IOT Based Temperature and Mask Scan Entry System

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***Abstract*— The project's main goal is to detect the presence of a face mask on human faces, as well as the person's body temperature, in real-time video and photos. Through its decision-making process, Artificial Intelligence has showed promise in health care. Wearing face masks and maintaining safe social distance are the two key procedures that must be followed in public settings to prevent the virus from spreading further. In order to build our face mask detection, we applied both machine learning and deep learning. We offer a dynamic Computer Vision-based automated solution system focusing on real-time face surveillance of people in public areas to detect face mask protocol violations with an embedded Pi camera and to monitor body temperature in order to provide a safe, COVID-19 healthy environment.**

If the person is wearing a face mask and their body temperature is under WHO norms, a security clearance procedure is in place that will enable them to enter. In this manner, the previously mentioned approach will profit society by saving time and forestalling the transmission of COVID. As a result, the above approach will benefit society by saving time and reducing the spread of the corona virus. This can be used in hallways, offices, colleges, and schools, among other places.

INTRODUCTION

After the breakdown of the overall pandemic COVID-19 circumstance, there emerges a serious need for insurance components like face covers, temperature being the essential one. To forestall disease transmission, we should wear face masks and hand sanitizers. Because of the pandemic circumstance, we should stick to the wellbeing measures taken by higher specialists to decrease infection spread, for example, obligatory veil wearing, social removing, isolate, and self-detachment inside and outside the country, regularly related to the disallowance and crossing out of enormous public occasions and get together.

This is one of the most dangerous occupations since the person in charge of them requires them to wear a face mask and monitor the body temperature. It will result in COVID-19 being transmitted from ordinary people to the person in charge of monitoring the facemask and body temperature. This setup includes its own 5MP camera module that monitors the face mask and a non-contactless temperature sensor that reads the body temperature and allows the user to follow the COVID-19 measures or sends an alarm to the appropriate authorities if they do not follow.

This framework will utilize profound learning and PC vision calculations to recognize people in picture or recordings streaming a face cover, utilizing libraries like OpenCV, Keras, and TensorFlow. The photos are ordered as "cover" or "no veil" and downloaded from a few open source sites. The photos we downloaded arrive in an assortment of sizes, tones and goals. The camera module is utilized to recognize the presence of a veil on the face. The camera picture is first changed to a dark scale picture, which is then utilized for face recognition, as the Open CV's Haar Cascade classifier requires. Also, another high contrast variant of the camera outline was built. After then, at that point, both photographs are exposed to confront discovery. On this occasion the length of the cluster is more prominent than one. On the off chance that the exhibit length of distinguished countenances is zero in the two conditions, it is viewed as that no individual is available inside the camera's field of vision.

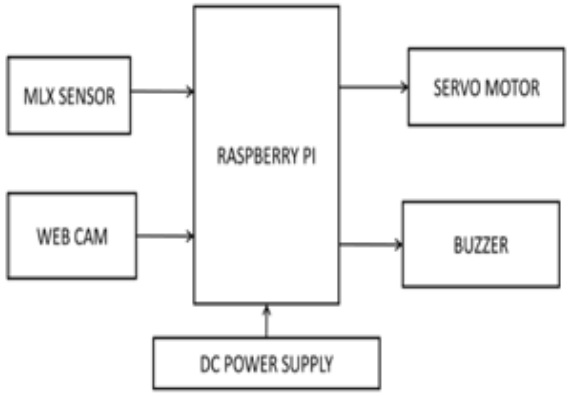
PROPOSED SYSTEM

Using the Raspberry Pi, we provide a dynamic Computer Vision-based automated solution system focusing on real-time face monitoring of individuals to detect face masks and automate sanitizer dispenser in public settings. To use an embedded Pi camera to detect mask protocol violations and an MLX90614

sensor to live blood heat. A security clearance mechanism is being designed to allow people to access if they're wearing a mask and their temperature is within WHO norms. As a result, the above-mentioned technology will benefit society by saving time and aiding within the reduction of corona virus propagation. this may be wont to inspect people publicly places like colleges, schools, offices, retail malls, and so on. If any of the foundations are broken, the suggested system sends the knowledge to Gmail and also the IOT cloud.

BLOCK DIAGRAM AND OVERVIEW OF PROJECT

BLOCK DIAGRAM:



HARDWARE REQUIRED

RASPBERRY PI-3B+:The Raspberry Pi 3B+ model, which encompasses a 64-cycle quad center processor, is the latest expansion to the Raspberry Pi 3 line. It is a little circuit board containing a CPU, GPU, USB ports, I/O pins, WIFI, Bluetooth, USB, and organization boot abilities, and it can do some capacities sort of a standard PC. It beats the past age as far as speed, interactive media execution, memory, and network. It is a charge plate estimated microcontroller that runs our product, gathers information from associated peripherals, and makes a move passionate about the Raspberry Pi's characterized conditions. It's a quad-center CPU that can approach 1.5 GHz, even as another video center VI 3D unit that approaches 500 MHz. On- board memory is accessible in sizes from 1 GB to 4GB.

