IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 7, July 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.542

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907084 |

Security Bot with Facial Recognition using IoT

N. Thanuja[1], C Sharon Mary[2], Darshan L[3], Deepashree M Moger[4],Harshitha R Putane[5]

Assistant Professor, Dept. of Computer Science and Engineering, BIT, Bengaluru, India[1]

Student, Dept. of Computer Science and Engineering, BIT, Bengaluru, India [2,3,5,4]

ABSTRACT: This project presents a security bot that performs facial recognition using Internet of Things (IoT), controlled via an Android application for examining threats in its vicinity. The bot is capable of detecting humans in real time scenarios. The project cycle of the robot is classified in a number of tasks: Face Detection, Face Recognition, generation of alerting to the user. The bot detects the human face based on CNN using a camera module interfaced with Raspberry Pi. The structure is exposed to numerous facial images of people from distinct angles and background conditions. This forms the data collection to train the system which aids in facial recognition. Subsequently, when the bot detects a human face, it initiates the algorithm for recognition of face which uses Convolutional Neural Network (CNN) approach. According to images in the dataset, the bot determines whether the human detected is a threat or not. In case of a match with the dataset, the user receives a message through Twilio module on his/her mobile phone along with the name of the person recognized. In case of a irreconcilable, a threat or an alert message is received by the user. The motion of the bot is controlled by the android application.

I. INTRODUCTION

Surveillance and observation have become very important for security reasons these days. Residential areas, government organizations, commercial spaces, banking, and other outdoor environments require high-end surveillance systems. In this work, a new scheme is being proposed called Security Bot with facial recognition. This system provides a real-time live streaming and monitoring system using Raspberry Pi with installed Wi-Fi connectivity. In addition to this, it also has the facility to send messages which can be received by the owner. Technological progress made closed-circuit television (CCTV) popular in office as well as home surveillance applications. Surveillance of each corner in the space using a CCTV is not cost effective. Also, this surveillance requires a human operator to detect and recognize the person and hence there are chances of human mistakes. CCTV systems alone cannot give 100% surveillance, hence, in this project, we present a security bot which has face detection and recognition capability also its movement can be controlled using an Android phone. The bot sends an alert message to the user that the detected human is a threat or not. The main advantage of the bot is that the user can recognize the human without even going to close vicinity. The main aim of this project is to implement a better efficient Security Bot with facial recognition for any given space in time. To minimize the response time after a detection is made. To build a bot with four wheels that is high in mobility with video access.

The proposed Security Bot with face recognition is continuously providing the surrounding area. The system continuously monitors the given area and is able to recognize whether the detected person in the given vicinity is known or an unknown person to the user. The main application of the project would be in households where infants are required to be left alone but at the same time needs monitoring. As a matter of fact, the Bot can be used in any household that needs security at a low cost and that requires less hassle in installing and getting it set up. All households, offices, institutions and any small-scale places that needs constant monitoring and alerting comes under the applicability of our project.

II. LITERATURE SURVEYS

Face-Recognition System Using IoT proposes a security system which is of low cost, low power consuming system that can easily provide high level of security as it combines two modern technologies together i.e. Face recognition and IoT. The only drawback of the system is the time taken for response is very high.

A Smart System for Face Detection with Spatial Correlation Improvement in IoT Environment, IEEE proposes a system where the gateway will run face detection algorithms and the result will be sent to remote user's cellphone or laptop. The face detection is done using the algorithms, Face Detection Design Process, Haar Feature-based Cascade Classifiers, Face Parts Spatial Correlation. The cons of the projects are that It is challenging to obtain accurate

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907084 |

estimates of face, particularly in unconstrained images like side face, rotated a face, and face with glasses and it is not available as a service on demand usage model.

IoT based facial recognition system for home security using Local Binary Pattern Histograms algorithm, ICICT proposes the solution in two parts, which are, Detecting Faces and creating the database locally, Creation of the database, comparing the faces in the database to recognize them. The system uses LBPH algorithm to recognize the person from the local database created for the family members. The drawbacks are that they do not work well in low lighting as the accuracy dropped down by 10% as compared to lighting conditions.

Smart Home Security using IoT and Face Recognition, IEEE, in this paper, the proposed system consists of embedded sensors which enable sensing helps in reducing power consumption by avoiding unnecessary loss of energy which is passive infrared radiation for motion detection and ultrasonic sensors for distance measurement using Local Binary Pattern and carries drawbacks pertaining to less accuracy and the system proposed is highly expensive.

