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RF Controlled Floor Cleaning Machine

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Abstract: ***Hygiene is very important in our day to day life. To remain healthy we need to keep our surroundings clean and sanitized. Floor cleaning machine performs a better role in the cleanliness of the surfaces. They intend of this project is to clean the dry, wet surfaces with the help of remote. With the advanced technology robots play a better role in the field of work. This project plays a better role in the areas where the lighting is not available all the time (like India in summers). In this pandemic(covid-19), the RF Controlled floor cleaning machine can be used in cleaning the affected places without even touching or going near that affected place.***

Keywords: Control system, Sprinkler system, motor wheel system, vacuum system

1. Introduction

This project is designed for the cleaning of surfaces with the help of remote sensors. Human effort and time is minimized to a great extent and area of cleaning is increases i.e. large surface areas are cleaned in very little time. As the machine is portable and automatic it can be used to clean malls, auditoriums, large halls etc.

Cleaning is essential need of the current generation. Floor cleaning is achieved by different techniques depending on the floor type. RF controlled floor cleaning machine is a highly stabilized and rapidly functionalizes electronic and mechanical control system. The cleaning purpose is specifically carried out by continuous relative motion between a scrubber and the floor surface. During the cleaning and moving operation of machine a propulsion mechanism such as driven wheels and guide wheels for the dry tracking on the floor surface to be cleaned, suction of water is carried out by water pump, scrubbing action is done by the scrubber directing water towards the rear end. Preferably, a sweeper mechanism is mounted on the body forwarded by propulsion mechanism and operated with such control system for advance sweeping of a debris-laden floor surface. A RF controller is used to govern the motion of system which takes the input from sensor circuit and feeds it back to the microcontroller which gives rise to simulation of wheel in a synchronized manner. The basic advantage of this product is that it will be cost effective and less human control is needed.

2. Design

The present work is aimed at designing a compact floor cleaner that can be useful for cleaning purposes. The complete process of the machine starts from the front vacuum pump. It is used to suck dry debris from the floor. This is very much useful for the purpose of pre cleaning of thesurfaces having heavier dirt particles. The debris thus sucked has to be stored so that it could be removed later. This is achieved by using a 12v vacuum pump with a debris chamber attached to it. The next aim is to make the surface wet which is carried out by sprinkling water on the floor. The aim is achieved by using a motor and a sprinkler system. This system has a shower like outlet and a chamber whose outlet is controlled by a dc motor pump. To clean the surface scrubber is usedwhich move or scrub over the floor.

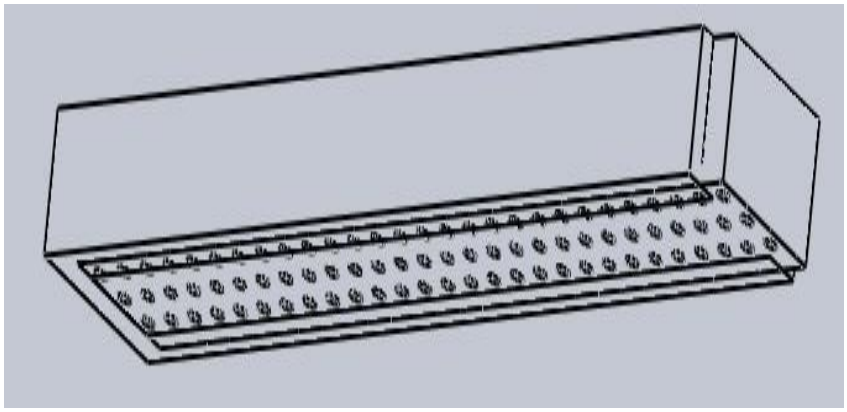
Components Used

Chasis:
It is the back bone of the system. All the systems and parts are attached to it. The solidity of the system is greatly affected by the chassis. It is rectangular shape and its dimensions are 60cm x 40cm.

Vacuum System:
Vacuum pumps are used for two different purposes. One for collection of dry debris and one for sucking of dust mixed with water. Vacuum system is mechanical machinery that creates negative pressure which helps in sucking air. Vacuum exchanges the mechanical input power rotating shaft into pneumatic or hydraulic power by evacuating the air liquid contained in a system. The pressure levels then become lowered than the outside atmosphere. In this project the vacuum system used is of 35000-40000 RPM.

