

Shoe Sanitation and Odour Removal Machine

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Abstract---Shoes are an important part of our day to day lives and we use it on a daily basis. Using the shoes on daily basis makes them trap moisture and stink. It is not feasible to wash the shoe everyday as it can destroy the material of the shoe. The machine is a considerable alternative to washing shoe. Basically, the machine uses 3 distinctive methods to tackle the core reasons of foul smell arise in shoes. Firstly, Heater will be operated for few minutes to remove the moisture from the shoes. Then the Ozone (natural disinfectant and deodoriser) and UV Light (for killing germs and proliferating bacteria) will operate simultaneously. The machine also contains 3 shoe sanitation mode and one cloths mode for removing smell for socks.

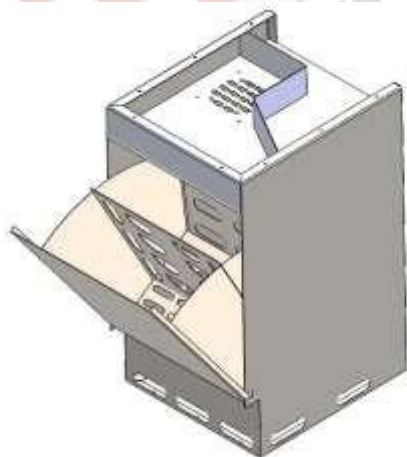
I. PURPOSE

Shoes are an important part of our day to day lives and we use it on a daily basis. Using the shoes on daily basis makes them trap moisture and stink. It is not feasible to wash the shoe everyday as it can destroy the material of the shoe. The mechanism is designed to remove foul smell and bacteria from shoes. The machine has dimension of 410*340*620 mm (including components compartments), its designed to fit 2-4 pair of shoes or and a pair of socks vertically so more shoes can fit in less place.

The mechanism has 3 main components for the process to be carried out: -

- i. Heater – To keep the shoes moisture free.
- ii. UV light – for killing germs and Proliferating Bacteria.
- iii. Ozone – Natural Disinfectant and deodoriser.

The process by the above-mentioned components is carried out such way that, if the shoes contain moisture the machine remove the moisture and then the Ozone and UV Light works simultaneously to remove odour and bacteria from shoes.



II. APPROACH.

Objective of this project would be help design, manufacture, assemble a product which would be a considerable alternative to washing our shoes and to create a sense of awareness and develop personal hygiene. Also, to avoid wastage of water and time. We have tried to come with a mechatronic for sanitation and odour removal of shoes. We are using heater, ozone generator, UV light, fans driven by the help of ESP32 in sauch a way that it is suitable for every type of shoe and to make the product human friendly and less complex

III. COMPONENTS

The components present in the mechanism for its working are: -

1. Fan 1 = 4" Fan (Heater Fan, for ventilations of heat through the cabinet)
2. Fan 2 = 6" Fan (Exhaust fan)
3. Heating Coil
4. DHT11 (Temperature sensor)
5. UV light (Germicidal Light)
6. Ozone Generator (Removal of odour)
7. ESP-32 (Micro-controller with inbuilt Wi-Fi module)

IV. WORKING

There are 3 modes for the shoe and one mode for cloths (if you wish to sanitize your cloths): -

- i. Basic Mode
- ii. Moderate Mode
- iii. Advance Mode
- iv. Cloth's Mode

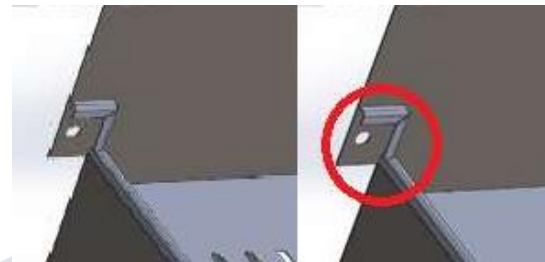
All the modes perform same functions, just the time for which the function is performed defers. The user is able to select the suitable mode using an app specially made for this machine.

