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# Bluetooth Operated Vacuum and Floor Cleaner using Android Mobile

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**Abstract -** *The research paper details the development of completely Automated Floor Cleaner. The project is used for both the domestic and industrial purpose to clean the surface . When switched on, it sucks in the dust by moving all around the surface (floor or any other area) as it passes over it. The controller is used to drive the motors and the suction unit also a couple of sensors are used to avoid the obstacles .This can be useful in improving the way of living of man. The purpose of this project is to clean the floors in various localities like colleges, hospitals, auditoriums, malls and workshops. The aim of this project work is to design and develop process for cleaning the floor having wet and dry surfaces. It is very useful for cleaning the wet as well as dry floors. In modern days interior decorations are becoming an important in our life cleaning of floor is very important for our health and this floor cleaning machine reduces the effort required for cleaning. Hence this project is very useful in our day to day life. It is simple in construction and easy to handle, anyone can operate this cleaner easily.*

**Keywords.-Automated Floor Cleaner, Domestic and industrial use, Simple in Construction.**

## 1. INTRODUCTION

### 1.1 Robotic Cleaners

Today , robotic cleaners have gained all the attention in robotics research due to their effectiveness in guiding humans in floor cleaning applications at various sectors like homes, hotels, restaurants, offices, hospitals, workshops, warehouses and universities etc. Basically, robotic cleaners are classified on their cleaning technique like floor mopping, dry vacuum cleaning, sweeping etc. Some cleaners are based on simple obstacle avoidance using infrared sensors on the other hand some utilize laser mapping technique. For example, robots utilizing mapping are comparatively more faster, energy efficient but expensive, while the later are relatively time efficient and less energy efficient because of random cleaning. The main motive behind this project is to provide a substantial solution to the problem of manufacturing cleaner utilizing local resources while keeping the cost less. Cleaning machine is very much useful in cleaning floors and in hospitals, houses, auditorium, bus stands and public place etc. In modern days interior as well as outside cleaning are becoming an important role in our life. Cleaning of waste is a very important one for our health and reduces the man power requirement.

### 1.2 Objective of Paper

1. To develop a machine that helps in easy and quick cleaning.
2. To provide the another option for road cleaning.
3. To reduce human efforts.
4. To save the time.
5. To reduce the cost.
6. To prevent injuries due to tripping or slipping. Injuries due to sliping and triping on level floors are one of the major reason of accidental injury or death. Unhealthy floor cleaning is one of the major cause of accidents.
7. To beautify the floor.
8. To remove stains dirt.
9. To clean grit as well as sand which scratch and wear down the floor.
10. To remove allergens, in particular dust.
11. To make the environment sanitary.

## 2. METHODOLOGY

Planning of work in order to work out the project is as follows:

1. Searching the problem of the society
2. Title finalization.
3. Literature review, for the same refernce papers net facility will be used.
4. To visit workshop, garage facility etc
5. Design: Split conceptual diagram in to parts to be designed and parts to be selected and complete the procedure.
6. Purchase: To purchase parts required to complete the project.
7. Actual Fabrication and Testing.

## 3. LITERATURE REVIEW

A automatic vacuum cleaner is an robotic electronic device that is intelligently programed to clean a specific area through a vacuum cleaning feature. Some of the available cleaners in market can clean around curves and corners while the rest include a number of additional features such as moist mopping and UV sterilization rather than only vacuuming. Some of the available cleaners in market are discussed below.