A Face Recognition Method in the Internet of Things for Security implementations in Smart Homes and Cities, IEEE, proposes a system, where a camera is utilized to achieve the image when a movement detected by PIR sensor and a computer vision module is applied to the captured images to detect and recognize the human faces and finally sending it to the smartphone by using Haar-feature and AdaBoost classifier. The proposed system does not give accurate results under low lighting and when the poses vary too.

CCTV Based Surveillance System for Railway Station Security, IEEE proposes an image enhancement method using the data matching with histogram shaping technique, they conducted experiments using images with 1,280 × 720 pixel collected from CCTV surveillance video system. The drawback of the system is that the accuracy of the system is less in the night time as compared to that in other time of the day.

IOT Based Automated Attendance with Face Recognition System proposes a Face Recognition system is used to mark the attendance for students and faculty without any person interference that makes very useful for institutions and schools to mark the attendance easily having a drawback of the camera modules since it is not cost effective.

IoT based Real Time Face Recognition Door Lock System using Neural Network proposes a system, Raspberry Pi is used for face recognition and Histogram of Oriented Gradients, Principal Component Analysis and Back Propagation Neural Network are used for solving face recognition problem. The drawback of this system is that the combination of Back Propagation neural network with principle component analysis makes the interface complicated.

IOT Based Door Access Control Using Face Recognition paper aims to assist users for improvement of the door security of sensitive locations by using face detection and recognition and the proposed system mainly consists of subsystems namely image capture, face detection and recognition, email notification and automatic door access management. The response time of the computation taken is not mentioned.

Face Recognition Using Open CV Based On IoT for Smart Door paper discusses a face recognition system which is designed and applied for doors resulting in smart doors based on IoT and the system provides real time face detection and recognition once the bell is triggered. The drawback is that the probability of naming the unknown face from the database is low.

In the IoT based facial recognition door access control home security system using raspberry pi paper, the Face recognition is tested on two types which are by testing image and real-time to determine the system accuracy. The tested image will have labelled the image with names for authorized person while unknown for unauthorized person. The drawback is that system proposed is less efficient on an overall basis.

Vehicle Security Systems using Face Recognition based on Internet of Things proposed a system that is evaluated on two face datasets which are ORL dataset and our dataset which were collected from 10 vehicles, each has 5 authorized drivers. Then every authorized driver was tested and 100 times without glasses and also with glass. The con of the project is that it is not available as an on demand service model.

Design and Analysis of IOT Based Real Time System for Door Locking/Unlocking using Face Identification proposes a system that uses a Raspberry Pi 3 model B for computation along with a Pi Camera to take face as an input of the user and fingerprint sensor is also used. The face detection and recognition system used for door opening will be able to learn user's faces from time to time and update its dataset. The drawback found is that the sample needs a lot of images to train the model which can lead to a potential overfitting scenario.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907084 |

Real Time Attendance System Using Face Recognition Technique uses an integrating face recognition technology with open source computer vision OpenCV algorithm and evolve an Attendance System. The software will facilitate the attendance automaton process and enable faculties to enquire student's data by just maintaining a log for clock-in and clock-out time. The accuracy of the system could be improvised.

Smart Home With Virtual Assistant Using Raspberry Pi proposes a system where Olivia is integrated into smart door lock implemented on Raspberry Pi. The virtual assistant are visually impaired people and they can perform various functions inside the house. The drawbacks are that it has poor accuracy levels and it is not available as a service on demand model.

III. PROPOSED METHODOLOGY

In this proposed system, the system proposes a Security Bot with facial recognition using Internet Of Things which develops and implements a mobile Security bot designed to monitor the given space and identify any person entering a given space. In case of any detection and identification of an unknown person, an intimation is to be sent to the owner through Twilio module. Based on the application and design stages, this research can detect humans. Web camera captures the live images. The device uses CNN method to detect humans from the whole body also the humans from parts of their body, such as half a body.

