

Automatic Sanitization Tunnel & Temperature Detection

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Abstract

As we know that the world is suffering from a pandemic situation due to the Novel Coronavirus. The deadly Novel Coronavirus is spreading very fast across the world. The way to stay safe and protected from coronavirus is taking the precautions like washing/sanitizing hands regularly, wearing a mask, and maintaining social distancing. We need to take precautions at the regular interval because the situation is deadly. At the early stage of time, the Govt. tried to implement a Janta curfew and then nationwide lockdown to decrease the chance of community spread. We all experienced a Janta curfew, the lockdown and now we are in the 3rd stage of the novel coronavirus. Due to the several lockdowns, the economic growth of the country was very low, and GDP was getting decreased day by day. Therefore, the Govt. has decided to give some relaxation from lockdown and has permitted to operate all business and open shops, malls as per the Govt. guidelines. Now as per the guidelines it is mandatory to use sanitizers for the customer to disinfect themselves from the coronavirus. The Novel coronavirus is known to stay live on the lifeless surface for a long period. So, the need of the hour is to introduce a machine that would help to eliminate the virus and will protect it from the virus. The "Automatic Sanitization Tunnel & Temperature Detection" machine will measure the temperature of a person using a temperature sensor and sanitize the complete body by shower/ spray the disinfectant chemicals through nozzles which are arranged in a way to shower on the body. The Smart disinfection tunnels or walkthrough sanitization gates can be installed at the entry and exit points of mines, shops, and malls to sterilize the clothes and bodies of mineworkers and all the customers who will be visited shops and malls.

Keywords: - : Covid-19, Sanitization, Full Body, Sanitizer, Tunnel, Temperature Sensor.

I: Introduction

The Temperature detection and automatic sanitization and disinfection tunnel is a machine that is use measures the temperature of a person using a temperature sensor and it will let us know that whether the temperature is high or normal. This whole system is designed by using the Arduino UNO and all the modules are interconnected to each other and are programmed by using the Arduino IDE tool. Due to the pandemic situation of COVID-19, the temperature measurement of a person is quite difficult to detect whether he is infected or not. By using the Temperature detection and automatic sanitization machine we can measure the temperature

without having any type of contact. Through this machine do contactless measurement by keeping proper social distancing. When a person will try to pass through the tunnel of the machine then it will measure the temperature of that person and if it will find the temperature is not normal then it will trigger a danger alarm sound so that all of us will be alerted and will ask that person to maintain the social distance and take all required actions against the coronavirus and will advise him to be in-home quarantine or hospitalized and take proper medicine of coronavirus. The Arduino Uno can be used in many applications nowadays because of its simplicity of programming features. Like for the normal micro-controller, the Arduino provides a USB port for communicating with the PC and power supply. The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller that runs on 16 MHz..

1.1 Sanitization Tunnel: - The Smart disinfection tunnels or walkthrough sanitization gates can be installed at the entry and exit points of mines, shops, and malls to sterilize the clothes and bodies of mineworkers and all the customers who will be visited shops and malls. Usually, these tunnels are designed to spray the disinfectant chemicals through the nozzles which are arranged in a way to shower the complete body. Ideally which disinfectant chemicals are being used in these gates or tunnels should be non-volatile, non-toxic, odorless, colorless, quick spray and harmless to the skin and as well as on other body parts in compliance with all the health guidelines and safety regulations. when a person will walk through the gates or tunnels than should be automatically activated using a passive infrared sensor to detect movement and measure the person's body temperature that can be seen in below figure. It can also be used in warehouses and factories to make disinfecting people by using liquid airborne and sanitizing vast. The National Academies of Sciences, Engineering, and Medicine reported that ultraviolet (UV) light-based walkthrough gates possibly could eradicate the coronavirus that contains the deadly and this is also not enough to prevent completely from coronavirus. To stay safe and disinfected from corona then pls be at home, follow all guidelines, and all types of taking precautions.

1.2 Temperature Detection: - The temperature screening systems are using advanced thermal imaging to detect the infrared rays which are emitted from a person's body. These rays emitted from a person's indicate heat, and the scanner can convert that reading into a temperature measurement. While we typically consider 98.6°F to be a healthy body temperature, the normal range can span from 97°F to 99°F. If the scanner senses someone with a temperature above that range, it will release an alert, after which company policy kicks in. Usually, a high temperature indicates a fever, which can be a symptom of infectious disease and is grounds for being sent home.