A. iRobot

In the year 2002, iRobot launched one of its kind vacuum cleaner robot named Roomba. At the beginning, iRobot decided to make limited number of units but Roomba quickly became a huge attraction. Due to increase in its demand, a no of other robots have been brought in the market:

1. Roomba

• Launch Date: 2002

• Manufacturer: iRobot (American)

• Type of Use: Dry Vacuum

• Technology: IR, RF and auto-charging mechanism

2. Scooba

• Launch Date: 2005

• Manufacturer: iRobot (American)

• Type of Use: Wet Washing of Floor

• Technology: IR with virtual wall accessories

• Price: $500

3. Braava

• Launch Date: 2006

• Manufacturer: iRobot, KITECH, Sony

• Type of Use: Floor moping for rough surfaces/Dry clean

• Technology: IR with virtual wall accessories for heavy duty

cleaning

• Price: $700

## 4. PROBLEM IDENTIFICATION

During the manual cleaning/brooming operation some dust and dirt particle may remain on the floor and due to the action of air the dirt and dust particle transfer from one area to another aera which causes the problems during cleaning which tends to increase man effort. Due to which desire cleaning of the surface not possible and because of that it takes more time.

During the rainy season the muddy water are dump on the corner of the wall with the help of manual cleaning it cannot possible to remove all the water from the surface of the floor which creates slippery surface and which may increase the chances of accidents also the water which remains on the corridor enter into the rooms.

Due to uneven surface of the corridor or floor during the wet cleaning of the surface desired cleaning not obtained and backflow of the water occurs which tends to increase manual effort and it is difficult to clean uneven surface of the floor and takes more time for cleaning of the surface.

## 5. CALCULATIONS

1. Battery

Type: Sealed Lead Acid Battery

Capacity: 12 Volts / 7.2Ah

Peak Current: 5.2 Volts

Qty.: 01 Nos.

2.Vaccum Blower

Type: Brushless Direct Current Motor

Rotation Type: Out Runner

Coil Type: Enamelled Copper 99.6%

Operational Req.: 12Volts / 0.35 Amps.

Turbine Size: 2” Diameter x 0.5” Height Motor Body Type: Aluminium Sheet Casing

3. Mop Motor + Wheel Motor

Type: Permanent Magnet Brushed Direct Current Motor

Rotation Type: In Runner

Coil Type: Enamelled Copper 99.6% Operational Req.: 12-36 Volts / 0.3 Amps.

Body Type: Aluminium Sheet Casing

Qty.: 03 Nos.

4. Micro Controller – Arduino Uno

Microcontroller: ATmega328P – 8 bit AVR family microcontroller

Operating Voltage: 5Volts Recommended Input Voltage: 7-11V

Input Voltage Limits: 5-20V

Analog Input Pins: 6 (A0 – A5)

Digital I/O Pins: 14

DC Current on I/O Pins: 40 mAmpere

DC Current on 3.3V Pin: 50 mAmpere

Flash Memory: 32 KB

SRAM: 2 KB

EEPROM: 1 KB

Frequency (Clock Speed): 16 MHz

5. L298N 2A Dual Motor Driver Module With PWM Control

Driver Model: L298N 2A

Driver Chip: Double H Bridge L298N

Motor Supply Voltage(Maximum): 46V Motor Supply Current(Maximum): 2A

Logical Voltage: 5V

Driver Voltage: 5-45V

Driver Current: 2A

Logical Current: 0-36mAmpere

Maximum Power (W): 25W

6. HC-06 6pin Bluetooth Module

Input Supply voltage (V): 3.6 ~ 6

Input current (mA): 50

Maximum Operating Range (m): 10

Operating Frequency: 2.4GHz ISM band

Modulation: GFSK

Emission power: 4dBm, Class 2

Sensitivity: -84dBm at 0.1% BER

Operating Temperature (°C): -20 ~ +75

Dimensions: Length (mm) 43 x Width (mm) 16.5 x Height (mm) 7

7. 12 Volts Charging Input Circuit

Charging Capacity: 2A

Therefore, Total Power Consumption:

(Mop Motor x 1) + (Vaccum Blower x 6) + (Micro Controller x 1) + (Motor Driver x 1) + (Bluetooth Module x 1)

That is,

= [(12 x 0.25)3] + [(12 x 0.35)6] + (12 x 0.09) + (5 x 0.036) + (5 x 0.05)

= 9 + 25.2 + 1.08 + 0.18 + 0.25

= 35.71 Watts

Available Power from On-Board Source at Full Charge:

