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Smart Door with Biometric Face Recognition and Thermal Screening

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Abstract: *Since the outbreak of covid-19 it has become truly challenging to recognize the individuals who visit us at our home, offices, educational instituitions are influenced by the infection or not during this COVID19 pandemic. To tackle this issue as of now, temperature gadgets are regularly used. But these gadgets are not non-contact. With the development of artificial intelligence and computer vision, face recognition has become a hot topic of pattern recognition. While recognizing any individual, the most important attribute is face. It serves as an individual identity of everyone and therefore face recognition helps in authenticating any person's identity using his personal characteristics. The whole procedure for authenticating any face data is sub-divided into two phases, in the first phase, the face detection is done quickly except for those cases in which the object is placed quite far, followed by this the second phase is initiated in which the face is recognized as an individual. Then the whole process is repeated thereby helping in developing a face recognition model which is considered to be one of the most extremely deliberated biometric technology. Our projects presents a conceptual model for providing entry access to an individual after face recognition and thermal screening. We will interface an IR temperature sensor to detect the temperature of an individual along with face detection to grant entry access. The proposed conceptual model can be helpful at every individual house, hospital to detect the temperature of the in-pateint and at institutions.*

Keywords: COVID, Arduino UNO, Temperature sensor, LCD Display, DC Motor.

I. INTRODUCTION

COVID-19 is an infectious disease caused by a newly discovered corona virus. This disease can show mild to moderate symptoms and like tiredness, aches and pains, sore throat, fever, difficulty in breathing or shortness of breath, loss of speech or movement, chest pain or pressure etc. This disease gets transmitted from person to person through droplets generated when an infected individual coughs, sneezes, or exhales. These droplets are too heavy and hence they don't hang in the air, So they settle on floors and surface. When other person comes in contact with these infected surface and thereafter if he touches his mouth, nose or eyes there are high chances to get exposed to this virus. Due to these situation, many protection and safety measures were taken by governments in order to reduce the disease spread, such as obligatory indoor mask wearing, social distancing, quarantine, self-isolation, limiting citizens' movement within country boarders and abroad, often together with prohibition and cancellation of huge public event sand gathering. In these times of COVID-19, it is essential to go through thermal screening for checking one's body temperature before entering any premises. However, it is a tiring process as it involves measuring body temperature of all people, one at a time. At the same time, those who carry out thermal screening are required to stand for more than 8 hours a day and check each and every person. This takes a lot of time and effort. So to come up with a solution that can do this job effortlessly, we have built a Facial Recognition Thermal Screening System. The device works by recognising the face of each person and doing thermal screening to detect the body temperature. If a person is found to have a very high temperature, then the system will not allow entry and instead will automatically notify that person to take a COVID-19 test. If the body temperature falls between the required normal temperature range and is found to be okay, then entry is allowed after proper sanitization.

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II. LITERATURE REVIEW

[1] Face Description with Local Binary Patterns: Application to Face Recognition", Timo Ahonen, Abdenour Hadid, and Matti Pietikainen, 2016. The texture extraction technique is considered from this paper modification is made to extract and detect the face based on Haar classifiers and Adaboosting technique.

[2]Fast Face Detection Using Ada Boost, Julien Meynet", 16th July 2017.The detection of faces in input images is proceeded using a scanning window at different scales which permits to detect faces of every size without re-sampling the original image.

[3] "Face Recognition as an Authentication Technique in Electronic Voting",Noha E. El-Sayad, Rabab Farouk Abdel-Kader, Mahmoud Ibraheem Marie, 2019.The calculated distances are compared with Gabor database and the real time image. The result shows whether the captured image is authenticated or not.

[4]"Local Gabor Binary Pattern Histogram Sequence (LGBPHS): A Novel Non- Statistical Model for Face Representation and Recognition",Wenchao Zhang, Shiguang Shan, Wen Gao, Xilin Chen, Hongming,2015.This project proposes face recognition based on Local Gabor Binary Pattern Histogram Sequence (LGBPHS). In this approach, a face image is modelled as a "histogram sequence" by concatenating the histograms of all the local regions of all local Gabor magnitude binary pattern maps.

III. PROPOSED SYSTEM

The proposed system provides a camera image as an input to Arduino UNO. It would undergo the face recognition process. The temperature sensor (MLX90614) acts as an infrared non-contact temperature reader that reads the temperature without contacting them and passes that as an input. If the face is not recognized, an entry not granted is displayed in LCD. If the face is recognized and temperature is under control, entry granted is displayed in LCD.If the face is recognized and temperature is abnormal, an entry not granted is displayed in LCD. A servo motor is used to demonstrate the opening and closing of the main door. It produces velocity and torque based on the voltage and the amount of current supplied.

