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## FTSI System

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**Abstract:** COVID-19 pandemic caused by novel corona virus is continuously spreading until now all over the world. The impact of COVID-19 has fallen on almost all sectors of development. Even in colleges there will be 2-3 security staff who stand at the entrance for checking whether students wore a face mask, measuring their body temperature using a thermal scanner, sanitizing their hands and fetching their details. Since this process takes human power, time loss and is a risky situation;

We propose a **FTSI (Face mask detector + body Temperature screener + hand Sanitizing + ID scanner) System** that restrict the growth of COVID-19(not only COVID-19,but also all other communicable diseases) by not letting in people who are not wearing face mask correctly and those who have body temperature higher than normal value by screening their body temperature, automatically sanitizing their hands & scanning their ID Card (Such as Voter ID / Aadhaar / Driving License etc.). This is a contactless system which can be held at any entrance and thereby reducing manpower & reducing time loss.This is a socially relevant project topic.Since we're engineering students we're responsible for making such helpful products for the society.

### I.INTRODUCTION

**In 2020, the rapid spreading of COVID-19 has forced the WHO to declare it as a global pandemic. It spreads through close contacts. Our FTSI system will be effective in helping to battle this pandemic.**

There are some essential equipment needed to fight against Corona virus. One of such most essential is Face Mask. Firstly, a face mask was not mandatory for everyone but as the day progressed scientists and doctors have recommended everyone to wear a face mask. Now To detect whether a person is wearing a Face Mask or not, we will use Face Mask Detection Technique.The application can be associated with any current or new IP cameras to identify individuals with/without a mask.

The contactless real-time body temperature measurement with alarm function is reliable and precise. An acoustic alarm signal can be triggered from a definable, increased body temperature. Possible febrile illnesses can thus be detected immediately and follow-up measures can be taken.

We also have integrated with our FTSI system an automatic sanitizer. As repeatedly touching the normal hand sanitizer containers to get a drop of sanitizer again initiates contact with persons, which may be risky.By providing contactless Sanitizing, we reduce the risk factor.

Lastly our system also includes an ID scanner as fingerprint scanners are potential sources of disease transmission due to contamination from multiple touches by various users in a wide range of questionable hygienic conditions.

### II. PROBLEM STATEMENT

As the virus outbreak continues day by day,our group is coming up with an innovative digital solution which we named as FTSI system .In this system our main aim is to build a multipurpose multifunctional FTSI system in which **F stands for face mask detection ,T for temperature screener , S for sanitiser (which is ofcourse an automatic contactless one) and finally I for ID scanner system.**

Face mask detection :

The task here is to predict people wearing masks or not wearing them. It is an object detection and classification problem with 2 different classes (Mask and Without Mask).

#### Automatic Temperature Sensing:

An automated temperature screening device can eliminate human involvement in taking someone's temperature while offering impressive accuracy and speed. Plus, they can integrate with your access control system so you ensure that only healthy individuals enter your facility.

