Autonomous Advance Disinfection Tunnel

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ABSTRACT

The new disease COVID-19(coronavirus disease of 2019) has seriously affected the world. By the end of November 2020 the cases of COVID-19 is increased to 60 million. To reduce the spread of the disease, social distancing and face-mask mandatory. Many public service providers require customers to wear face-masks in accordance with predefined rules (e.g., covering both mouth and nose) when using public services. These developments inspired research into automatic techniques for detection of face-mask and temperature detection that can help in constraining the COVID-19 pandemic. This project will eliminate all the problems, it will continually monitor all the person who is entering to that particular place. It will continuously check the temperature of the user as well as it will also check that the user had a mask on or not if both the thing are proper then only it will allow the user to let him\her go otherwise it will alert the administrator. If both temperatures is good and mask is on the system will allow the user to pass through the tunnel which will fully sanitize or disinfect the user. This system will reduce the number of cases of COVID-19 by maintaining safety precautions said by the government.

Keywords : COVID-19, masked-face detection, temperature detection, disinfection, COVID-19 compliant mask detection.

I. INTRODUCTION

In December 2019, a new contagious disease, called COVID-19, was later found to be caused by a previously unknown zoonotic corona virus, named SARS-CoV-2. To limit the spread of this new coronavirus, the WHO as well as governments across the world recommend that people should wear the mask and use sanitizer whenever necessary.

In this project we designed automatic disinfection tunnel using raspberry pi. The main objective of this project is to detect the mask and temperature and then sanitize the person automatically without any human intervention that may help in maintaining social distance and prevention of COVID-19. [1][2][3][4] In near future it can also be used at different industries, companies and many public places to maintain safety precautions for prevention of diseases.

For detecting the mask neural network, Open CV and Python language is used. The system is designed with using Raspberry pi.[1][2] This paper provides working of the system, design and implementation using Raspberry pi and Python and their applications.
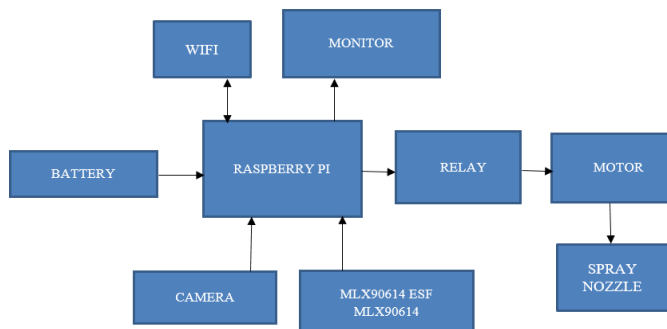
II. PROPOSED SYSTEM

Figure 1. Block diagram of system.

System Description

Our system overcomes the problem of mask, temperature detection and automatic sanitization or disinfection.[1][2][3] The system consists of Raspberry PI, temperature sensor and camera module in the controller section.

This system enriched the level of mask and temperature detection.[2][3] Access to tunnel is granted only for the user whose warring mask and whose temperature is below average max temperature i.e. 97°F (36.1°C) to 99°F (37.2°C).[1][2][3] If these two conditions matches, then the user is allowed to go forward in tunnel for sanitization for disinfection process.

In disinfection process we have connected the water pump for pumping solution from the solution tank. The solution further passed to the spray nozzle attached to the roof of tunnel.[4]

III. HARDWARE REQUIREMENT

3.1 Raspberry Pi 3

Figure 2. Raspberry Pi 3

Raspberry Pi 3 Model B was released in February 2016 with a 1.2 GHz 64-bit quad core ARM Cortex-A53 processor, on-board 802.11n Wi-Fi, Bluetooth and USB boot capabilities. On Pi Day 2018, the Raspberry Pi 3 Model B+ was launched with a faster 1.4 GHz processor, a three-times faster gigabit Ethernet (throughput limited to ca. 300 Mbit/s by the internal USB 2.0 connection), and 2.4 / 5 GHz dual-band 802.11ac Wi-Fi (100 Mbit/s). Other features are Power over Ethernet (PoE) (with the add-on PoE HAT), USB boot and network boot.