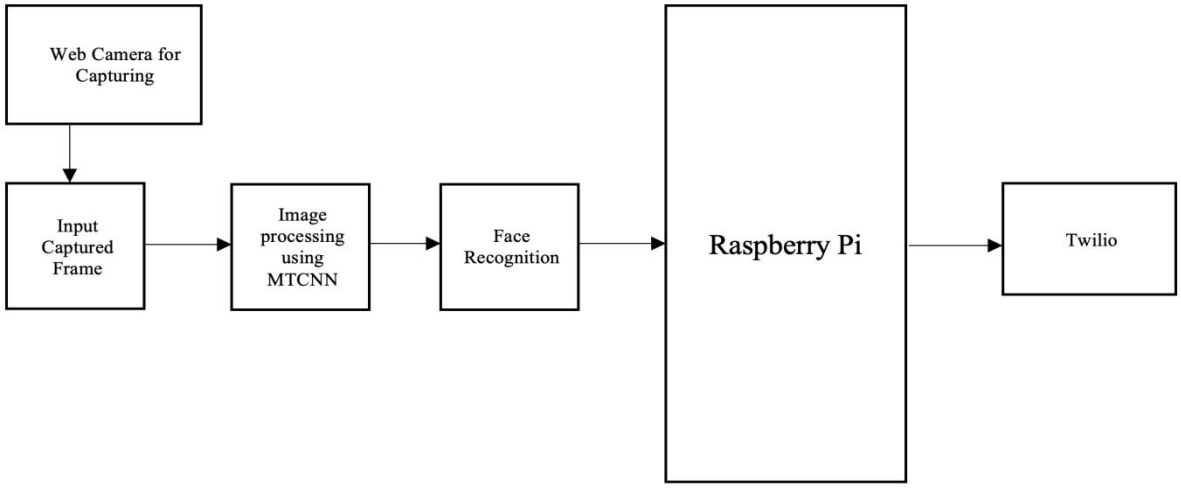

Figure 1. Architecture of Proposed System

According to the system architecture diagram shown in Figure 1,

- The captured images are given as the input from the camera and then it compares captured frames with the database and classification and image processing is done using CNN.
- The main hardware components in this architecture Raspberry-pi, Driver motor, Wi-Fi module, Relay, Camera.
- The Node MCU is an open-source hardware and software perform which can be connected to the internet using it's inbuilt wireless LAN. In this system architecture both Raspberry-pi and Node MCU work as a standalone system.
- Intimations are sent to the users immediately in case of a detection of a person through Twilio or Telegram application.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907084 |

