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Shoe Sanitization Machine

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***Abstract*: In this paper, a construction of a Shoe sanitization machine is done through means of IR sensor and micro-controller. The main objective of the system is to disinfect the shoes by throwing liquid sanitizer. The system looks like a shoe mat. We place sanitizer sprayer under the mat. The system sprays liquid fluid when it senses the shoes. A IR sensor array is used for sensing the presents of shoes or people. The micro-controller is responsible for coordinating whole system such as, ON/OFF the liquid flows, senses the shoes etc. Additionally, the proposed unit provides the required amount of spillage and gets prepared for the next action rapidly within 15 seconds of duration.**

***Keywords*: IR sensor, micro-controller.**

1. Introduction

A novel coronavirus (COVID-19) was identified in 2019 in Wuhan, China. This is a new coronavirus that has not been previously identified in humans. COVID-19 spreads primarily from person to person. Fighting this disease is our joint responsibility. The main idea of this project is to make a tunnel that can try and prevent the spread of COVID-19.

The disinfectant solution used consists of a combination of sodium hypochlorite (NaOCl) and water (H2O). The disinfectant is non-volatile, thus enabling prolonged veridical and bactericidal activity and sanitizing the surfaces.

The Smart micro-controller system is an effective germ killing delivery system for shoes when used as directed for: Medical/Lab & Health Care Clinics, Food Processing, Sports Facilities & Locker Rooms, High Technology, Veterinary, Emergency Medical & Fire Service and Law Enforcement.

So, we select and took this initiative to make this Smart Disinfection and Sanitation Tunnel.

Objective:

To find the problem and the weakness, this project needs to do specific research and studying to develop the best technology. To prepare for its success there are many things that we want to know such as How can Shoe will be sanitize, How its design, benefits of this project these are the list of the purpose to be conducted before continue to proceed on this project.

- Remove or destroy harmful microorganism
- Disinfect the shoes by throwing liquid sanitizer
- Prevent Shoe form infection

2. Literature Review

The World Health Organization (WHO) on January 30, 2020 publicly declared the COVID-19 pandemic as a global emergency because of the rapidity at which it had spread worldwide. The virus has shaken worldwide economies leading to a stock market crash in many countries. Since, the first bunch of cases identified in Wuhan City, China, in December 2019, the coronavirus pandemic has rapidly spread across China as well as over the borders, causing multiple incidents in nearly all countries of the world except Antarctica Despite the scarcity of publicly available data, scientists around the world have made progress in estimating the scale of the pandemic, the progression rate, and various transmission patterns of the disease. Recently, clinical data confirmed that a significant portion of the COVID-19 patients show diminutive symptoms for the first four days, which illustrates the stealthy transmission potential of this contagious disease. Scientists have deliberated that COVID-19 is far more transmittable and lethal than the ordinary flu. As coronavirus is an enveloped virus, any low-level disinfectant (e.g., 1% w/v sodium hypochlorite, isopropyl alcohol) will be able to destroy it. An ideal disinfectant for spraying and to be used in these tunnels should be nonvolatile, require less contact time, be harmless to mucous membranes and skin, and have veridical and bactericidal activity. There are no guidelines and evidence supporting the efficacy of these disinfectants for human disinfection. These disinfectants can destroy the outer envelope of the virus, only if allowed for a recommended con-centration with a contact period of more than 60s. Reduced contact period and diluted concentration limit the efficacy of these disinfectants. Direct inhalation or spraying of these disinfectants on human skin can be toxic and corrosive to skin and lead to various allergic disorders. Even for once, if we may think that these DTs may deactivate the virus on contaminated surfaces (skin and clothes of the person), any asymptomatic patient would remain infective as the virus in the nasopharynx and respiratory tracts remains viable

Mental health impacts among health workers during COVID-19 in a low resource setting: a cross-sectional survey

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from Nepal. Pratik Khanal, Navin Devkota, Minakshi Dahal, Kiran Paudel & Devavrat Joshi Globalization and Health volume 16, Article number: 89 (2020).

3. Project Methodology

Fig. 1. Hardware setup

Hardware Required:

- Sensor (IR proximity) - used for sensing shoes or people's feet.
- Water pump - flows liquids disinfection liquid from tank to mats.
- Sanitizing tank - The reservoir of liquid fluids.
- Water spring head - used for spraying the fluids.
- Connecting pipe - used for supplying liquid sanitizer from sanitizing tank to shoes mats.
- Frame - customized frame (made from mild steel)

1) I/R sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation. There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems.