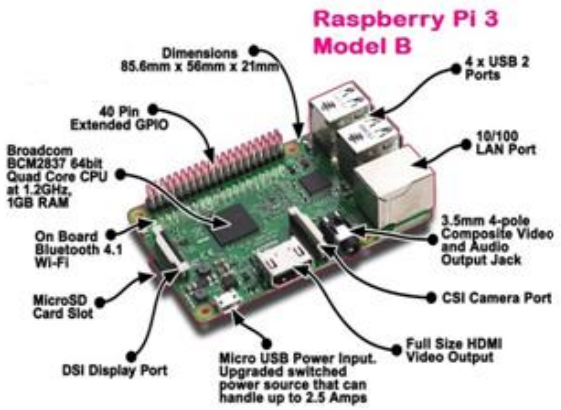


Fig: Raspberry pi

CAMERA MODULE

This framework utilizes a 5MP Raspberry Pi Camera Module Rev 1.3. With the Raspberry Pi 3B+, you may have to use any USB webcam. This camera module is right for Raspberry Pi projects which require a touch measure of room. The highest quality camera module takes superb photos and may likewise record video, making it ideal for drones or a reconnaissance activity. For extra computations, the Raspberry Pi 3B+ constantly gets signal from the 5MP camera module. It's normally employed in picture handling, AI, and security projects.

Fig:5MP Camera Module

CONTACTLESS TEMPERATURE SENSOR:

The MLX90614ESF is an infrared thermometer that may be utilized to require non-contact temperature readings. It's accustomed to recognize internal heat level for this example. it's a temperature range of - 20 to 120 degree Celsius. It distinguishes the individual's internal heat level and conveys the information to the Raspberry Pi. The MLX90614 infrared sensor works by changing over infrared signals gathered from articles and bodies into electrical signs, conveying the electrical message converter after clamor intensification and intensifier handling, then, at that time changing over the electrical sign into

computerized signals and arranging the prepared signs within the inner memory.

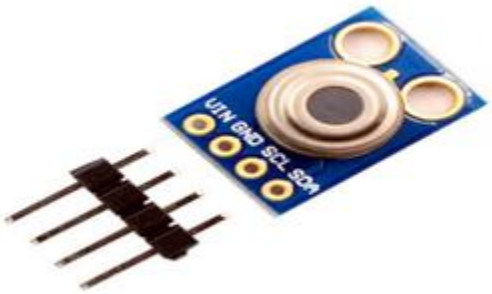


Fig :MLX90614 Contactless Temperature Sensor

SOFTWARE REQUIRED

MACHINE LEARNING:

AI is a part of computerized reasoning (AI) that permits PCs to learn and improve without being expressly customized. AI is the investigation of making PC calculations that can get to information and find out on their own. The learning interaction begins with perceptions or information, like models, direct insight, or guidance, so we can look for designs in information and settle on better choices later depending on the models we give. The crucial objective is for PCs to learn all alone, without the requirement for human contribution, and to change their conduct likewise. Notwithstanding, text is treated as a progression of catchphrases when utilizing customary AI calculations; all things considered, a semantic investigation procedure imitates the human capacity to appreciate the significance of a report.

DEEP LEARNING

Profound Learning is a sort of man-made brain power that imitates the human cerebrum's handling of information and formation of examples for dynamics. Profound learning is a computerized reasoning subset of AI that utilizes neural organizations to take in solos from unstructured or unlabeled information. Profound neural organizations, profound conviction organizations, profound support learning, intermittent neural organizations, and convolution neural organizations are instances of profound learning plans that have been utilized in different spaces. PC vision, discourse acknowledgment, regular language handling, machine interpretation, bioinformatics, drug plan, clinical picture investigation, material review, and table game projects are only a portion of the spaces where they've beaten human specialists. In profound learning, "profound" alludes to the work of various layers in the organization. A direct perceptron can't be a general classifier; however an organization with a non-polynomial actuation capacity and one secret layer of limitless width can, as per early examination. Profound learning is a new variation that spotlights an unbounded number of layers of limited size, considering down to earth application and advancement while keeping up with hypothetical all inclusiveness under gentle conditions. For effectiveness, teaching ability, and understandability, profound learning layers are additionally permitted to be heterogeneous and stray considerably from naturally educated connectionist models, henceforth the "organized" partition.

TENSORFLOW

Tensor Flow is a free and open-source dataflow and differentiable programming library that might be utilized for an assortment of purposes. It's an emblematic number related library that is additionally used in neural organizations and other AI applications. Tensor Flow is Google Brain's second-age innovation, which is used for both exploration and creation. The standard execution runs on single gadgets, and adaptation 1.0.0 was delivered on February 11. Tensor Flow might be utilized on an assortment of CPUs and GPUs (with discretionary CUDA and SYCL expansions for universally useful registering on designs handling units).

