SMART DOORBELL SYSTEM

Keep an eye on your doorstep,even when you're away-home's vigilant guardian

[1]Aarathi P, [2]Anjana Chandran, [3]Anupama K A, [4]Archana C S, [5]Praveena k

[1]Student, [2]Student, [3]Student, [4]Student, [5]Assistant Professor (CSE)

[1]Computer Science and Engineering Department,

[1]Nehru College of Engineering and Research Center (NCERC), Thrissur, India

Abstract: In recent years, face recognition technology has proved to be the most popular method of contactless biometric system, outstanding the ones based on iris, voice and gait recognition. Smart Doorbell systems are analyzed to break up modern doorbells into generations, of which the Amazon Ring series shines for those who are open to Amazon infrastructure, and the Eufy Video Doorbell remains viable for those who prefer their data to be more local. Moreover, computers can now outperform humans in terms of many face recognition tasks particularly when it comes to searching of faces in larger databases, capturing and storing minute facial details in as minimal format as possible. A system with the ability to detect and recognize faces has many potential outcomes not just in crowded places but in home security systems as well. One such application of automating the household doorbell can not only solve the security issues but also offer extra flexibility to smart house control by recognizing the person at doorstep and announcing the name. We propose a system by making use of Raspberry-Pi with ARMv8 Cortex-A53 as the core. The project aims at porting the Open Source Computer Vision (OpenCV) library to the Raspberry-Pi board and using its pre-trained classifier Haar-Cascade and recognizer Local Binary Pattern Histogram (LBPH) for face detection and recognition purpose. Furthermore, using the Raspberry-pi accelerated command line media player, name of the person will be announced and faces unknown to the database will be captured and stored. This low-cost and low-power system will indeed prove a boon for persons with disabilities.

Keywords: CNN (Convolutional Neural Networks), Face recognition, biometric, raspberry-pi, OpenCV

I. INTRODUCTION

The purpose of this paper is to document the advancements in smart doorbells made in recent years. The techniques and findings of several research papers as well as the features currently available in featured doorbells in production are discussed along with potential areas of future research expansion. The modern doorbell has evolved into a box far more advanced than in past days. Instead of being merely a button that triggers an audio response, doorbells are now becoming the first point of contact with visitors, not requiring the owner to walk to the door or even be home. In addition, they can be used as security devices interfaced with other systems, such as external cameras, floodlights, and integrated smart locks. This field has become mainstream, with companies as large as Amazon and Google being key players. Face recognition process is initiated by pressing the doorbell. This will turn on the integrated camera and capture images. The image captured will be compared with the one stored in the backend database. On matching, the name of the person at the doorstep will be announced. In case, the face is not present in the database, it will be stored newly. Comparing to the old traditional doorbell, this improvised one notifies us with the person at the door. This will be helpful for persons with disabilities particularly the blind people.

II. LITERATURE SURVEY

A literature review is an overview of the works that recognized academics and researchers have published on a certain subject. It comprises the state of the art, encompassing significant discoveries as well as theoretical and methodological advancements on a given subject. Reviews of the literature do not present newly conducted experiments; instead, they rely on secondary sources. A literature review enables us to improve and showcase our abilities in two primary domains: locating knowledge and evaluating it critically.

2.1 Face Recognition technology based Smart Doorbell System using Python's OpenCV library

Flawless identification of individuals is a very a basic societal requirement. Just a few decades ago when technology was not at its peak, people in small tribes and villages knew everyone and recognized everyone else, just because there were manual face-to-face interactions between them. One could easily detect a stranger or identify a potential breach of security. In today's larger world where the society norms are getting more rigid, it isn't that easy. In today's age where interactions take place electronically, security becomes a crucial factor where a person's individual identity is something which cannot be compromised. Until now, magnetic swiping cards or passwords were used. But lately, these aren't considered to be secure as they can be lost or easily misused by some other person. So, the solution to this was Biometric systems. In surveillance and monitoring systems, say a public place, people cannot be asked to punch in their thumbs or cards always. So, something that won't physical touch and easy to recognize an individual same up, which is nothing but the face recognition technology. We propose a system by makes use of Raspberry Pi with ARMv8 Cortex-A53 as the core. The project aims at porting the Open Source Computer Vision (OpenCV) library to the Raspberry-Pi board and using its pretrained classifier Haar-Cascade and recognizer Local Binary Pattern Histogram (LBPH) for face detection and recognition purpose. Furthermore, using the Raspberry-pi accelerated command line media player, name of the person will be announced and faces unknown to the database will be captured and stored. This low-cost and low-power system will indeed prove a boon for persons.