#### Automatic Hand Sanitizing :

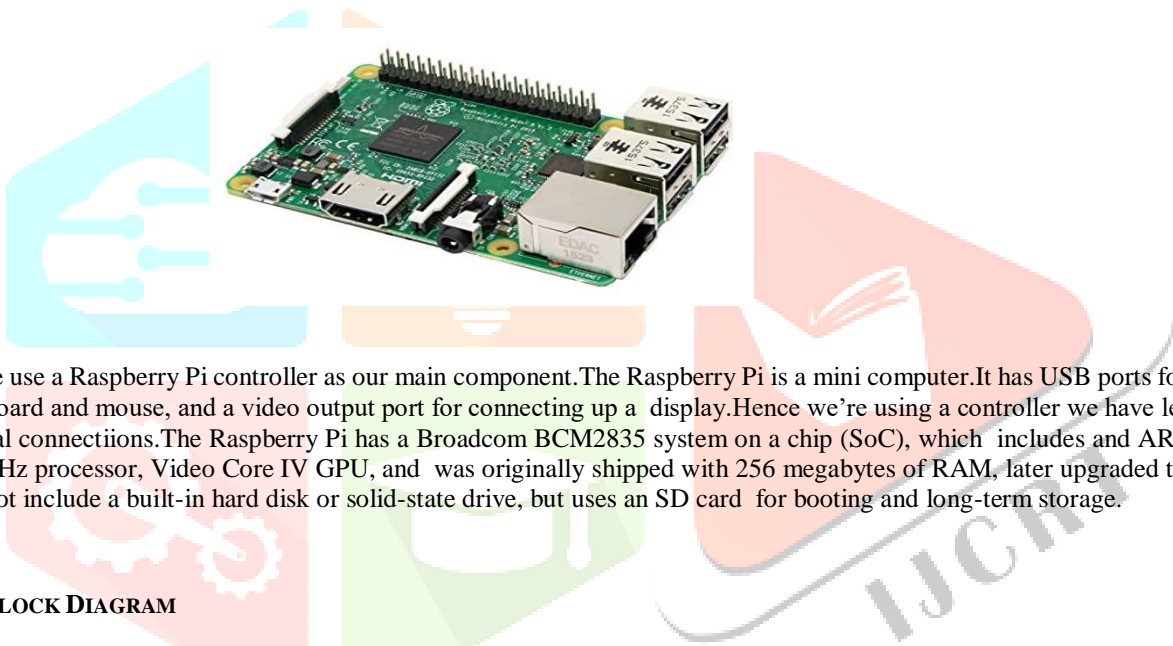
Demand for hand sanitizers has surged since the coronavirus broke out and spread around the world. Hand sanitizers are usually applied by squirting the sanitizer liquid when one presses a pump with one's hand. This causes many people to come into contact with the pump handle, which increases the risk of viral transmission. Some hand sanitizers on the market are automatically pumped. However, because sanitizer containers and pump devices are designed to be compatible only between products produced by the same manufacturer, consumers must also repurchase the container for the liquid if they replace the hand sanitizer.

#### Automatic ID Scanner :

To identify human beings by scanning a QR Code which contains the person's name, year of birth, mobile number & any ID card number. The QR Code can be generated by ourselves.