86.4 Watts

Then Power Back Up of the Unit:

= 86.4 / 35.71

= 2 .419490339

= 2 Hours 25 Minutes

But Power Source used is SLA type Lead Acid battery with no Deep Cycle Capability

Hence, considering Discharge Efficiency of 50% for Long lasting Battery Life of 800 Cycles as per Manufacturer Recommendation, we get

(86.4 x 50)/100

= 43.2 Watts

Therefore,

Power Back Up of the Unit:

= 43.2 / 35.71

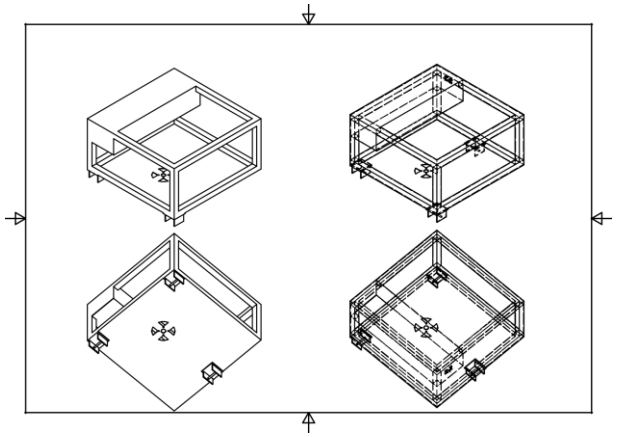
= 1.209745169

= 1 Hours 13 Minutes

It should be noted that power backup can be doubled using similar Capacity and rating Battery in Parallel Connection Together.