PYTHON PROGRAMMING

Python Language is a universally useful, deciphered undeniable level programming language whose plan theory stresses code lucidness. Its language structure is supposed to be honest and costly. Python has an enormous and exhaustive standard library. It upholds modules and bundles, which energizes program seclusion and reuse.

Python's engineers attempt to stay away from untimely improvement by dismissing fixes to non-basic spaces of the C Python reference execution that would give minor speed gains to the detriment of clearness. At the point when speed is fundamental, a Python software engineer can utilize Py, an in the nick of time compiler, or move time-touchy capacities to augmentation modules written in dialects like C. Python is another choice, which

changes over Python contents to C and calls the Python translator straightforwardly from the C level. Python's makers have focused on it to keep the language agreeable to utilize.

OPERATING SYSTEM

Linux portion based working frameworks are the most well-known on the Raspberry Pi. The ARM11 depends on ARM adaptation 6, which is not, at this point, upheld by various conspicuous Linux appropriations, including Ubuntu. NOOBS is the Raspberry Pi's establishment director. NOOBS accompanies the accompanying working frameworks:

- Archlinux ARM
- OpenELEC is an open-source media player.
- Pidora is an anecdotal person (Fedora Remix)
- The open source advanced media focus Raspbmc and XBMC
- RISC OS was the principal ARM-based PC's working framework.

Raspbian (suggested) – It is kept up with freely of the Foundation; it depends on the ARM hard-skim (ARMHF)-Debian 7 'Wheezy' design port, which was produced for a fresher ARMv7 processor whose parallels would not chip away at the Raspberry Pi, yet Raspbian is arranged for the Raspberry Pi's ARMv6 guidance set, permitting it to work yet at a low speed. It gives pre-arranged programming groups and DEB programming bundles. A 2 GB SD card is vital, notwithstanding a 4 GB SD card or bigger is suggested. For exchanging programs, there is a Pi Store. In contrast with the traditional PC orientated Raspbian, the Raspbian Server Edition (RSEv2.4)' is a managed variant with other programming bundles packaged.

OVERVIEW OF PROJECT

Face-mask Detection: For the implementation of face mask detection, we have utilized the Open Computer Vision classifiers i.e Haar cascade classifiers. At whatever point the force supply is given to Raspberry Pi, then, at that point the working arrangement of raspberry pi will run and booting documents will run. Raspberry Pi will check the camera and it will be on condition. By using the convolution neural network (CNN) it checks whether the person is wearing a mask or not. This framework will help to identify people on image/ video stream wearing a facemask with the assistance of Deep learning and Computer Vision algorithms by using various libraries such as OpenCV, Keras, and TensorFlow etc. If the person is wearing the mask then it indicates on the screen “MASK”. If the person is not wearing the mask then it indicates on the screen “NO MASK”.

Temperature Detection: For the detection of body temperature, MLX90614 is a Contactless Infrared Temperature Sensor that can be used to gauge the temperature of a specific object. MLX90614 sensor uses infrared rays to measure the temperature of the particular object without any physical contact and communicates to the microcontroller using the I2C protocol. Here we need to draw some limit to it. If it crosses the cut off limit then the buzzer bell will go on.

Detection of Hand- Sanitization: For the detection of automatic hand-sanitizing, the 5V pump and relay module is placed. Whenever the relay receives the signal from raspberry pi, it will be on the pump otherwise it will be off the pump.

IR Sensor is used to detect the actual qualities of its close environmental surroundings. At this point the hand is put close to the sensor, it detects that signal from the receiver and sends it to the relay module. Here the relay module is placed because raspberry pi does not give adequate power to the pump.

Fig. Circuit connection

CONCLUSION

We successfully implemented a functioning prototype of the mask, blood heat, and Hand sanitization detection system during this project. This

project is commonly employed in places where there are many people, like schools, universities, offices, shopping malls, and so on. The system initially determines whether or not the user is wearing a mask before sending the info to the microcontroller.This project has resulted in an automatic system, which dispenses with the necessity for somebody's to screen COVID-19 conventions. Mask detection is improved by employing a bigger image dataset to coach the module. The Raspberry Pi has almost sufficient computational ability to detect a mask from an image/video stream, yet future Raspberry Pi updates will make the interaction plenty simpler. Finally, face masks, temperature, and hand sanitization can help us reduce huge crowds of individuals in one location without wearing masks, which brings down the possibility of infection.

FUTURE SCOPE

In future the project might be extended by adding the detection of some symptoms like checking the cold and cough of an individual and also the other minor detections. By scanning the throat and nose. So, then we are able to take the information of the person and may send the info to the hospitals or higher officials, to avoid the person not roam in other places likewise. So, this often reasonably help to the society by preventing the spread.

REFERENCE

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