### III. METHODOLOGY

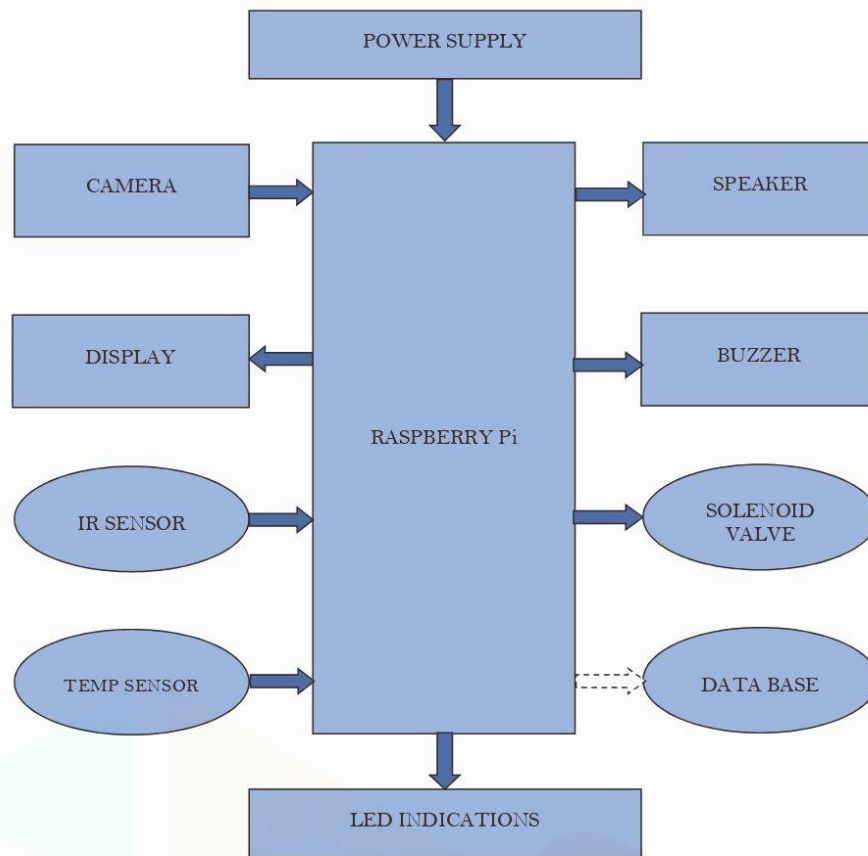
#### Raspberry Pi 3 Model B



We use a Raspberry Pi controller as our main component. The Raspberry Pi is a mini computer. It has USB ports for connecting a keyboard and mouse, and a video output port for connecting up a display. Hence we're using a controller we have less number of external connections. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage.

### IV. BLOCK DIAGRAM

- Raspberry pi
- Power supply
- Buzzer
- Camera
- Speaker
- IR Sensor
- Data base
- Solenoid valve
- LED indicator
- Display



Block diagram of FTSI System

#### 4.1 Raspberry Pi 3 Model B

The Raspberry Pi is a computer, and from a connections point of view it doesn't look much different to a normal desktop computer. It has USB ports for connecting a keyboard and mouse, and a video output port for connecting up a display.

- 1 GB RAM
- 1.4GHz clock frequency
- 40 PIN (28 GPIO)
- Camera Serial Interface
- Display serial interface
- Ports:
  - HDMI
  - 3.5mm audio-video serial jack
- Ethernet
- Bluetooth

#### 4.2 Pi Camera

The Pi camera module is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects.

- 5MP color module without mic
- MIPI Camera Serial Interface
- Omnivision 5647 Camera Module

### 4.3 DISPLAY

Monitor works as an output device that device help to provide output in the form of graphically and text as well.

- Any type of display devices can be used as R-Pi display.
- We use a computer monitor screen
- Provide graphical and text output

### 4.4 TEMPERATURE SENSOR (MLX90614)

The MLX90614 is an infrared thermometer for non-contact temperature measurements.

- Small size and low cost
- Easy to integrate
- -70 to 380°C for object temperature
- High accuracy of 0.5°C

### 4.5 LED Indicators

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p-n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electro-luminescence.

- Indicating power supply
- Different functions indication

### 4.6 Buzzer

A buzzer or beeper is an audio signaling device which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

### 4.7 Multimedia Speaker

Speakers are transducers that convert electromagnetic waves into sound waves. The speakers receive audio input from a device such as a computer or an audio receiver. Directly connected to stereo jack port.

### 4.8 IR SENSOR

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. These types of radiations are invisible to our eyes, which can be detected by an infrared sensor.

- Operating Voltage 3.0 to 5.0V
- Current consumption 3.3 V:23mA at 5v
- Detection range :2cm -30cm