IV. EXPERIMENTAL RESULTS

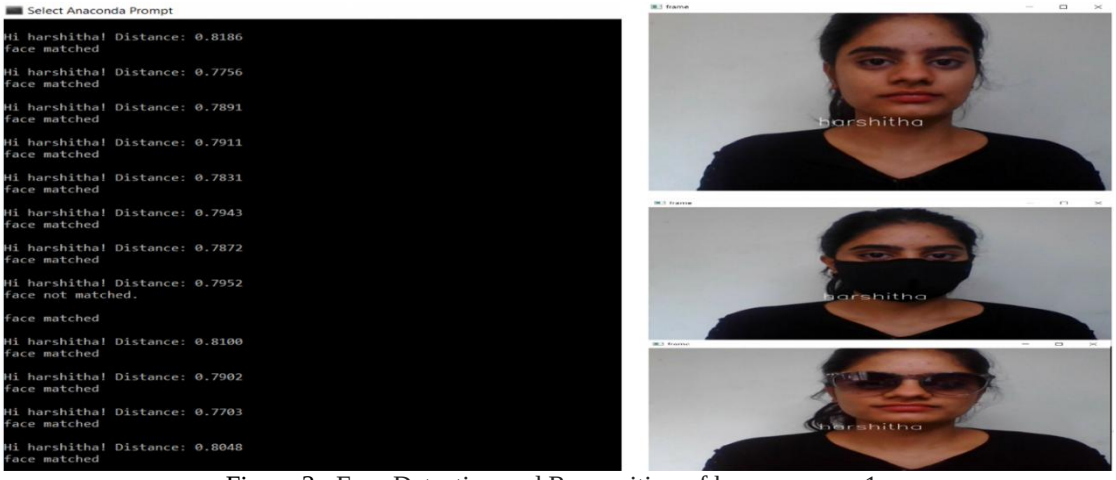

Figure 3 : Face Detection and Recognition of known person1

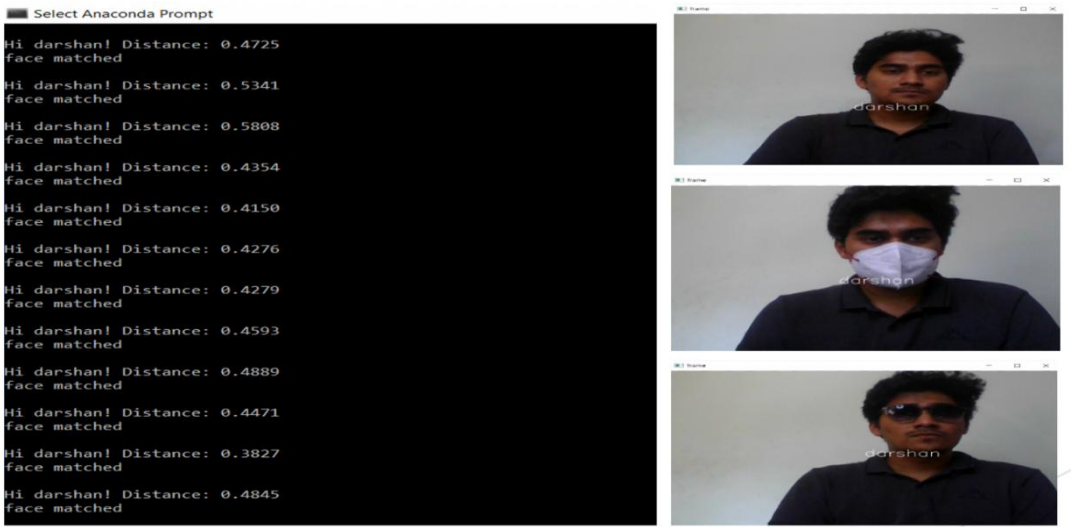

Figure 4: Face Detection and Recognition of known person 2

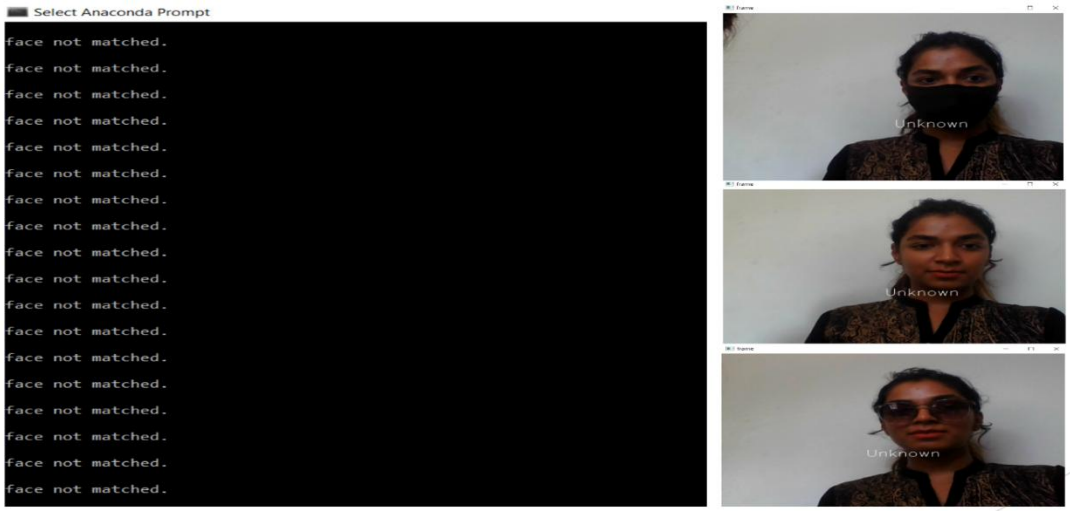

Figure5:Face Detection of unknown person

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907084 |

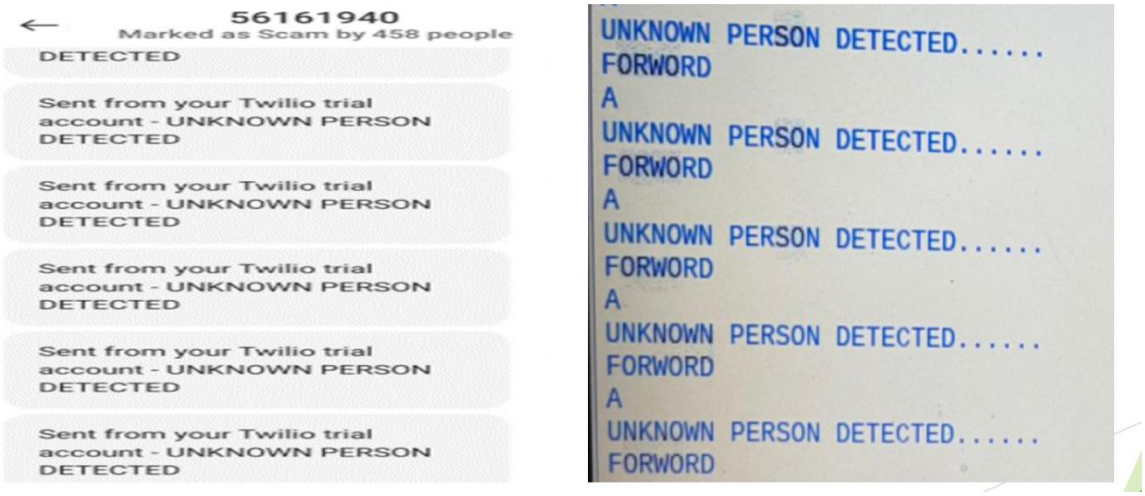

Figure 6: Message sent to Owner via Twilio

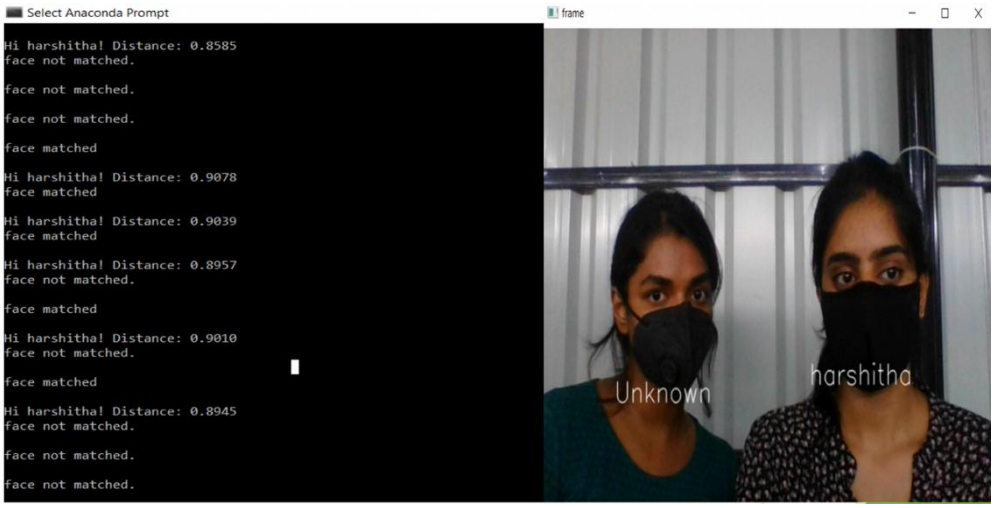

Figure 7: Multiple face detection and recognition

V. CONCLUSION

The security bot that is proposed is less expensive and provides basic security system. The bot can be easily installed to any environment since it is a mobile bot and it can be controlled via IoT applications. Facial recognition and detection of any intruder or authorized person give access to high security and safety.Any anomalies in the specified environment are immediately intimated to the owner.

The security bot that is proposed can be used to control appliances in any given environment along with the existing facilities.The security bot that is proposed can include gas sensors and other sensors for easier detection and performance.A much more complex interface can be built to let the user operate the functionalities with ease.The addition of emergency numbers to the application and direct contact with the legal authorities can be implemented for a more robust and tight secure system.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907084 |

REFERENCES

