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DEVELOPMENT IN FLOOR CLEANER MACHINE

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Abstract -*In this paper, recent developments in floor cleaning machine is proposed. This is capable of performing cleaning of floor and corners effectively, semi-automatic water spray, cleaning of byre, dry as well as wet cleaning tasks. This floor cleaning machine is designed by keeping the basic considerations for machine and operational cost reduction, efforts reduction, environment friendly and easy handling. Manual work is taken over the robot technology and many of the related robot appliances are being used extensively also. Here represents the technology that proposed the working of robot for Floor cleaning. With the advancement of technology, automated floor cleaning machines are getting more attention of researchers to make life of mankind comfortable. Our concept is developing in economic countries but the reasons for non-popularity is the design complexity, cost of machines, and operational charges in terms of power tariff. The machine will work on electricity. This work can be very useful to improve the life style of mankind.*

***Key Words*: Microcontroller, Motor Driver, Ultrasonic Sensor, Suction Unit, Vacuum Unit.**

1. INTRODUCTION

A floor cleaner may refer to either a person's occupation, or a machine that cleans streets. A street cleaner cleans the streets, usually in an urban area. Street sweepers have been employed in cities since sanitation and waste removal became a priority. A Street-sweeping person would use a broom and shovel to clean off litter, animal waste and filth that accumulated on streets. Today, modern street sweepers are mounted on truck bodies and can vacuum debris that accumulates in streets.

In the modern era, the Automatic Floor Cleaner is required. Thus, the cleaner is designed in such a way that it is capable of cleaning the area reducing the human effort just by starting the cleaning unit. In the paper, main focus is to build and program it in such a way, that it can move around freely and clean a specific area by the vacuuming process. Brushes are attached at its side in order to collect the dust while moving. It uses Ultrasonic sensors to detect the obstacles and hence change its direction while moving and also preventing the cleaner to fall from height.

The floor washer is a new mechanism for solving the problems of road cleaning, pipe cleaning, dust or garbage removing that really makes a life difficult.

There are various function of the cleaner machine

- Cleaning of floor by scrubber.
- Blower are used to remove dust and sand.
- Arm and gripper mechanism is used to pick and place the objects.
- Pipe cleaning mechanism is used for cleaning pipe and prevent it to get choked up.

In today's date it is required that all the roads leading towards highways must be cleaned properly and not only the highways but also the roads where the traffic moves daily. Household cleaning is a repetitive task carried out by number of people every day. Hence there is a need of bringing revolution in the area of science and technologies, which could help easily in repetitive tasks which we perform daily. And also giving consideration to the intensity of labour required and improving qualities to its optimum level. There are already several big bulky floor cleaning machines available in the market which are not capable of cleaning the remote areas which are not in the reach. The need of designing a new technological based vacuum cleaner, which could overcome the short coming of existing vacuum cleaner. And also comprehending of new add on facilities vacuuming, mopping, sanitizing the floor using UV light.

The study is more focused towards the economic scale and better sensors technology for avoiding collision with obstacles, navigating its own path and making the vacuum cleaner functionally more competent i.e doing various functions of floor cleaning like vacuuming, mopping and soaking at the same time.

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 some butchers and fishmongers. It used to be common to use tea .leaves .to. collect .dirt. from .carpets .and. remove. odours.

Nowadays it is silly 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 cleaners 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. EXISTING METHODOLOGY

2.1 Development in Floor Cleaner Machine [A] Manually Operated Floor Cleaner Machine

In recent years, conventional floor cleaning machines are most widely used in airports, railway stations, malls, hospitals and in many commercial places, as cleaning is one of the important parameter for the sanitation and government regulations. For maintaining such places, cleaning the floor is the major task which is necessary. There are conventional floor cleaning machines available to perform floor cleaning operations in above said places. Generally a conventional floor cleaning machines requires electrical energy for its operation. In India, especially in summer there is power crisis, in majority of places. Hence cleaning the floor using the conventional floor cleaning machines is difficult without electricity. In this project an effort has been made to develop a manually operated floor cleaning machine so that it can be an alternative for conventional floor cleaning machines during power crisis.