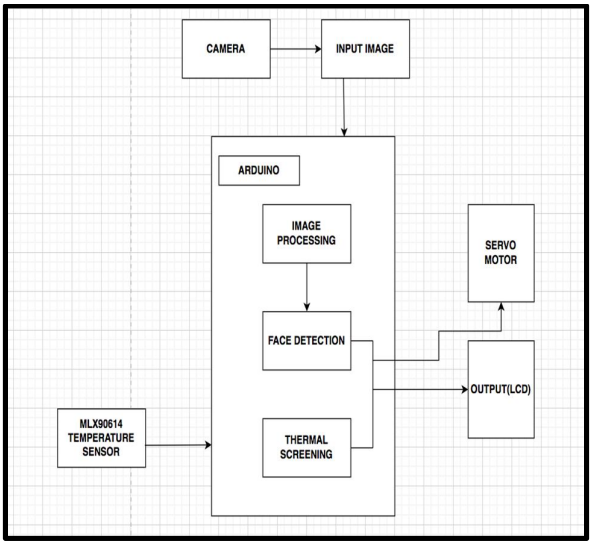

Figure 1: Block diagram of proposed system

It also works as a part of a closed-loop system providing velocity and torque as commanded from the servo controller with a feedback device to close the loop. If entry is granted, the servo motor will open the main door. If entry is not granted, the servo motor will not open the door.

IV. METHODOLOGY

4.1 Face Recognition

Face recognition is a technique that takes the image of a person (query image) and compares it with the previously recorded images in the database. This is done by comparing the invariant features obtained from the techniques that capture

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the representative variability of the faces or the structure, the shape and the face attributes like distance between the eye centers and nose, upper outlines of the eyes, width of eyebrows, etc. Face recognition has the benefit of being a passive, non intrusive system to verify personal identity in a natural and friendly way. The main benefit of this technique over other biometric approaches is that the face images can be taken from a distance.

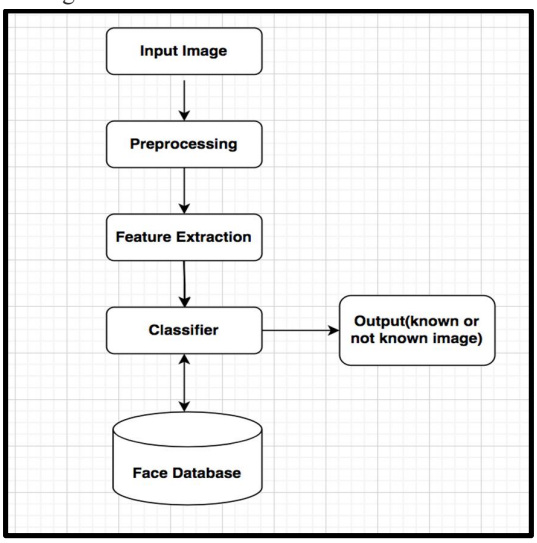

Figure 2: Flowchart of the face recognition process

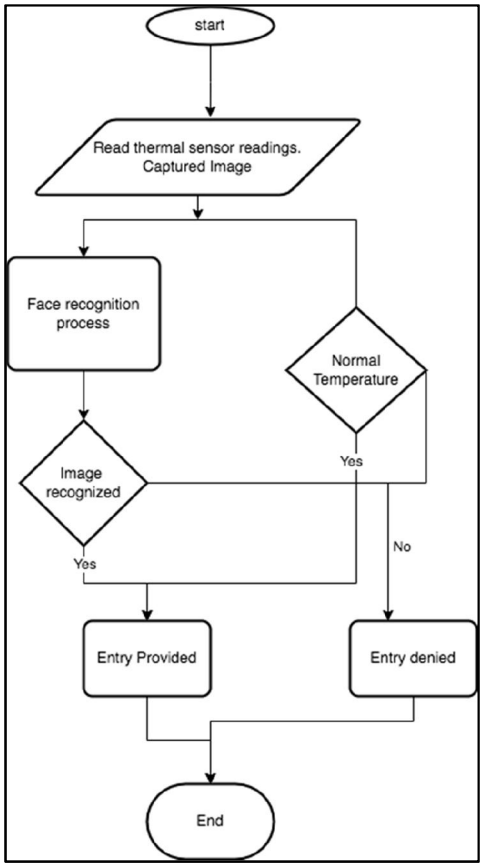

Figure 3: Flowchart of the proposed system

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4.2 Data Set Collection

The images used for training and testing the model could be obtained from the college database or corporate database. To determine the bounding box region of a face in an image, start with an image of an individual. It can capture the face Region of Interest after determining where the face is now in the picture, and then utilize facial landmarks to detect the position of mouth, eyes, nose, and other features. The face is captured and the blob is constructed from the image that depicts people. This blob is passed to achieve face detection from the extracted blob .The weak detection is filtered to ensure that the confidence (probability) is more than min degree of reliability so that face ROI (Region of Interest) is extracted and switched to RGB format from BGR format and it is reformatted to 4 × 224, and then preprocessing is done,