Components	Basic Mode		Moderate Mode		Advance Mode		Cloths Mode	
	On time	Off time	On time	Off time	On time	Off time	On time	Off time
Heater	0	120	0	180	0	240	0	120
Fan - 1	0	180	0	210	0	270	0	180
Fan – 2	120	180	180	210	240	270	120	180
Ozone & UV (same time)	180	270	210	540	270	810	180	540
F1 & F2 (same time)	270	300	540	600	810	900	540	600
Total time	300		600		900		600	

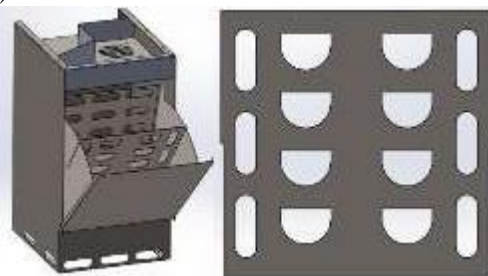
Real time working

V. DESIGN

Designing plays a very important role for manufacturing any project. It helps us understand how our final product would be and look like. You can get the Realtime simulation of the product without actually making it. The dimensions of the mechanism are 400mm*410mm*640mm(l*b*h), it includes the shoes cabin and 3 component cabins (at top, behind and bottom).



Sketch.4



Sketch.1

Sketch.2



Sketch.5

The Sketch.1 shows the finalized design of the shoe cabinet, where we have designed the inner cabinet in such way that closes vertically so that it contains more shoes in less space (it contains 3-4 pairs of shoes/ heels). The Sketch.2 shows the dividing between the one compartments of shoes. The semi-circle holes in Sketch.2 are for the heels to be hanged by heel of them, so that they don't fall on closing the cabinet.

The Sketch.4 shows us the mechanism to made to remove air gap, so that ozone stays trapped inside the inner cabinet for the for removing smell and bacteria. The Sketch.5 is the rubber gasket we are going to apply on the mechanism displayed in Sketch.4 and various other parts so that there would be no air-gap.



Sketch.3

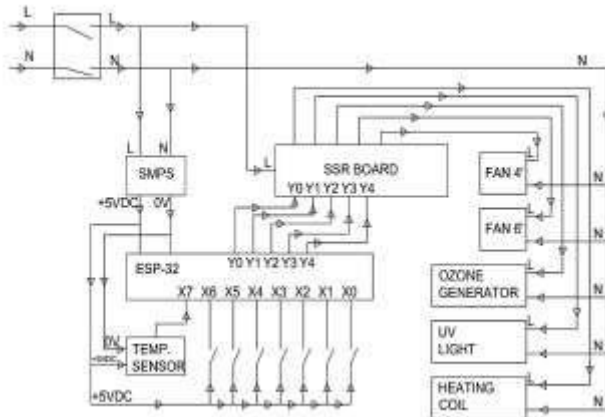
The Sketch.3 shows the diversion made for the heater and heater fan. We have made a separates compartment for the heat circulation of the mechanism so that the other components don't get affected by the heat produced by heater.



Sketch.6

The Sketch.6 shows us the lower component cabinet made for the lower fan (6"), for the sole purpose of removing the heated air and ozone after the work is done.

VI. CIRCUIT DIAGRAM



VII. SUMMARY AND CONCLUSION

- Ozone being a very good disinfectant, it also helps in deodorisation.
- UVC Germicidal Blub helps eliminate viruses and bacteria if present.
- The Heater helps in the temperature control while the carbon filter help trapping the bad odour.
- The ventilation system ensures moisture control.
- All these components combined with a proper logic and code, turns out to be effective and efficient.
- After testing, the project was found to be a success and gave good results.

VIII. FUTURE SCOPE

- Since this product uses UV light which kills bacteria, Ozone Generator which is a natural disinfectant, this product can be modified as per required and used to clean fruits and vegetables.
- This can be used to Sanitize our clothes even against the most proliferating viruses and bacteria.

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