier consists of

- a. Placed in the centre of the machine
- b. Contains rotating blade, blower and heating coil
- c. Dry up the brush as well as the wet surface.

The Drier setup consists of Fan and Heating coil which is used to dry the wet surface during clean.

2.7 Heating coil

A heating element converts electricity into heat through the process of Joule heating. Electric current through the element encounters resistance, resulting in heating of the element.

Most heating elements use Nichrome 80/20 (80% nickel, 20% chromium) wire, ribbon, or strip. Nichrome 80/20 is an ideal material, because it has relatively high resistance and forms an adherent layer of chromium oxide when it is heated for the first time. Material beneath this layer will not oxidize, preventing the wire from breaking or burning out.

2.8 Fan

Mechanical fan, a machine for producing airflow, often for cooling. Here computer fan (or CPU Fan) is used. The fan consists of a rotating arrangement of vanes or blades which act on the air. The rotating assembly of blades and hub is known as an impeller, a rotor, or a runner.

Drainer Tank consists of the following parts,

- d. Removable tubular container that collects the water used for brush cleaning happens at certain interval.
- e. This water can be discharged once its level is reached.

Drainage is the natural or artificial removal of surface and sub-surface water from an area. The dirty water is collected and stored on this drainage tank and then easily disposed.

3. WORKING

Working of our machine literally starts from the remote signals from transmitter and ends with the movement of wheels & brush and finally cleaning/drying surface and floor. Below are the work flows,

- Ensure the machine is in neutral state – spring down doors closed and brush placed inside.
- Fill the tank with the right proportion of water/chemical mixture
- Start the machine by switching ON the machine by the remote.
- Set the RPM and start moving the wheels using the controls in the remote
- Once the wheels moving brush also rotates with the RPM given.
- Move the machine by commanding its wheels by the remote
- In this process, water/chemical mixture will be coming and wet the rotating brush in parallel.
- The above process is called as “SURFACE CLEAN” where both the wheels, brush are in motion.
- It’s always important to clean the brush frequently often in this process
- This can be done by selecting the “BRUSH CLEAN” option from the remote
- At this time, brush is pulled up to certain distance and down DOOR will automatically closed as it’s a spring type.
- Water starts coming and now the brush will rotate in impulse inside the water within the closed down doors

At the end, water is drained to the drainer.

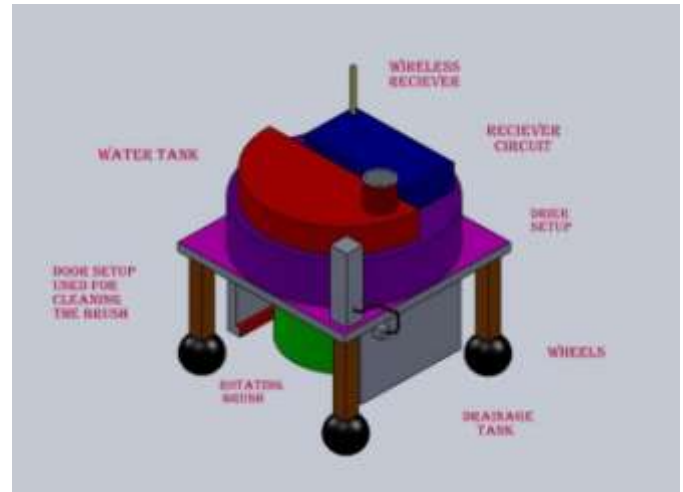


Fig 1.1 Proposed Prototype

4. BILL OF MATERIALS

S.No	Component Name	Cost In rs.	Qty	Specification
1	DC Wiper motor	550	2	12v,90w,60rpm
2	DC motor for brush	640	1	12v,80w,2800rpm
3	DC motor for water spraying	450	1	12v,20w,3800rpm
4	Drier fan	400	1	12v,20w,1000rpm
5	Heating coil (spring type)	100	1	12v, 3A
6	Back Wheel (Nylon)	140	2	6 inch dia
7	Front Wheel (Nylon)	65	2	3 inch dia
8	Water Tank	150	1	1 litre
9	Rotating Brush	300	1	6 inch dia
10	Body* (mild steel)	1000	1	
11	Electronic Circuit	1500	1	

6. MARKET TARGET

We designed the product for home purpose and to sole in market. This product is newer to Indian market but the designed project cost is about rs.6000 (\$150). If we sole in market and during mass production the product cost will reduced up to 50%.

7. CONCLUSION

Thus the floor cleans automatically and also with the help of man power and make our home very clean and neat at low cost.

8. REFERENCES

- www.google.com
- <http://evolution.com/> – Website of Evolution Robotics
- www.amazon.com/...Robotics-Mint-Automatic...reviews/B00408PCEW
- www.jungle.com/automatic+floor+cleaner



Fig 1.2 Designed Prototype

5. ADVANTAGES

- Cost effective & portable.
- Suitable & safe for all type of floorings
- Less maintenance efforts
- Fast cleaning process
- Drying facilities makes the wiping process complete.

No skilled labour is required to operate and hence can be used by the all class home makers like vacuum cleaners

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