2.2 Iris + Voice Recognition System for a Smart Doorbell system

In this paper, describe our methodology for designing a smart doorbell system for the homes. While the recent trend of big companies is to offer a home voice assistant, which can integrate all possible services, including the recognition of the owner (or authorized people) at the house door, privacy concerns and independence from a single service provider are requiring more freedom in the choice of the "smart objects" that surround us. The doorbell system is using both iris and voice recognition to verify the identity of the user who rings at the door. Since there is the involvement of biometric data, this information has to be properly handled. In particular, we designed our system in such a way that it can avoid to send or store any biometric data to the cloud. Machine-learning algorithms are used to perform local computations, thus implementing Edge-Computing analytics to determine the identity of the user, by combining both voice and iris biometrics. The system is implemented on reconfigurable hardware in order to accelerate some of the most intensive tasks and achieve enough performance at a reasonable power consumption. Our tests confirm that, by using our architecture, the performance is about 5x the sequential case and, at the same time, we reach about 7x less energy consumption.

2.3 A study on IOT smart doorbells by Dr. C.K. Gomathy, Ms. Devulapalli Satya

The purpose of this project is to make home or office or any area secure. When someone presses the doorbell, then the doorbell make a video call to the registered number. If someone roams in front of the door it notifies you by sending message. Then he can see the person who is roaming in front of our door. So, if the person is known we can open the door otherwise we can be alert. And also we can talk to the person through

mobile only and the person can reply there itself, Because it contains the audio speaker so that we can hear the outside people talks trough the mobile once we pick up the video call. If someone tries to steal it then the steal alarm will be activated.Implementation method On a Wooden Board, Take a microcontroller board named Raspberry pi which has 28 GPIO (general purpose input-output), 12-C, SPI, UART. Now, take a bread board arranges the relay circuit on it which contains 4 pins. Now connect on of it pin with the DC motor wire. Another wire of the DC motor connects to the bread board. Take a battery connects one of the wires to the relay circuit and another one to the bread board. Now take a push button place it on bread board and connect one of the end to bread board and another end to raspberry pi4 microcontroller. Now take a small LCD which contains three pins. Connect one of the pins to the bread board. And connect the second pin to the camera. And the third pin to the small resistor. Now connect the camera to the microcontroller and bread board respectively. So that our hardware part of the design implementation completed. Now at last insert SD card into the microcontroller at the respective SD card slot. Components Used:- 1. 70db audible alarm with capacity 30 m distance. 2. 1080 FHD Camera sensor which place on the doorbell. 3. Head to toe display and day and night clear visibility of picture. 4. Intruder alarm sensor to alert with a loud alarm. It works in day light and moon light also. Even in dark the video quality and picture quality is high. When someone roan in surroundings. The respective owner will be notified as someone is there. If anyone presses the bell it automatically makes a video call to the respective owner. He can even reply in video call itself and the visitor also can speak to him through Speaker. If any intruder roams then it will send a notification to the respective mobile. If anyone try to steal it then it will alerts the owner by alarming. We can access the doorbell by calling okay Google or Alexa. 36-different tunes are available in the speaker to differentiate the situation. If it is a big house we can increase the chimes number by setting up it.

2.4 A Hybrid Alert System for Deaf People using Context-Aware Computing and Image Processing

The life of deaf people or People with Hearing Impairments (PHIs) is difficult as they have to face challenges in identifying sounds like a visitor pressing the doorbell. The traditional doorbell uses an audio signal to notify people. However, it does not notify PHIs because PHIs are insensitive to sound. Due to the lack of help from support services, PHIs may not have normal daily lives. Therefore, it is necessary to propose an efficient doorbell solution in helping PHIs to be notified, and the intangible benefit for PHIs is that it will reduce their dependency on their families in their daily lives. This paper proposes a hybrid (Image Processing and Context-Aware Computing) alert system that would notify PHIs by using visual communication signals and tactile cues instead of audio signals. Compared with the existing solutions, the enhanced face recognition feature included in the proposed system design, made it smart enough to know when the visitor's image has to be snapped or not and how to reduce the transmission time of the image. In addition, what is context aware, and how the context aware feature will benefit the system design is also discussed. On the other hand, the intangible benefit of this research would be helping PHIs by reducing their dependency on others and building their self-confidence.