Fig. 2. I/R sensor

2) High pressure DC pump

Fig. 3. High pressure DC pump

A booster pump is a machine which will increase the pressure of a fluid. They may be used with liquids or gases, but the construction details will vary depending on the fluid. A gas booster is similar to a gas compressor, but generally a simpler mechanism which often has only a single stage of compression, and is used to increase pressure of a gas already above ambient pressure. Two-stage boosters are also made. Boosters may be used for increasing gas pressure, transferring high pressure gas, charging gas cylinders and scavenging.

3) Piping

Fig. 4. Pipe

A tube, or tubing, is a long hollow cylinder used for moving fluids (liquids or gases) or to protect electrical or optical cables and wires.

The terms "pipe" and "tube" are almost interchangeable, although minor distinctions exist generally, a tube has tighter engineering requirements than a pipe. Both pipe and tube imply a level of rigidity and permanence, whereas a hose is usually portable and flexible. A tube and pipe may be specified by standard pipe size designations, *e.g.*, nominal pipe size, or by nominal outside or inside diameter and/or wall thickness. The actual dimensions of pipe are usually not the nominal dimensions: A 1-inch pipe will not actually measure 1 inch in either outside or inside diameter, whereas many types of tubing are specified by actual inside diameter, outside diameter, or wall thickness.

4) Fogging nozzle

Fig. 5. Fogging nozzle

Inside, there is a high-pressure pipeline with 4 4-Way Fogger which can be connected. The fog leaves no marks on clothes,

while completely enveloping the incoming person and destroys the virus even in hard-to-reach folds of clothing and protects for some time after the exit.

5) 4 Way Fogger

Discharge Rate: 30 LPH/0.5 LPM (for 1 fogger)
Recommended Pressure: 45-60 psi
Average Droplet Size: 65 microns (at 55-60 psi)
Filtration Required: 130 Micron (120 mesh)
Pump required: 40 to 45-meter Head

6) Reservoir tank

Fig. 6. Reservoir tank

Reservoirs can be created in a number of ways, including controlling a watercourse that drains an existing body of water, interrupting a watercourse to form an embayment within it, through excavation, or building any number of retaining walls or levees.

Defined as a storage space for fluids, reservoirs may hold water or gasses, including hydrocarbons. *Tank reservoirs* store these in ground-level, elevated, or buried tanks. Tank reservoirs for water are also called cisterns. Most underground reservoirs are used to store liquids, principally either water or petroleum, below ground.

7) Wheels

Fig. 7. Wheels

In its primitive form, a wheel is a circular block of a hard and durable material at whose center has been bored a hole through which is placed an axle bearing about which the wheel rotates when torque is applied to the wheel about its axis. The wheel and axle assembly can be considered one of the six simple machines. When placed vertically under a load-bearing platform or case, the wheel turning on the horizontal axle makes it possible to transport heavy loads. This arrangement is the main topic of this article, but there are many other applications of a wheel addressed in the corresponding articles: when placed horizontally, the wheel turning on its vertical axle provides the spinning motion used to shape materials (e.g. a potter's wheel); when mounted on a column connected to a rudder or to the steering mechanism of a wheeled vehicle, it can be used to control the direction of a vessel or vehicle.

8) Battery

A battery converts chemical energy into electrical energy by a chemical reaction. Usually the chemicals are kept inside the battery. It is used in a circuit to power other components. A battery produces direct current (DC) electricity (electricity that flows in one direction, and does not switch back and forth).

Using the electricity from an outlet in a building is cheaper and more efficient, but a battery can provide electricity in areas that do not have electric power distribution. It is also useful for things that move, such as electric vehicles and mobile phones

Fig. 8. Battery

Table 1

Brand	POWERSAFE
Package Dimensions	15.5 x 10.5 x 6.5 cm; 2 Kilograms
Number Of Items	1
Voltage	12 Volts
Batteries Required	No
Battery Power Rating	7500
Item Weight	2 kg

Future scope:

More advanced Disinfection and shoe Sanitation models come equipped with special devices like SOLAR, traffic lights and motion detectors. Traffic lights work will work on simple red and green principle whereas motion detectors will automatically trigger the spray once the sensors detect any motion in the tunnel.

Advantages:

- Clean and non – pollutant
- Transportable over long distances
- High speed operation
- No return lines
- Relatively low cost to produce
- Technology can be easily learned

Application:

Super markets, scenic spots, shopping mall, stations, air ports, factories, court rooms, police station, movies, hall, temples, commercial area, railway station, bus stands, food markets, offices, college, hospitals, colony, schools, communities etc.

4. Conclusion

As per above discussion we conclude that the design and development of a fully automatic, modular, and portable tunnel

that has two chambers and use to disinfect people with high neutralizing efficiency of the COVID-19 virus. In the chamber, the person is disinfected by the spraying of the ionized mist of an approved disinfectant solution for 20 s.

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