### 4.9 SOLENOID VALVE

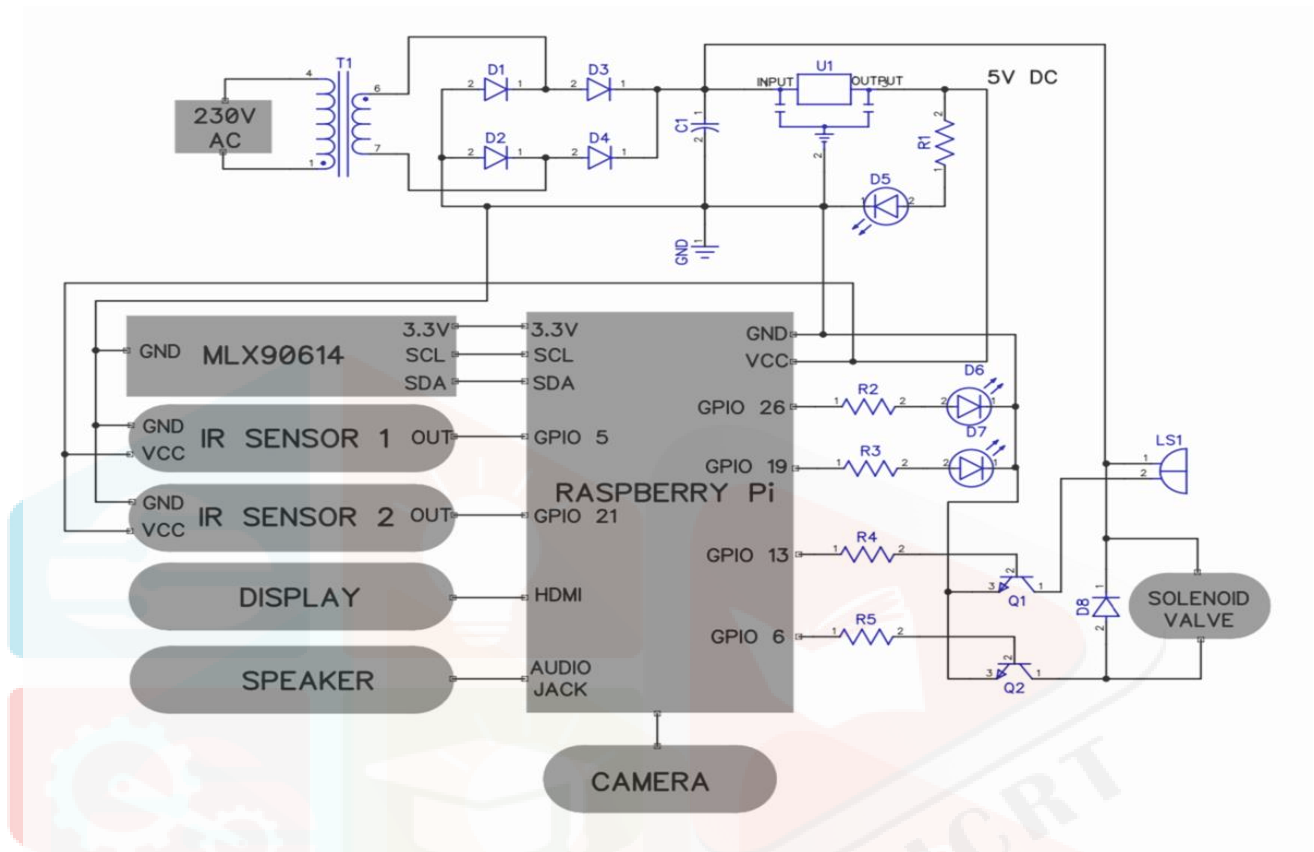
12V DC Solenoid Water Air Valve Switch (Normally Closed) controls the flow of fluid (liquid or air) and act as a valve between high pressure fluid. As it is normally closed assembly, it opens the flow of fluids as soon as it is powered ON and stops/blocks the flow when the supply voltage removed

- Supports air, water, liquid.
- 2 Way ,Normally Closed

### 4.10 POWER SUPPLY

Here 9v battery provides for the whole system. The microcontroller needs 5v. So it is converted through 7805 regulator. Two capacitors also there, one for filtering and other for cleaning the damages. The microcontroller and other devices get power supply from Ac to Dc adapter through 7805, 5v regulator. The adapter output will be 12v DC Non-regulated. The 7805 voltage regulator are used to convert 12v to 5v DC.

## V. CIRCUIT DIAGRAM



## I. RESEARCH METHODOLOGY

### 1.1 Software Description :

We used a software called DipTrace. It is an EDA/CAD software for creating schematic diagrams and printed circuit boards. The developers provide multi-lingual interface and tutorials (currently available in English and 21 other languages). DipTrace has 4 modules: Schematic Capture Editor, PCB Layout Editor with built-in shape-based auto-router and 3D Preview & Export, Component Editor, and Pattern Editor. DipTrace is an advanced PCB design software application that consists of 4 modules PCB Layout with efficient auto-router and auto-placer, schematic capture, component and pattern editors that allow you to design your own component libraries

### 1.2 Python Programming :

Python is a high-level, interpreted, interactive and object oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently whereas the other languages use punctuations. It has fewer syntactical constructions than other languages. Python features a dynamic type system and automatic memory management and supports multiple programming paradigms, including object-oriented, imperative, functional programming, and procedural styles. It has a large and comprehensive standard library. Python interpreters are available for many operating systems, allowing Python code to run on a wide variety of systems. CPython, the reference implementation of Python, is open source software and has a community-based development model, as do nearly all of its variant implementations. C Python is managed by the non-profit Python Software Foundation.