3.2 Camera Module

Figure 3. Camera Module

The Raspberry Pi Camera Modules are official products from the Raspberry Pi Foundation. The original 5-megapixel model was released in 2013, and an 8-megapixel Camera Module v2 was released in 2016. For both iterations, there are visible light and infrared versions. A 12-megapixel High Quality Camera was released in 2020. There is no infrared version of the HQ Camera, however the IR Filter can be removed if required.

3.3 Temperature sensor (MLX90614 IR)
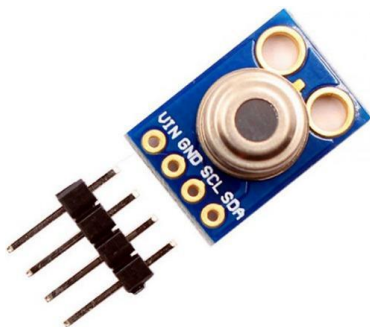
Figure 4. Temperature sensor (MLX90614 IR)

The MLX90614 is a Contactless Infrared (IR) Digital Temperature Sensor that can be used to measure the temperature of a particular object ranging from $-70°$ C to $382.2°$C. The sensor uses IR rays to measure the temperature of the object without any physical contact and communicates to the microcontroller using the I2C protocol.

3.4 Relay Module

Figure 5. Relay module

The Single Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay.

3.5 Water Pump

Figure 6. water pump

This water pump has an 18W motor that can lift water up to 1.6m and is made of rust proof durable ceramic shaft. The motor submerges completely into the water as it is water resistant. The product comes with and

Output Pipe with dimensions 1/2 and 3/4 inches that has an output of 3200 liters per hour. The pump weighs 400 grams and is highly portable. Water pump is easy to install and handle which comes in a compact size that consumes low electricity.
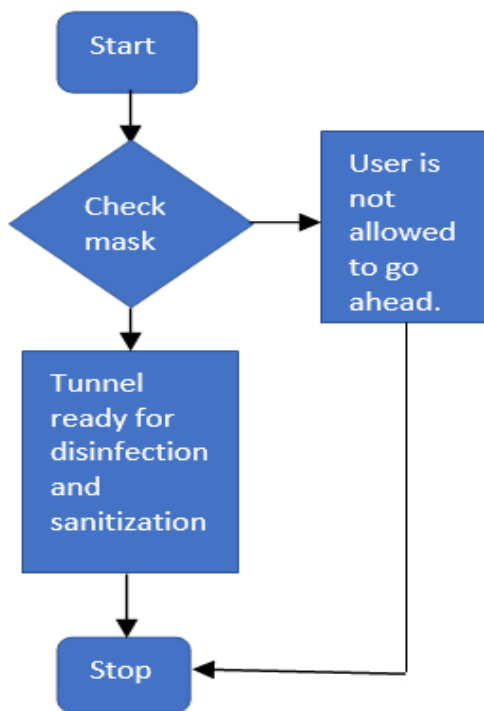
IV. FLOW CHART

Figure 7. System Flow Chart

V. CONCLUSION AND RESULTS

5.1 Conclusion

Hence this system face mask detection with sanitization will provide good solution to disinfect and control viruses like covid-19. Our project will overcome the problem of checking everyone in public places whether he or she is wearing mask or not and it will also sanitize people entering the system. It will help prevent peoples get affected by covid-19 like disease.

5.2 Results

Below figure shows the output pf the system with mask and without mask:
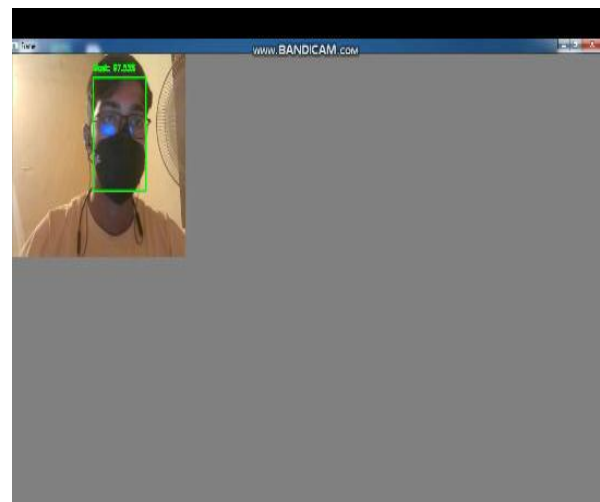

Figure 8. Output when no mask.

Figure 9. Output with mask.

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