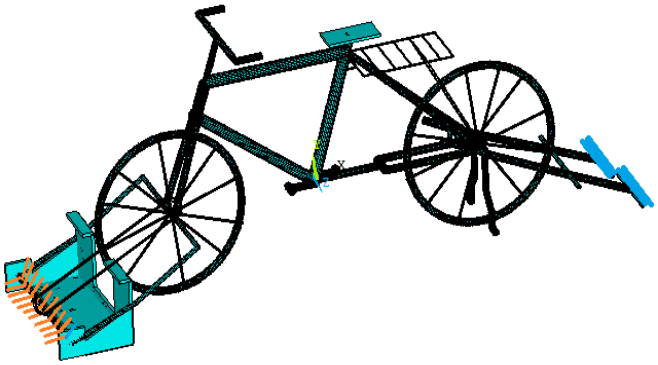

Figure 1: Manually operated floor cleaner

A manually operated floor cleaning is developed with major list of objectives, one; to achieve simultaneous dry and wet cleaning in a single run, secondly to make the machine cost effective and thirdly to reduce the maintenance cost of the manually operated floor cleaning machine as far as possible. In recent years, finite element method is most widely used to analyze the mechanical component design and hence we have used it in the present work.

[B] Multipurpose Floor Cleaner Machine

A street cleaner cleans the streets, usually in an urban area. Street sweepers have been employed in cities since sanitation and waste removal became a priority. A Street-sweeping person would use a broom and shovel to clean off litter, animal waste and filth that accumulated on streets. Later, water hoses were used to wash the streets. Machines were created in the 19th century to do the job more efficiently. Today, modern street sweepers are mounted on truck bodies and can vacuum debris that accumulates in streets.

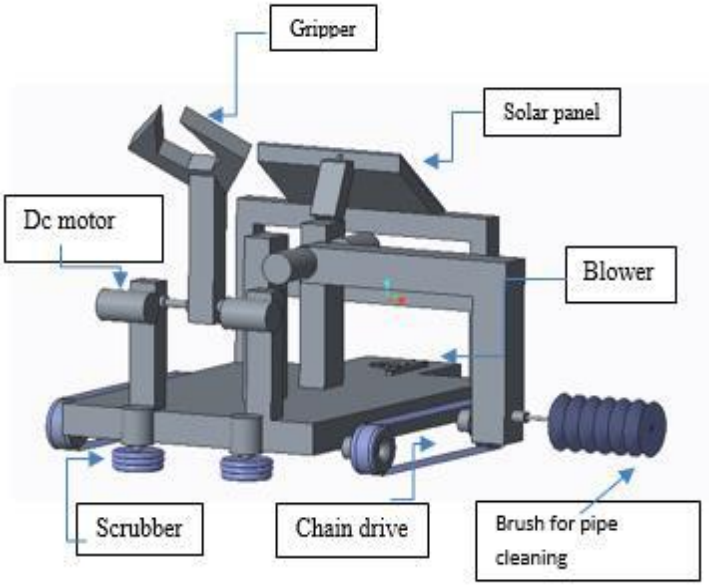

Figure 2: Multipurpose Floor Clear [8]

The floor washer is a new mechanism for solving the problems of road cleaning, pipe cleaning, dust or garbage removing that really makes a life difficult. There are various function of the cleaner machine 1) cleaning of floor by scrubber. 2) Blower are used to remove dust and sand. 3) Arm and gripper mechanism is used to pick and place the objects. 4) Pipe cleaning mechanism is used for cleaning pipe and prevent it to get choked up. In today's date it is required that all the roads leading towards highways must be cleaned properly and not only the highways but also the roads where the traffic moves daily.

The cleaner machine mainly consist of 5 units. The chain drive, pipe cleaner unit, arm and gripper, scrubber & Solar panel. The whole assembly is mounted on a frame made up of wood as it is poor conductor of electricity. In the front side, scrubber is mounted using L-clamp on which motor is mounted and the brush are attached. Above the scrubber, the mechanical arm is mounted using aluminum bars, motor, clamps and worm and gear mechanism operated jaws of mechanical arm while on the rear side, high speed blower is attached to blow out dust towards the side of the floor.