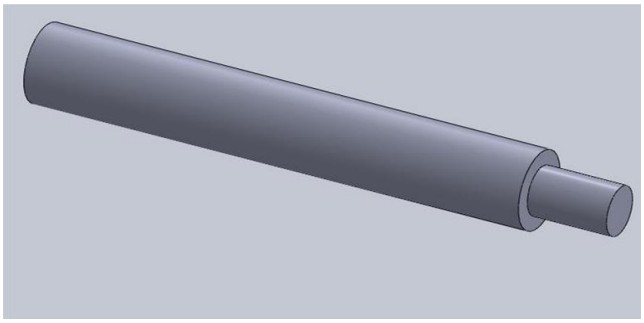
Sprinkle System

The next work of the machine is to make the surface wet. To achieve this we have designed a sprinkling mechanism. The sprinkler system is programmed in such a way that it supplies water in the interrupted manner.



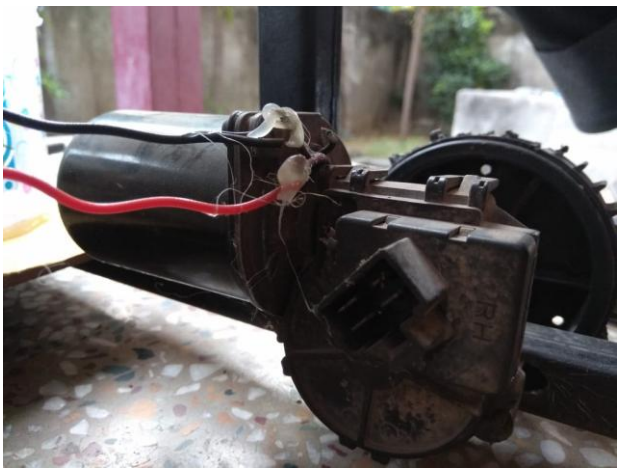
Scrubbing System

In this project the scrubber is given a rotational motion to scrub the surface. The rotational motion is achieved by a 12v DC motor having 600rpm.



Motor Wheel System

The complete product is a four wheel drive automation process. Two wheels are independently connected to two different gear motors.

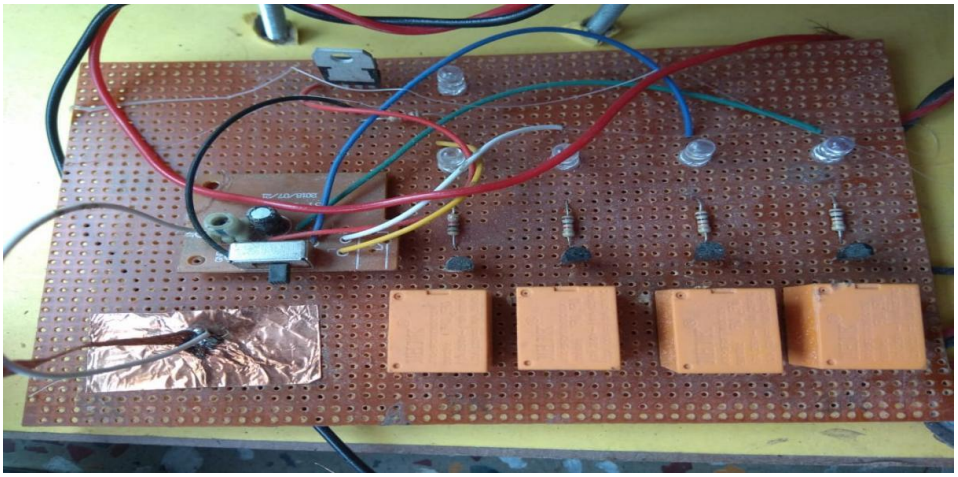


Rear wheels are always in operation to pull the system. The diameter of the wheel is 7.5cm.