### 1.3 My SQL Database :

MySQL is the world's most popular open source database software, with over 100 million copies of its software downloaded or distributed throughout its history

- MySQL software is Open Source.
- The MySQL Database Server is very fast, reliable, scalable, and easy to use
- Ease of use—Go from download to complete installation in less than 15 minutes.

## II. WORKING

In the power supply section there is 220V step down transformer, bridge rectifying circuit, capacitor, voltage regulator, resistor and LED. Input of the step down transformer is 220 V and it gives 12V AC output. To convert AC to DC we use a bridge rectifying circuit. It consists of 4 diodes. IN4007 diodes are used. The output of the rectifying circuit is 12V DC. But this output is not pure DC, it consists of some ripples. The output is passed through an electrolytic capacitor to remove the ripples and get a filtered 12V DC.

This circuit needs both 12V and 5V. To get 5V a 7805 voltage regulator is used. 7805 is a 3 pin IC. One of the pins is for input, second is for GND and third is for output. 7805 IC provides +5V regulated power supply. Here 12V DC is the input of the regulator and it gives constant +5V as output. To indicate the presence of constant +5V we connect a LED through a resistor. Vcc of Raspberry Pi is 5V. GND is connected to the common point.

Two LEDs are used. One is to indicate data transfer and other is for program running. One end of the LED is connected to the GPIO pin's through the resistor, the other end is grounded.

MLX90614 non-contact temperature sensor is used. The output of the temperature sensor is also an AC which is converted to DC using an ADC. The ADC used is ADS1115. The analogue signal coming from the temperature sensor is connected to the A0 PIN of the converter. It needs 3.3V Vcc so it is connected to the Rpi. SDA and SCL are the serial data and serial clock pins. These are connected to the GPIO pins of RPi.

The output of an IR sensor may be an analogue signal hence to convert it a comparator (LM324 IC) is used. It consists of 4 independent op-amps. IR sensor is connected to the positive terminal of the comparator and in the negative terminal a threshold voltage is set using a variable resistor 10k. When an obstacle is detected IR sensor produces an output voltage. If that voltage exceeds the threshold voltage, the GPIO pins send out 1 or 0. The solenoidal valve is used for dispensing fluid in a particular direction.

Firstly a resistor is connected to the GPIO Pin. The base of the transistor BC547 is connected to the resistor. The emitter is grounded. The output coming from the collector is connected to one end of the solenoidal valve and the other end is connected to 12V. Solenoidal valve is an electromagnetic valve. To protect this valve from back emf, a diode is connected across it.

## III. ADVANTAGES & LIMITATIONS

### Advantages :

- Entering a person's information on register is much easier.
- Safe and secure
- High reliability
- Less time consuming
- Avoid contact with others
- High accuracy

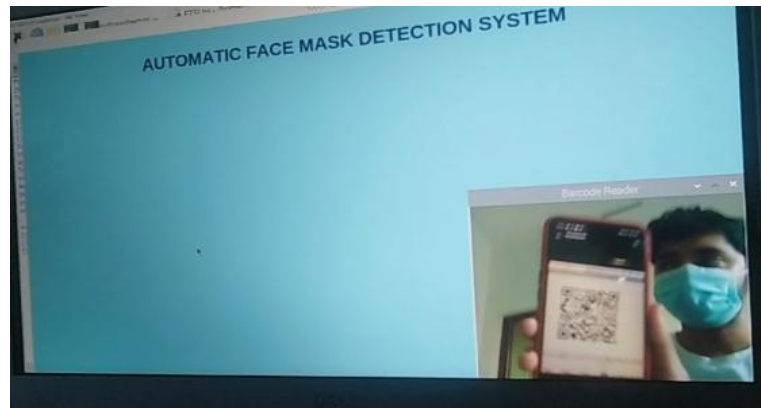
### Limitations :

