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FACE MASK DETECTION WITH THERMAL SCREENING USING RASPBERRY PI

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Abstract:

A low cost based Covid-19 safety measures has been implementing in this paper. In this the implementation is based on Face Mask detection and thermal screening system, which is essential in this pandemic situation. Even vaccination is available still the threat for virus affecting is more. And it is difficult to monitor each and every person wearing masks with normal temperature in a large place is difficult so that this project is implemented. In this project Raspberry pi, Web Camera and MLX9061 IR Temperature Sensor for mask Recognition and thermal screening.

Keywords: *Compliance monitoring coronavirus, pandemic COVID-19, smart sensor, Mask Detection, Thermal Screening.*

Introduction

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It was first identified in December 2019 in Wuhan, China, and has resulted in an ongoing pandemic. The first case may be traced back to 17 November 2019. In the current wake of the COVID-19 pandemic, preventing and/or limiting the community spread of the virus across the world different strategies are applied. First method is to restrict population movement and social interaction. As population mingles there occurs a rapid spread of virus. To avoid virus spreading while people socially interacted, this method is helpful.

Existing System

In the existing system there are some of the technologies are used to detect people and temperature monitoring. They are consisting of IR sensor for detecting people and manual temperature monitoring.

Since this technology is not much effective, when more people comes to a common place. Temperature monitoring also becomes difficult if many people arrives

DRAWBACKS:

- This technology is not much effective, when more people comes to a common place.
- Temperature monitoring also becomes difficult if many people arrives.

Proposed System

In this project we make use of Raspberry Pi, Web camera and Temperature Sensor. Firstly when a person comes, it checks for mask. If mask detected only then proceed to next stage. If mask not detected, the camera screen will display “Please wear Mask”. If mask detected, it displays “Thank you for wearing mask”, and proceed to next stage. Next it checks for Temperature that is thermal

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screening if the temperature is normal then it will display temperature is normal. If all the above stages completed, finally the door opens using dc motor.

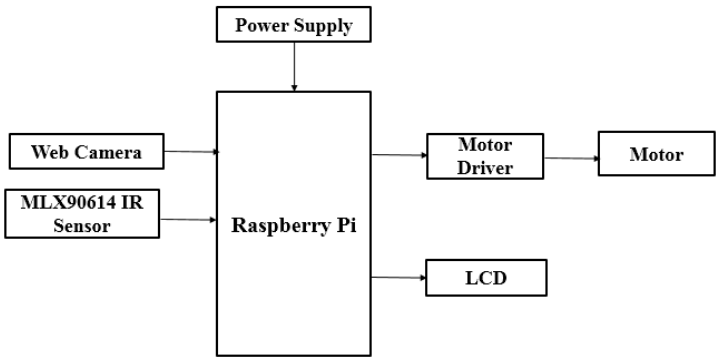

Fig1: Block Diagram

Hardware Requirements:

A) Raspberry Pi:

Raspberry pi is a powerful microcontroller that exists in credit card size. It serves as micro controller, also it serves as a minicomputer by connecting essential cables like HDMI cables, audio cable. Simply we can say Raspberry Pi is a credit card sized computer which also serves as microcontroller. It is fast as compared to other controllers.

Fig2: Raspberry Pi

B) Liquid Crystal Display:

LCD is 16X2 LCD which displays 32 characters at a time. It has 8 data transferring Pins, RS which is Register select, En is Enable, and R/W is Read and Write Pin.

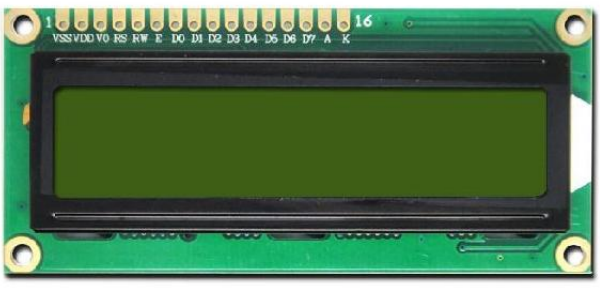

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Fig3: LCD

C) MLX90614 IR Temperature Sensor:

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.

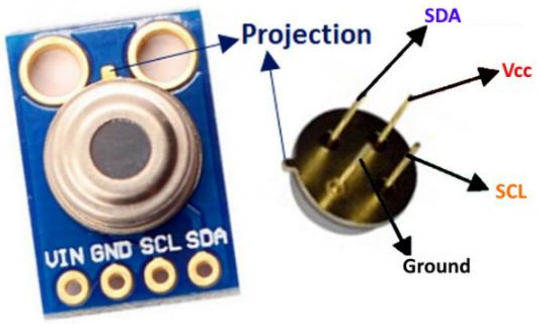

Fig4: MLX90614 IR Temperature Sensor

D) Web Camera:

A webcam is a video camera that feeds or streams an image or video in real time to or through a computer to a computer network, such as the Internet. Webcams are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. Webcams can be used during a video chat session involving two or more people, with conversations that include live audio and video.

Fig5: Web Camera

E) L293D Motor Driver:

The L293D is a 16 pin IC, with eight pins, on each side, dedicated to the controlling of a motor. There are 2 INPUT pins, 2 OUTPUT pins and 1 ENABLE pin for each motor. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor.