2.5 Smart Wi-Fi Based Door Bell Circuit Development for Homes

IoT is a delivered benefit in this area that could routinely cause an event, like calling the police, hearthplace brigade or your neighbour in case of any emergency. Now we can make a Smart Wi-Fi Video Doorbell the use of ESP32-CAM. This Smart doorbell can without difficulty be powered through an AC socket and every time a person on the door presses the doorbell button, it'll play a particular tune for your telecall smartphone content message with a hyperlink of video streaming web page in which you could see the individual on the door from everywhere in world. The setup is made through the use of ESP32-CAM, FTDI Board, 220V AC to 5V DC Converter, Buzzer, Push Button, LEDS. Now-a-days safety is turning into very important. maximum of the humans need the revolutionary shape of safety it approach we want to invent a device so that it will assist us from many Security associated threats we've many safety associated structures like Raspberry Pi

Visitor tracking device, video surveillance digital digicam, wi-fi doorbell, IoT primarily based totally Door Security Alarm, now we're going to layout the safety device via way of means of the use of esp32 cam. The esp32 cam has many functions so that it will offer safety via way of means of the use of the digital digicam as withinside the assignment we've additives like esp32 cam, FTDI programming board, breadboard, buzzer, push button, led and a Twilio app so allow us to see how The esp32 cam consists of the digital digicam and a MICROSD slot esp32-s chip that is a microcontroller and right here the esp32cam is attached with the FTDI programming board to sell off the code from the Arduino ide to the esp32 cam reminiscence because the esp32 cam has no direct USB port to attach the Arduino ide so we're go along with the FTDI programming board which act as an interface among esp32 cam and Arduino ide As right here the FTDI programming board having receiver is attached to the transmitter pin of the esp32cam and the transmitter pin of the FTDI is attached with the receiver pin of the esp32cam and the io0 and GND pins withinside the esp32cam is want to be shorted and the 5v of FTDI is attached to the VCC of esp32cam so afterward while we join the cable to the Arduino ide.

2.6 IoT & AI Based Smart Doorbell System

In daily life, people have the need to know the identity of a visitor who comes to their organizations, regardless of whether they are there at that time. This need is even greater for people who suffer from some kind of disability that prevents them from meeting the visitor. To provide a solution in this sense, this paper proposes a smart model that performs the task of a doorbell, which should recognize the visitor and alert the user. To achieve that, this proposal incorporates technologies for facial recognition of visitors, notification to user and management of their responses. The complete process .i.e. recognition of visitor and notification to user and the related management problem divided into interrelated stages and their standardization issues are discussed later . Finally to test the effectiveness of the model, three scenarios where integrated; each one was composed by different organizations over which the recognition of known and unknown individual was analyzed . The human face has a particular shape that requires complex calculations in order to recognize it. Individuals are distinguished by their faces, with which they are being identified. The face recognition systems are embedded very practical to be used in different applications, such as terrorist's identification, security systems and identity verification access. In fact it is implemented in many public and even dedicated areas. Thanks to well develop technologies to the computer science, we can obtain considerably good and satisfying result of face identification and reveal. The extracted detail from faces will be analyzed and compared with the already existing similar face operated details in the thingspeak database. In this paper, face recognition is initiated by pressing the doorbell button. Indeed, an integrated web camera will captured several pictures of the visitor. The face recently scanned will be verified in the present database. In case of unknown face, a message with captured image is generated and pop at the owner screen. Otherwise, in case of known face, actual face id is matched with face id's which is already stored in database and door will automatically open's for few seconds. Furthermore, the owner will be notified through his device connected with system. Comparing to old face recognition systems that are already commercialized, this project is more efficient in real time response with better recognition rate.