1.3 Application Usages: - There is several usages of this application. Below are the areas where measured used this machine. Industries • Public park • Educational Institution • Railway Station & Offices • Public entry gate • Corporate Office • Residential area • Defense Campus • Shopping Malls • Hospitals • Airports.

II: LIST OF EQUIPMENTS AND COMPONENTS NEEDED: - There are several equipment and component used to accomplish this machine. They are as follows.

- ❖ Arduino Uno
- ❖ Relay Module 5V
- ❖ Ultrasonic Sensor/PIR Sensor
- ❖ LCD 16x2.Display
- ❖ Electronic 12V DC pump
- ❖ Power Adopter 12V
- ❖ Nozzle Pipe
- ❖ Connection wires
- ❖ Sanitizer
- ❖ Storage Tank

❖ **Arduino Uno:** - The Arduino Uno is a microcontroller board based on the Microchip ATmega328P microcontroller. It is developed by Arduino.cc. The Arduino board is equipped with sets of digital and analog input/output (I/O) ports. It may be interfaced to various expansion boards and other circuits. The Arduino board has 14 digital I/O pins and 6 analog I/O pins and is programmable with the Arduino IDE via a type B USB cable. This board can be powered by the USB cable or by an external 9-volt battery through which it accepts voltages between 7 and 20 volts.

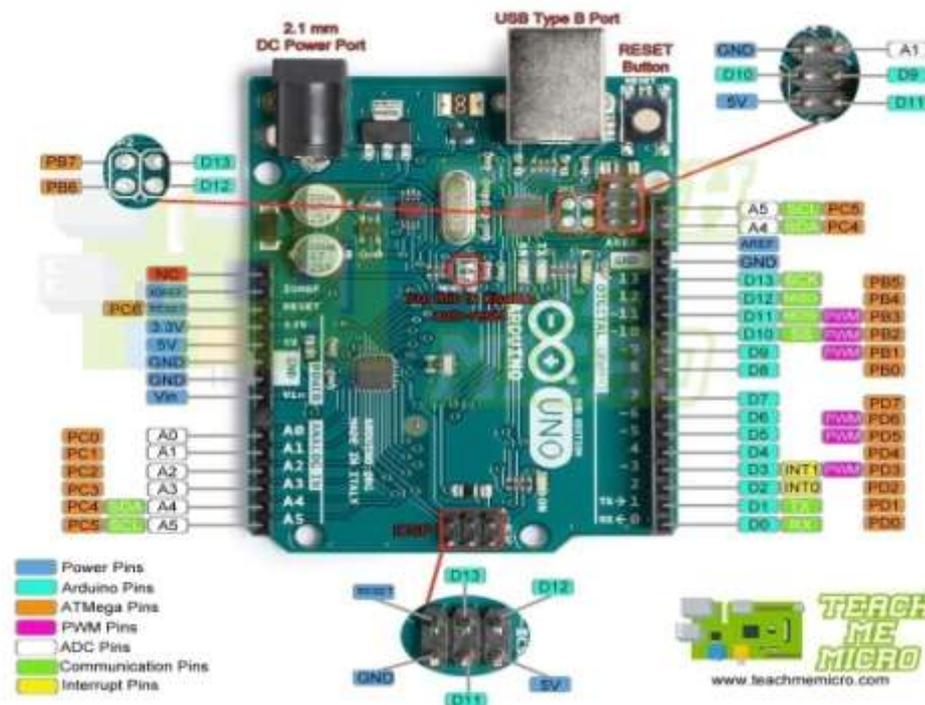


Fig 1: Arduino Uno Module

- ❖ **Dual Channel Relay Module 5V:** - The Relay is the electromagnetic switch. Relay allows to switch from one circuit to another circuit while they are separated. The relay is used whenever we want to use a low voltage circuit to turn ON and turn OFF the device which is required high voltage for its operation. For example, 5Volts supply connected to the relay which is sufficient to drive the bulb operated on 230Volts AC mains. The relays are available in the various configurations of operating voltages like 6V, 9V, 12V, and 24V. The relay is divided into two parts. One is input and other is output. The input side is a coil which generate magnetic field when the small input voltage is given to it. The relay has three contactors. They are Normally closed (NC), Normally opened (NO) and common (COM). By using the proper combinations of these contactors, the electrical appliances may turn ON or OFF.
- ❖ **PIR Sensor:** - The PIR sensors are used to detect occupants' presence by sensing the difference b/w heat emitted by moving people and background heat. The Ultrasonic sensors are used to detect the presence of people by sending out ultrasonic sound waves into a space and then measuring the speed at which they return.