[1] WanliXue , Wen Hu Praveen Gauranvaram, Aruna Seneviratne and Sanjay Jha, An Efficient Privacy-preserving IoT System for Face Recognition, ∗University of New South Wales (UNSW) - Sydney, Australia, 2020 IEEE Workshop on Emerging Technologies for Security in IoT (ETSecIoT).

[2] NafisMustakim, NafisMustakim, Mohammad Mustafizur Rahman, Nadimul Islam, Zayed Hossain Sayem, Md. Asaduz Zaman Mamun, Face Recognition System Based on Raspberry Pi Platform, Department of Electrical and Electronic Engineering Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh.

[3] Prof. Vishal Badgujar, Mr. Pranav Chauhan, Mr. Sachin Gupta, Mr. Rohit Arava, Dr. Sameer Nanivadekar, ML Enabled Surveillance System for Societies Department of Information Technology, A.P. Shah Institute of Technology, Thane (M.H), India 400615.

[4] S. A. I. Quadri and P. Sathish, "IoT based home automation and surveillance system,"2017 International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, 2017, pp. 861-866, 978-1-5386-2745-7/17©2017 IEEE.

[5] Bhookya, R V Prasad and Nitesh Gaikwad, "IoT Based Secured Smart Home Automation Using Raspberry Pi,"2017 International Journal of Ethics in Engineering & Management Education (IJEEE), ISSN: 2348-4748, Volume 4, Issue 3, March 2017.

[6] Chowdhury, Md. Nasimuzzaman&Nooman, Md &Sarker, Srijon, "Access Control of Door and Home Security by Raspberry Pi Through Internet," 2013 International Journal of Scientific and Engineering Research, Volume 4, Issue 11, November 2013.

[7] Robot vision Berthold Horn, Berthold Klaus, Paul Horn MIT press, 1986.

[8] Robot modelling and control Mark W Spong, Seth Hutchinson, Mathukumalli Vidyasagar.

INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 7.542

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

Scan to save the contact details