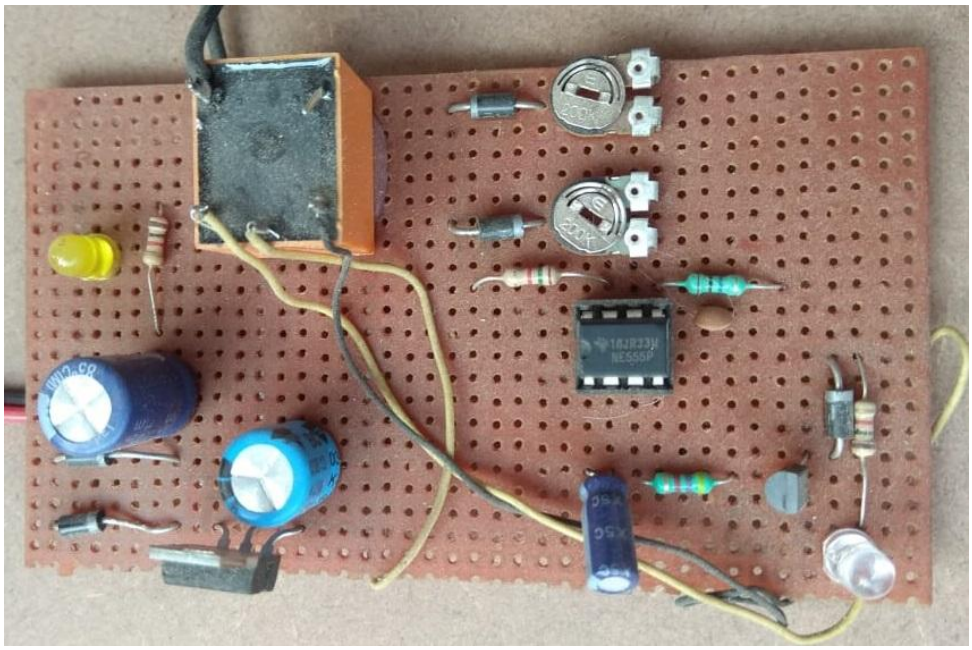
Control System

The purpose of the control system is to give a semi-automatic motion to the machine. When the switch is in on mode, the motion of the machine is controlled by remote and the movement of the machine is thus controlled by remote controller. For the motion in a particular direction relay sets are use which gives direction according to the requirements. In our machine two control systems are used, one control system is for the motion of the machine in the particular direction and another control system is used for the sprinkler system.

For example: In first one, four relay sets are used which gives four different directions to the machine i.e. Left, Right, Forward, Backward.

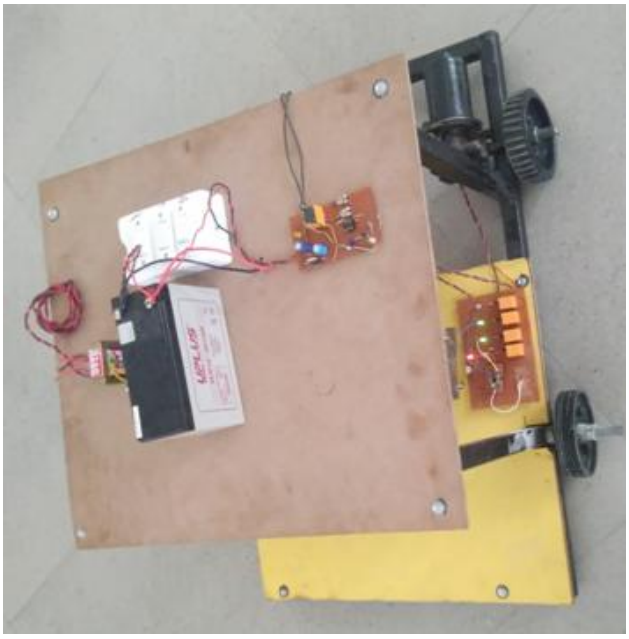


Another control system is used for the sprinkler system i.e. to provide interrupted water supply to the floor, so for this purpose only one relay set is used which provide the flow of water in the discontinuous manner.



3. Working

This module of automatic floor cleaning machine by micro controller is run to clean the floor and sweeps the dust away. In this module, a remote controlled machine has gear motor attached at the front wheels, another motor is attached with a cleaning brush at back and the gear ,motor is connected to 12 volt battery the machine is controlled by the remote which can cover up to 10m range in distance. When the remote controlled machine is operated the DC gear motor is manually operated in switch type, the motor runs in clockwise direction at high speed of 500 rpm and the brush below the motor cleans the floor. The movement and the directionsof a machine are controlled by micro controller.



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4. Conclusion

The product thus developed is fully operational and gives desired motion. It is being tested in a room which results in successful outcome. The scrubber design should be modified in future because the current design has few problems. Few of those are the motor is not detachable and the high rpm leads to vibration of the whole system. If these features will be modified, this will work well. This will be the next development stages. This not only decreases cost but also increases reliability of the instrument. Overall the concept is very much helpful and there is scope of a lot of development in mechanical parts. The optimization will continue till achieving the best one. Overall the project is successful to its intent and will definitely change the era robotics and floor cleaning. The development can be made in the field of sensing. As a whole this is a successful product developed that can be used in current Indian house-hold.

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