Fig2: PIR Sensor

- ❖ **Ultrasonic Waves:** - The ultrasonic sensor is an electronic device. It measures the distance of a target object by sending out ultrasonic sound waves and converts then reflected the sound into an electrical signal. The Ultrasonic waves are travel faster than the speed of audible sound. The ultrasonic sensors are having two main components: 1. **Transmitter:** - which emits the sound using piezoelectric crystals and 2. **Receiver:** - which encounters the sound after it has traveled to and from the target.
- ❖ **LCD 16x2.Display:** -The LCD stands for liquid crystal display. It is one of the electronic display modules which used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. Mainly these displays are preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using these modules are inexpensive,

simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

- ❖ **Electronic 12V DC pump:** - This series pump can be used for general water transfer, sprayer pumps, small rain system, or another industry usage (perfect for small car washer system, water heater shower, sprayer), use it with fresh or saltwater or other liquid with weak acid & alkaline is ok. We tried to test these pumps and found they will operate to a 1.5-meter suction. The pump with a built-in pressure switch can be working automatically when the tap turns off.



Fig3: DC Pump

- ❖ **Power Adapter 12V:** - The AC/DC adapter or AC/DC converter is a type of external power supply device which is often enclosed in a case and is like an AC plug. Other common names include plug-in adapter, adapter block, domestic mains adapter, line power adapter, and wall wart, power brick, and power adapter and Its plug designs are for an India power socket. The adapters are for battery-powered equipment which may be described as a battery charger. The AC adapters are being used with electrical devices that require power but do not contain the internal components to derive the required voltage and power from mains power. The internal circuitry of an external power supply device is very similar to the design that would be used for a built-in or internal supply.
- ❖ **Nozzle Pipe:** -A spray nozzle is a device that facilitates the dispersion of liquid into a spray. The nozzles are used for three purposes. 1. To distribute a liquid over an area, 2. To increase liquid surface area, and 3. create impact force on a solid surface.
- ❖ **Connection wires:** -The connecting wires allow an electrical current to travel from one point on a circuit to another point of the circuit because electricity needs a medium through which it can move/travel. Most of the connecting wires are made up of copper or aluminum

- ❖ **Sanitizer:** - The sanitizer is a liquid, gel or foam generally used to kill most viruses/bacteria/microorganisms on the hands.
- ❖ **Drawbacks of hand sanitizer:** - There are unit bound things throughout that handwashing with soap and water area unit most well-liked over There are unit bound things throughout that handwashing with soap and water area unit most well-liked over hand sanitizer, these include: eliminating microorganism spores of Chloridoids difficile, parasites like Cryptosporidium, and bound viruses like norovirus looking on the concentration of alcohol within the sanitizer (95% alcohol was seen to be only in eliminating most viruses). Also, if hands area unit contaminated with fluids or alternative visible contaminants, hand laundry is most well-liked furthermore as once exploitation the rest room and if discomfort develops from the residue of alcohol sanitizer use. moreover, office states hand sanitizers aren't effective in removing chemicals like pesticides.

III: CONSTRUCTION

Full body sanitizing machine is simple in structure it consists of several simple parts that are easily available in all markets, it's size and parts depending on its application and mode of use, we are making it as a project purpose, so the parts or components used is according to it. For commercial and domestic purposes, it may vary. It consists of parts like RO booster pump, RO pipe, spray nozzles, frame, HDPE polythene, storage tank, human body detection sensor, and storage tank, etc.