4.3 Temperature detection

The MLX90614 temperature sensor is connected to the Arduino's GPIO Pin. The thermometer's noise reducer amplifier, with a 17-bit ADC, and powerful DSP efficient unit is used which helps in achieving more correctness. The sensor does have a digital System Management Bus (SMBus) output, with PWN which has been factory calibrated and prepared. A 10-bit PWN is programmed to continuously broadcast the recorded temperature of approximately -19 to 130°C with an outcome resolved up to 0.15°C. Output is Celsius, and if the temperature reaches the threshold value entry is not granted for an individual.

V. Results and Discussion

The device works by recognising the face of each person and doing thermal screening to detect the body temperature. If a person is found to have a very high temperature, then the system will not allow entry and instead will automatically notify that person and display the value.

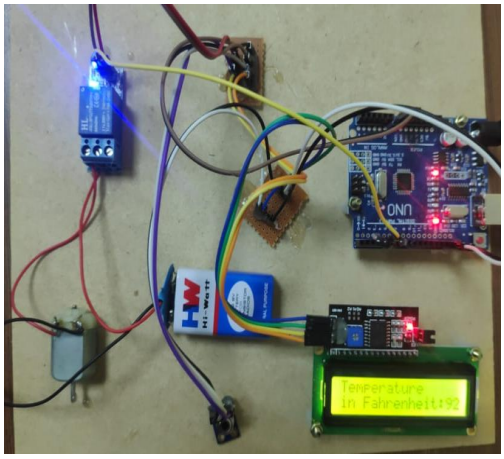

Figure 4: Hardware output of proposed system

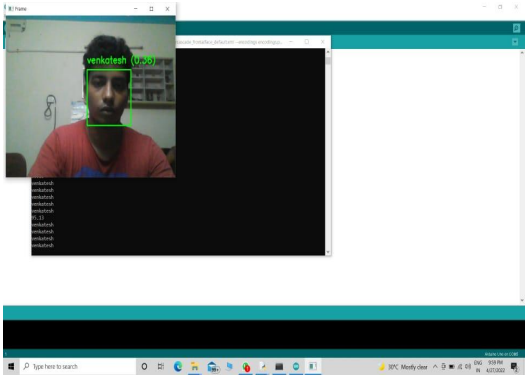

Figure 5: Output of Proposed System

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VI. CONCLUSION

Face recognition based door locking has been developed to provide better security. It is user friendly system. The use of Eigen face recognition technique makes system more secure. This system can be used in several places, where high security is required where confidential information and equipment is kept.

REFERENCES

[1]. P. Garcia Lopez, A. Montresor, D. Epema, A. Datta, T. Higashino, A. Iamnitchi, M. Barcellos, P. Felber, and E. Riviere, "Edge-centric Computing: Vision and Challenges," SIGCOMM Comput. Commun. Rev.,vol. 45, no. 5, pp. 37–42, Sept. 2015.

[2]. M. Henze, J. Hiller, O. Hohlfeld, and K. Wehrle, "Moving Privacy- Sensitive Services from Public Clouds to Decentralized Private Clouds," in 2016 IEEE International Conference on Cloud Engineering Workshop (IC2EW). IEEE, Apr. 2016, pp. 130–135.

[3]. A. M. Khan and F. Freitag, "On Participatory Service Provision at the Network Edge with Community Home Gateways," Procedia Computer Science, vol. 109, pp. 311–318, Jan. 2017.

[4]. Jafri, Rabia, and Hamid R. Arabnia. "A survey of face recognition techniques." Jips 5.2 (2009): 41-68.

[5]. Orji, Chigozie, Evan Hurwitz, and Ali Hasan "Thermal Imaging Using CNN and KNN Classifiers with FWT, PCA and LDA Algorithm "in Seventh International Conference on Computer Science, Engineering and Information Technology (CCSEIT 2017), 2017.

[6]. Pratibha Sukhija, Sunny Behal, "Face Recognition System Using Genetic Algorithm", 2016.

[7]. A. Rosebrock,"COVID-19: Face Mask Detector with OpenCV, Keras/TensorFlow, and Deep Learning", May 4, 2020, https://www.pyimagesearch.com/2020/05/04/covid-19-face-mask-detector-with-opencv-keras-tensorflow-and-deep-learning/.

[8]. A. Hidayat, Subono, V.A. Wardhany, A.S. Nugroho, S. Hakim, M. Jhoswanda, "De-signing IoT-Based Independent Pulse Oximetry Kit as an Early Detection Tool forCovid-19 Symptoms ", 2020 3rd International Conference on Computer and Infor-matics Engineering (IC2IE).

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