The main goal of this work is to create an intelligent doorbell system mainly based on face identification To achieve the described functioning, we sub divided the face recognition process into three parts: Face Detection, Face Extraction and Face Recognition. The human face is most accessible way in which we are able to understand who someone is and how they might be feeling, and how someone might feel can give us clues to how they might behave. Data about the face is key to this understanding. Recognize individual faces or reading someone's emotional reaction is often crucial to a business operation. Recognition must be quick and accurate, regardless of whether it is to prevent unauthorized persons from entering a restricted area or to determine customer's feeling about a new product. So far, this has primarily being an assignment for security, marketing staff etc. An automated process for face recognition, based on specially developed software analyzing video streams, from network cameras, not only allows for a faster and more flexible and distributed system but will also improve overall service for a business and customers.

2.7 Smart Surveillance with Smart Doorbell by R.V. S.Lalitha, Kayiram Kavitha, N V Krishna Rao, G. Rama Mounika, V. Sandhya

With the evolution of the Internet and wireless Sensor Network Technologies, IoT has evolved as a concept to enable communication between heterogeneous devices (things or objects like sensors, actuators, RFID tags, etc.). These IoT devices operate without a screen or user interface in a resource-constrained environment usually dedicated to a single task. There are many constraints in IoT like battery power, memory space, and security as these devices are connected instantly to anything, anyplace and anytime. In contrast to the traditional internet, the IoT device intelligently gathers and analyzes human behavior . The high connectivity of these inteligent objects leads to serious security issues. IoT is formed with a network of sensor objects that can communicate via the Internet involving activities from the external environment. Any communicating device with a unique identification be part of the network. In the future, IoT-based technology will influence activities in daily life. Many IoT applications can be found in many industrial, scientific, and agricultural equipment, transportation systems, etc. According to Gartner report the number of smartphones and tablets will reach up to 7.3 billion units by 2020. As tremendous growth is observed in IoT, the communication network has challenges in terms of huge amounts of data. Home Security has become an important concept in the modern era. The home security system provides continuous monitoring with CCTV surveillance. As we witness a huge transformation in technology, the world is emerging smart in every aspect. These smart devices are invading into our lives, while offering the required privacy. These Internet-of- Things (IoT) devices remotely monitor objects connected by Internet. We are living in a digital world where every activity needs to be recorded through Closed Circuit Television (CCTV) surveillance cameras. It is neither possible to continuously monitor the CCTV footage nor inspects the door every minute. Also, there is a need for monitoring our premises; we need an alert immediately when a stranger is seen in-front of the door. Our Smart Doorbell can alert the resident automatically with an alarm when there is a visitor at the door.

In this paper we have developed an IoT based Smart doorbell to can alert the resident automatically with an alarm when there is a visitor at the door. The smart doorbell is connected to the internet and can capture the visitor at the door and transfer that information to the cloud or any storage devices spontaneously. In case of any break into the house, we have the evidence of crime from the video footage available. Such systems only serve as monitoring system. In case of any unforeseen event this camera footage can be helpful in providing eye witness for post event analysis. The system can alert the home owner about the visitor waiting at the door. This surveillance is done 24*7, so the system requires huge memory to store the video data. Obvious reasons are that these devices are wireless networks and also due to continuous capture of video leads to higher memory requirements in the device. The Raspberry Pi based applications for motion detection finds ease in developing intelligent based communications. The Smart Doorbell is helpful in remote monitoring the premises of a house even from office as now-a-days family members are out for most of the times and feel insecure about their home. This IoT based system provides a secure and reliable solution. Prior to this, various systems came into existence like pi camera and GSM module which included various incompatibilities i.e., delay in alerting the user, functioning with systems of heavy equipment which are not portable. In this Paper, we devise a method to maintain such networks at a very low price. Our IoT based application can monitor the home premises and alerts if any object is detected at doorstep. This security system can be placed at the main door of home or office and can be monitored from anywhere in the world via internet. This automated system proves to be useful for people in providing security, comfort and ease in access.