## 6. RESULT

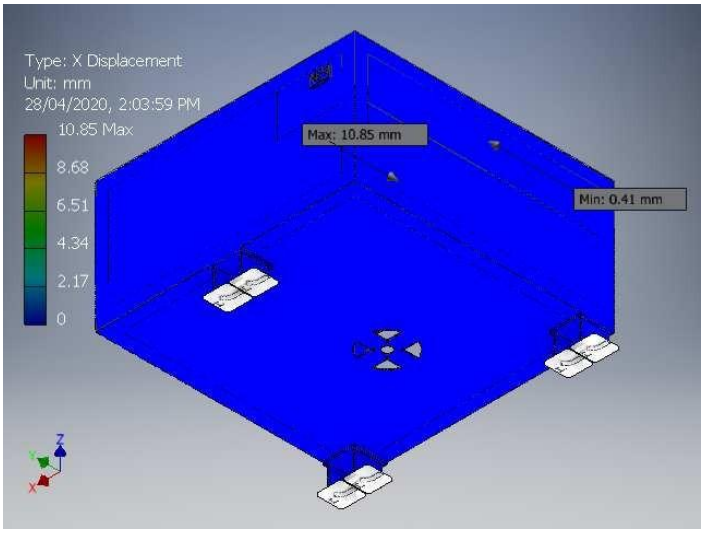
### 6.1 3-D Frame Model



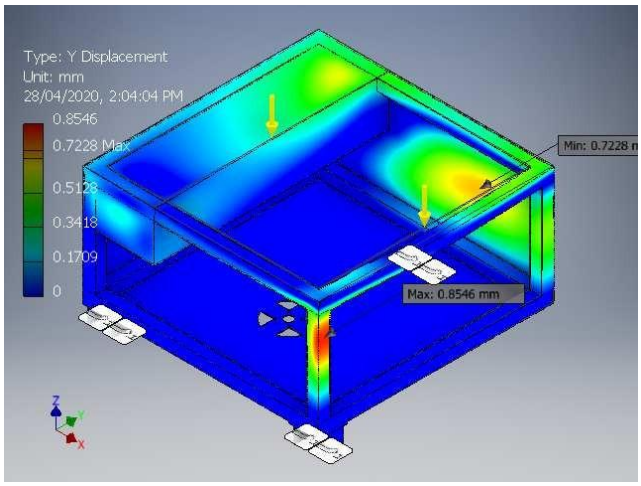
### 6.2 Ansys Analysis

Displacement-

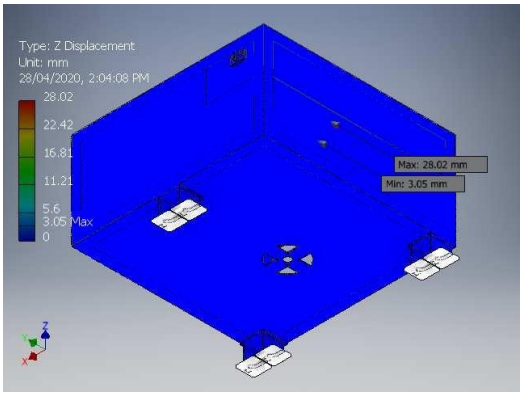
X-Displacement



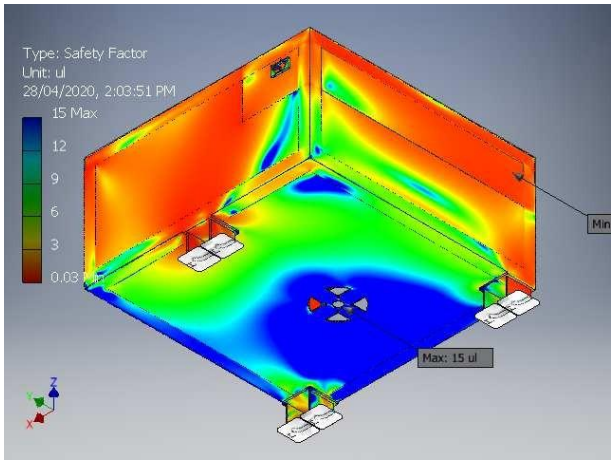

Y-Displacement



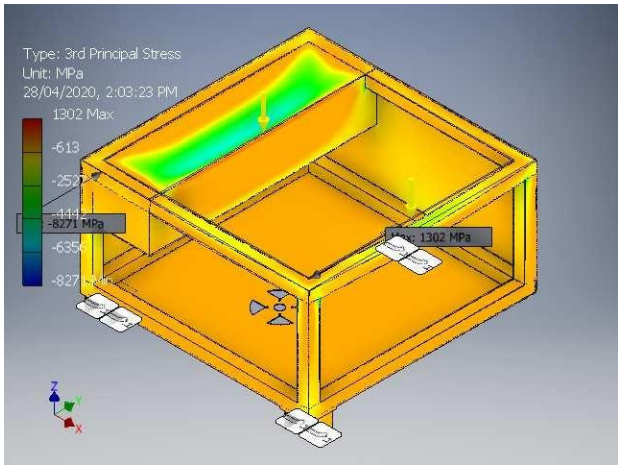

Z-Displacement




### Safety Factor




### 3-D Principal Stress




## 7. CONCLUSION

As discussed in this paper, Bluetooth Operated Vacuum and Floor Cleaner using Android Mobile was designed, planned, fabricated and executed and troubleshooted by the Project group members. The design was aimed towards development of a Efficient, Low Cost Frame and Model on the basis of most time tested design parameters as guided by the Project Guide. The Results were acceptable above the Expectations factors preset during trials. It is suggested that the Future Scope of the Project in upcoming phase concentrates on further weight reduction of the model by use of Polymer Moulded Body and space saving design parameters while keeping the cost same or lower it. Overall this Project has vast modification and future development possibilities taking into account the guidelines given under Hon' Prime Minister of India – Mr. Narendra D. Modi's Swachh Bharat Mission.

## 8. ACKNOWLEDGEMENT

Although it is a stimulating and motivating experience, completing a project takes a lot of effort, time and energies. And apart from the efforts of one's own, the success of any project

largely depends upon the guidelines and encouragement of many others. I would like to take this opportunity to express my deepest gratitude to the people who have been instrumental in the success of this project.

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