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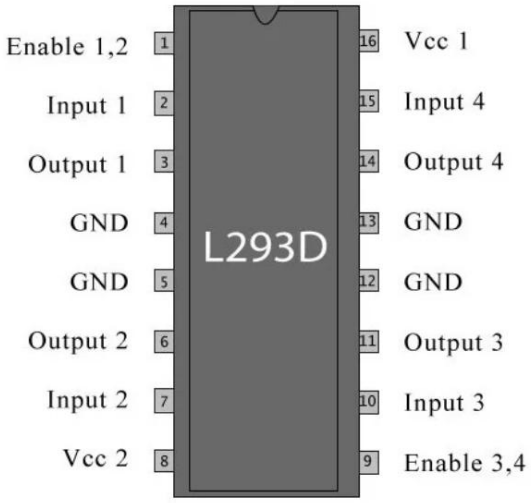

Fig6: L293D Motor Driver IC

F) DC Motor:

Electromagnetic direct current (DC) engines are normally runs fast and low torque (Gear down) Electromagnetic substituting current (AC) engines.

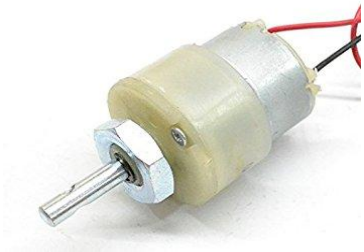

Fig7: DC Motor

Software Requirements

A) Python:

Python is an interpreter, high level, interactive and general purpose programming language. It was developed by Guido van Rossum during 1985 – 1990. The source code is available under general public License. Python is named after a TV Show 'Monty Python's Flying Circus' and not after Python-the snake. It supports Object Oriented programming approach for developing applications.

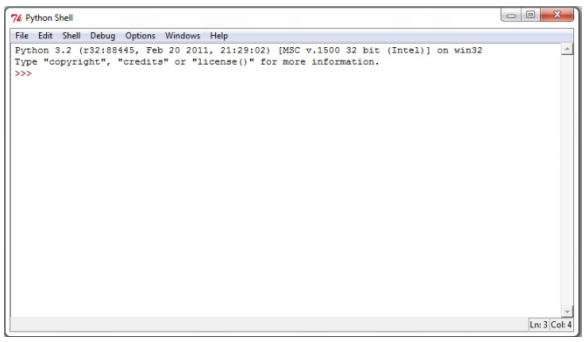

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Fig8: Python Shell

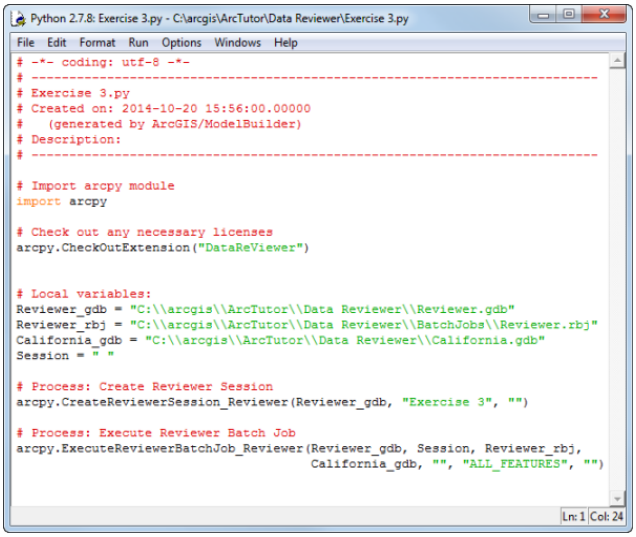

Fig9: Python Script

Working of the project:

In this system, Raspberry Pi acts as a main primary unit. Raspberry Pi is a single board computer. It can be used as a proper desktop computer. The 16GB memory card is used and this acts as a hard drive. A 5V Power supply is required for the Raspberry Pi. In this technology, python programming is used .camera and MLX90614 Temperature sensor acts as input units. LCD, motor driver and dc motor acts as output units. The whole system is controlled using Raspberry Pi, which forms the controlling unit of this proposed system. In this proposed system, firstly will scan for mask using web camera. If mask is not detected, no mask detected, it will display “Please wear mask”. If mask detected, then will display “Thank you for wearing mask” then proceed to the next stage that is Thermal Screening. It checks for person temperature if it is normal then door will open.

Advantages:

- This is safest method while going in public, in this covid-19 situation
- Low cost and high effective system
- Compact system
- Accurate

Applications:

- Homes
- Offices
- Schools
- Colleges

Conclusion

An effective solution to ensure COVID-19 safety compliance is presented in this work. The system relies on open source software and widely available sensors to make a low cost and easy to configure

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and customize set up. It relays useful real-time information wirelessly to a dashboard which can be used to monitor and assist in COVID-19 SOP. The system is currently limited to entry level scanning. Future efforts will be focused to expand the detection for the complete floor area, contact tracing, and support for additional queues. The system can be extended easily with minimal time and is quickly adaptable to different situations.

Future Scope

Future efforts will be focused to expand the detection for the complete floor area, contact tracing, and support for additional queues. The system can be extended easily with minimal time and is quickly adaptable to different situations.

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