

Mechanism of Automatic Sanitising Machine

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ABSTRACT:The world is suffering from novel corona virus and the virus is spreading rapidly. According to specialists and researchers, the main cause of spreading of virus is close contact between one another. To provide the layer of protection to every individual the proposal of low cost, portable Automatic Sanitising Machine is introduced which sanitises an individual's whole body with sanitiser including cloth and shoes. The study of this machine deals with the flow of the fluid and working mechanism of the machine in a computational manner.

Keywords: Covid-19, Sanitisation chamber, Automatic Sanitising Machine, Portable.

I. INTRODUCTION

From previous few months it is found that the corona virus has affected the entire world by spreading at unexpected rate. This virus has taken the lives of millions of people across the globe and has disrupted the global economy. Many countries failed in dealing with disease outbreak, which highlights the need to develop the system and the tools to improve the response to disease outbreak. The main strategy used to reduce the transmission of this deadly corona virus is to reduce contact between the people.

When an infected person speaks, sneezes, coughs very fine droplet particles are produced, these particles are main medium of the transmission of the disease. These viruses may stay on different surfaces for few hours to few days depending on the environmental condition. During this period if a person touches the infected surface and then touches his/her nose or mouth or eyes, the virus may enter the body and make a person infected. The virus may stay on cloth and body surface too and travel to another surface. To reduce spreading of the disease, frequent disinfection is

necessary. It is found that 10% of the frontline health worker got infected while treating the patients as virus gets stuck on the PPE kits.

To provide an extra layer of protection, contactless frequent sanitisation of the body is necessary. For this we propose low cost, portable Automatic Sanitising Machine which disinfects the whole body in a contactless way. This machine can be used in hospitals, educational Institution, shopping malls, theatres etc. to reduce the risk of spread of the covid-19.

Research

Various studies were done about the sanitising chamber and the flow property of the fluid in the machine.

II. DESIGN OF AUTOMATIC SANITISING MACHINE

The proposed design of Automatic Sanitising Machine is shown in figure 1. The machine has dimension of 3.5ft (width)*4ft (length)*7ft (height). The aluminium sheet of 20 gauge (0.912mm) encloses the sides and top of the machine. Five nozzles are used in this machine, two nozzles are placed at the height of 1.5ft from the bottom, similarly two nozzles are placed at the height of 4.5ft from the bottom. And one nozzle is placed at the top of machine. The top nozzle is placed at the centre of the machine.

Three aluminium frames are used in the machine which provides support to the machine and tension to the aluminium sheet. The diagram of frame is shown in figure 2.

The sanitiser used in the machine is pumped by the pump of 1HP. The sanitiser flows in PVC pipe of 20mm diameter and a wall thickness of 3mm. The machine is designed in such a way that only one person enters the chamber at a time.

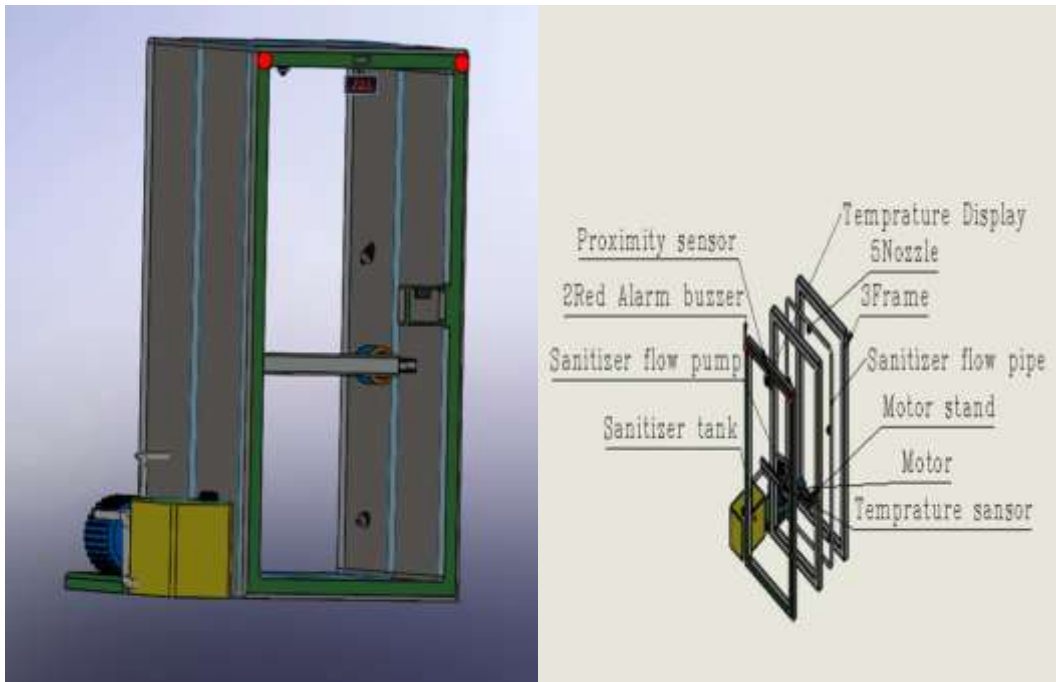


Figure 1:- ASM Figure 2:-Frame& pipe

The temperature displaying LED is placed at the entrance of the machine which displays the temperature of the body. A machine is also provided with the proximity sensor, temperature sensor and buzzer. A barrier is also mounted on the middle frame which is driven by servo motor.

The nozzle used in this machine is plane orifice atomiser nozzle of 0.3mm diameter which produces very fine mist of sanitiser of range 3 microns to 107 microns. The nozzles which are used at the height of 4.5ft from the bottom are inclined at an angle of 45 degree for effective sanitisation. When these nozzles spray sanitiser at a time the whole body is sanitised including cloth and shoes.

III. PERFORMANCE CRITERIA

To check the performance of the machine, the operation of the machine is studied with different values of the discharge. After various studies it is found that at the discharge of 2.1 litre/hr the spray angle formed is 50°, similarly at discharge of 2.9 litre/hr the spray angle formed is 55° which produces mist of bigger size and may result in wetting of the cloth but at discharge of 4.4 litre/hr, the spray angle formed is 90° which produces very fine mist of size 3 microns to 107 microns which does not wet the cloth and thus is suitable from economical point of view. It is found that at the discharge of 4.4 litre/hr the machine is

more efficient and the wastage of the sanitiser is low at this value of discharge.

IV. RESULTS

The position of the nozzles were initially at the height of 1ft but after several studies the position of nozzle were changed to 1.5 ft and 4.5 ft from the bottom of the machine.