Two aluminum bars are clamped vertically on which the motors are clamped of the top sections of the bars. The brush is attached via a motor which rotates clockwise and anticlockwise to clean the pipes. The chain drive mechanism is used on which the machine will move.

3. COMPONENTS OF FLOOR CLEANER MACHINE

3.1 Electronics Component in Floor Cleaning Machine

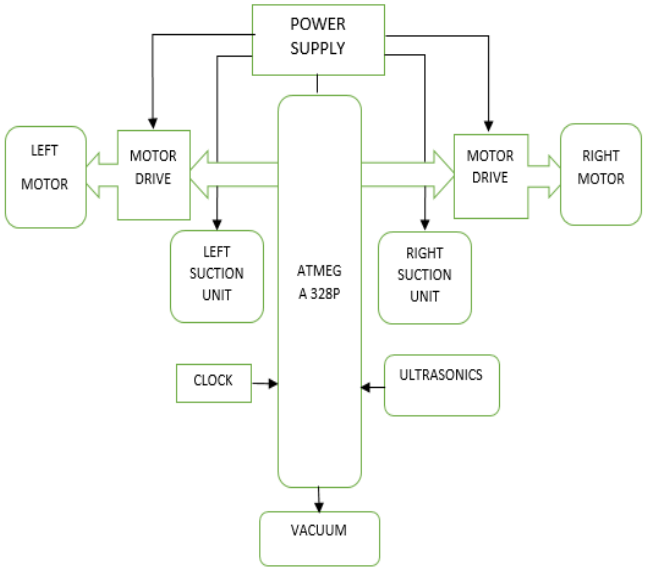

Figure 3: Block diagram of Automatic Floor Cleaner

Microcontroller (ATmega 328p) is used which is provided with clock signal (quartz crystal operating at 16 MHz frequency). DC motors attached to motor drivers to provide high current and most importantly it is installed with a sensors and suction unit to perform vacuum operation effectively. For Power Supply two separate batteries are used. One is used to turn on the cleaning unit and other is used to provide power to the suction unit.

A. Hardware used:

a) ATmega 328p/ Arduino

b) Ultrasonic sensor (SC-H04)

c) Motor driver (L293D)

d) Suction unit (Vacuum)

a) ATmega328/ Arduino:

ATMega328p is the ATMEL Microcontroller on which Arduino board is based. The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB In-System Programmable Flash(ISP) memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines,32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between1.8-5.5volts. The device achieves through put approaching 1 MIPS per MHz Serial data to the MCU is clocked on the rising edge and data from the MCU is clocked on the falling edge. Power is applied to VCC while RESET and SCK are set to zero. ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost microcontroller is needed.

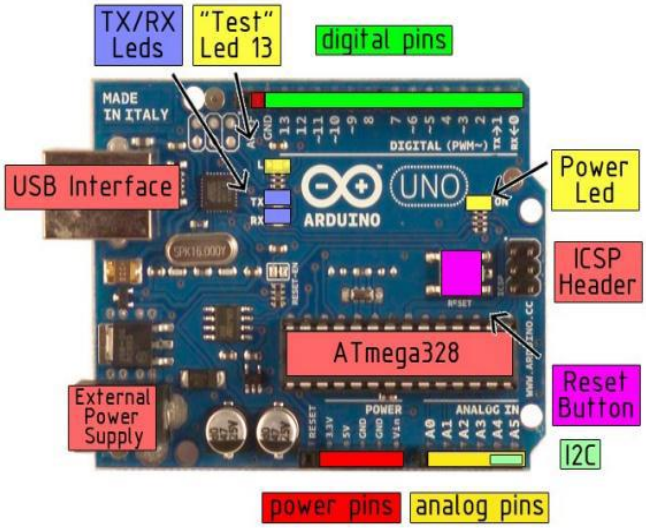

Figure 4: Arduino pin description

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

4. CONCLUSION

In this paper, the recent development in floor cleaning machine i.e from manual operated machine to automatic floor cleaning machine which is the need of these time is described. This design of automated floor cleaning system can be used to clean any kind of remote places. As the motors selected can consume much less power so it will be the power saving and cost is saving too. Also there is a need of a floor cleaner which operates automatically. As well as provides new add on of floor using lights & multiple functioning in one time of operation.

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