- Less internal memory : We can extend the memory using different memory devices.
- The stored data retain only for 2 years : Expired data can be removed manually from the database, thereby data leakage is stopped.
- System fails when network is disconnected

## IV. RESULTS AND DISCUSSION

### 4.1 STEP-1

The first process of the system is ID Card Scanning(QR Code Scanning) by the Pi Camera used in our system. The system reads the QR Code and then store the details in MySQL database we created.



### 4.2 STEP-2

The 2<sup>nd</sup> process of the system is Face mask detection. The system itself will check the status of masks. Whether mask is properly fit or not.

According to the results the system will give speech output instructions. If :

Not properly wore face mask : "You're restricted. Please wear a face mask"

The person will get 3 extra chances to wear mask correctly. Even after these 4 chances he didn't wear face mask ,

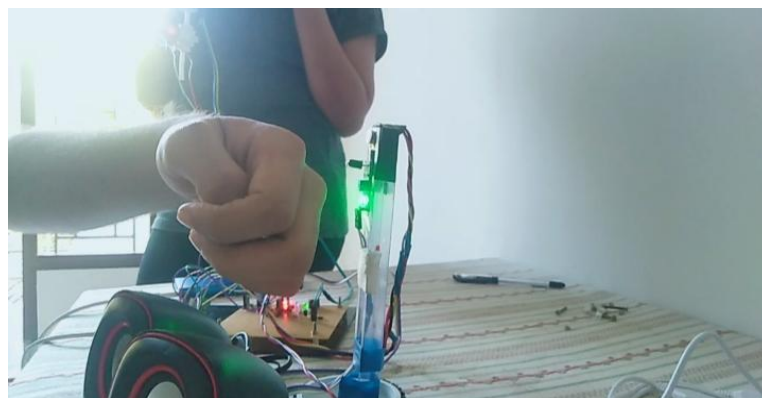
Then : "Sorry We couldn't detect the mask on your face, You can't enter."

Face mask is properly worn : "Please show your hand towards the red circle, system is going to check your body temp."



### 4.3 STEP-3

The system will next check the person's body temperature. The contactless temperature sensor MLX90614 will measure his body temperature. We set ambient temp = 35degreeC.



If the temp. goes higher than 35, speech out : "Your temperature is high"

### 4.4 STEP-4

If the temperature is below ambient level, the person will get an instruction for hand sanitization.

Speech out instruction : "Please sanitize your hands"

While the IR sensor near the solenoid valve detects hand motion, The solenoid valve will be Opened and sanitizer will be dispensed into the person's hand.



After the successful completion of all the process, there will be an instruction : "You have completed all verification process, Thank You"

If the person fail in any of the process, he will get an instruction of : "You are failed in screening process. Try again, Thank You" The details from the QR Code is stored in the MySQL Database created by us. Named as FTSL. Inside that there will be a table having fields, : Name, Age, Mobilenumber, Aadhar card no. The details will correspondingly stored in the respective fields.

## VI. ACKNOWLEDGMENT

It is our privilege to express our sincere gratitude and deep indebtedness to the people who helped us to complete this project successfully. We are deeply grateful to our principal **Dr. Beena V I** for providing all the facilities for doing this project. We would also like to remember **Mr. JITHENDRA K B**, Head of the Department, Electronics and Communication Engineering, for her valuable support. We are grateful to coordinator **Mr. JITHENDRA K B**, Asst. Professor, Dept of Electronics and Communication Engineering, for providing necessary information and guidance during the course of this project. And highly indebted to our Guide **Mrs. HYNA M**, Asst. Professor, Dept of Electronics and Communication Engineering, for providing me the best facilities for the completion and presentation of our project.

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