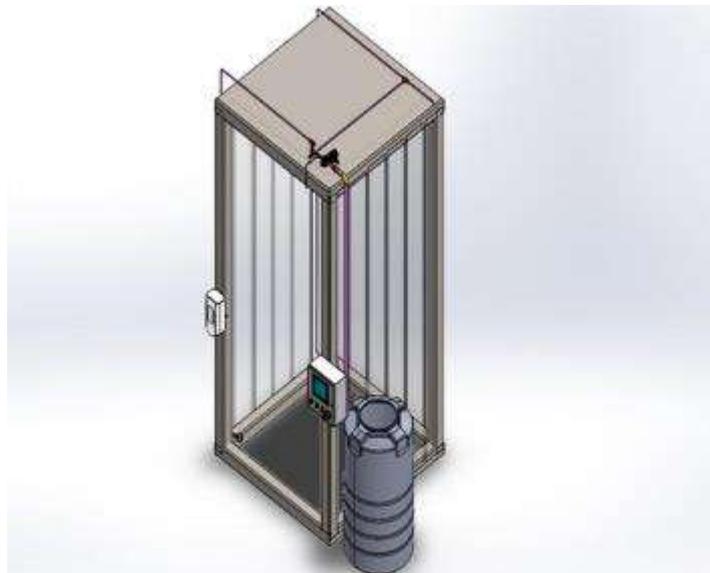


Fig 4: Tunnel Construction

IV: FLOW DIAGRAM

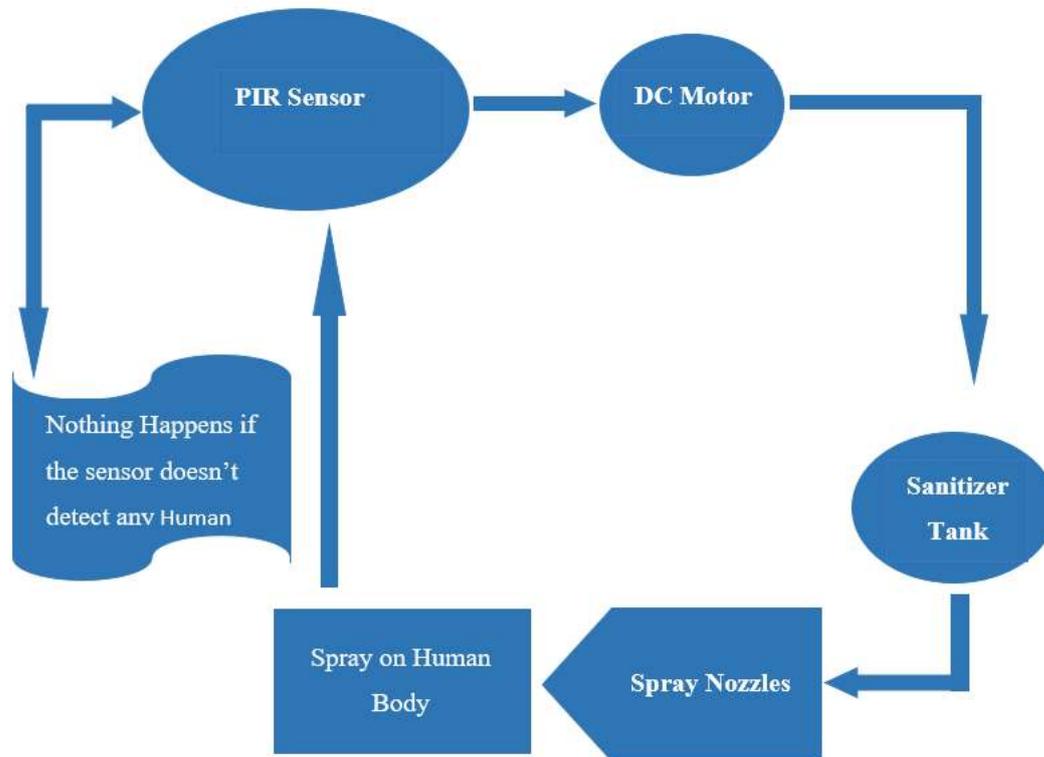


Fig 5: Flow Diagram

V: WORKING

The working principle of the proposed “Temperature detection and automatic sanitization and disinfection tunnel” can be explained with a flow diagram which was shown above fig.

In this when a person enters into a room/tunnel, then PIR sensor detects the presence of human at entrance of the tunnel then using temperature sensor we measure the temperature of the person which are fixed at the entrance. The temperature measured is always analog quantity and using analog pins of Arduino it reads that temperature and converts into degree Celsius and Fahrenheit using baseline temperature. Here we considered baseline temperature to be 40 degree Celsius. The Arduino was programmed using Arduino IDE such that if the temperature is less than or equal to 99-degree Fahrenheit then sanitization is sprayed and blower is on to remove the dust particles of Luggage, else, if temperature is greater than 99-degree Fahrenheit then a buzzer will ON and gives some sound, means that person need to take medical checkup and medication.

VI: CONCLUSION

At the end of the report, we can conclude that this tunnel could be very helpful in tackling the Covid-19 pandemic during the unlock period when all the businesses and shops are open for the general public and there is a greater chance of community spread among the people. This cannot be as effective as a vaccine to COVID-19, but it could be a very good tool in tackling this pandemic. Hospitals have started to use Robots to cater Covid-19 patients during the treatment to reduce the human intervention and to also reduce the risk of further transmission of the virus. The possibility is endless in these machines, we can also include an infrared camera to

detect the body temperature of people entering and if temperature is above recommended temperature a buzzer will sound, and person can be stopped from entering and transmitting the virus (if he has further symptoms of COVID-19.)

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