2.8 Doorbell system in home using IOT by B. Baron Sam , K. Purna Chander, K. Vinay, A. Pio Sajin

The Internet of Things (IOT) is the communication between different objects— gadgets, structures, vehicles, and different things—implanted with hardware, programming, sensors, and system availability. Burglary appropriation in light of IOT gives a framework. Web of Things is relied upon to create high level of human to machine correspondence alongside machine to machine correspondence. The work characterizes common access focuses to a home as essential and optional access focuses relying upon their utilization. Rationale based detecting is executed by recognizing ordinary client conduct at these entrance focuses and asking for client confirmation when important .We will secure the home from any undesirable individual. In this we will utilize IR and PIR sensor which is utilized to recognize the individual. Vibration sensor is utilized to identify the undesirable individual who break the glass. Every one of the exercises are screen by camera and every one of the parameters are gathered by the raspberry pi. At the point when undesirable individual distinguished means it naturally send warning to the portable, for example, Gmail (various client) and drop box utilizing IOT. An IOT ubidots stage which contains sensors information and a gui surrounded in that stage to open the entryway when we get the notice. We will get to a record in that stage which speaks to the working of sensors in it. By utilizing the conventions we will send the data to the client. We are utilizing python for building up the interface utilized as a part of this. So if client requires he can work it. Each datum is stockpiled cloud avant-garde in our ubidots account. Along these lines we are creating entryway chime framework utilizing IOT for savvy homes. Scientists have been testing and enhancing the strategy for savvy house from 1970s. As innovation progressed with time, electronic gadgets and use of web has turned out to be more prominent and reasonable, so the idea of home mechanization and people's desire from a shrewd home has changed drastically. Presently a-days shrewd home turned into an advanced mix of numerous Smart Devices and Sensor/Actor Networks which are remote. All these new client desires, entangled gadgets and unusual client conduct conveyed new security difficulties to the home mechanization front. The module of house security has additionally created with time. A hostile-to-robbery framework is any gadget or technique used to avoid or stop the unapproved apportionment of things thought about profitable. Burglary appropriation in view of IOT gives a framework. Web of Things is relied upon to deliver high level of human to machine correspondence alongside machine to machine correspondence.

2.9 Smart Home with Wireless Smart Doorbell with Smart Response

Smart homes are the need of the day and home security has always been an important aspect in this regard. In the days of COVID-19 pandemic, apart from security against intruders, the protection against the novel Corona virus has also become the latest concern. This paper describes an idea that how multiple home security systems can be integrated together to get a protective gadget for making our surroundings safe against the Corona virus. In this work, we have come up with a complete but low cost solution of smart home doorbell.

This smart wireless doorbell not only broadcasts the video of the visitor but it also senses his/her body temperature without the physical press on the bell. Moreover, it establishes a connection to an Android application "SmartWDB" via Bluetooth and sends the notification of arrival of the visitor, his body temperature and video using the WiFi signals. The smart homes market is enjoying the boom with the introduction of Internet of Things (IoT), with new technologies, improved interoperability, expanded product intelligence, enhanced service integrations, and innovations in business models. The researchers around the world are trying hard to make homes smarter, to enhance the security and safety of the houses. With the advent of COVID-19 from Jan, 2020, the people around the world cannot live their lives with the old routines and habits. Homes are not really homes anymore, they have turned into offices, schools and universities. "Stay home, stay safe" has become the slogan of everyone. But after staying at home and taking all the possible safety measures, there is still a likelihood that infection may invade the residents. In routine life, many people keep visiting us at our houses and they usually press the doorbell to convey their arrival. They might be the

carriers of novel Corona virus. Generally, the house occupants can answer the bell in three ways with certain consequences. Firstly, by going to the door personally; a high risk of coming in contact with the infections. Secondly, by using the answering machine that would not tell anything about the body temperature or identity of the person. Thirdly, by not responding, if the person is not at home or does not want to meet the certain person. In that case he does not have a way to convey the message.

2.10 A Low-cost Smart Doorbell System for Home Use

Smart doorbells allow home owners to receive alerts when a visitor is at the door, see who the guest is, and communicate with the visitor from a smart device. They greatly improve people's life quality and contribute to the evolution of smart homes. However, the commercial smart doorbells are quite expensive, usually cost more than 190 US dollars, which is a substantial impediment on the pervasiveness of smart doorbells. To solve this problem, we introduce the Dashbell-a budget smart doorbell system for home use. It connects a WiFi-enabled device, the Amazon Dash Button, to a network and enables the home owner to answer the bell triggered by the dash button using a smartphone. The Dashbell system also enables fast fault detection and diagnosis due to its distributed framework. Doorbells have been playing an important role in protecting the security of modern homes since they were invented. A doorbell allows visitors to announce their presence and request entry into a building as well as enables the occupant to verity the identity of the guests to help prevent home robbery or invasion at a moment's notice. There are two types of doorbells depending on the requirement of wall wiring: the wired doorbells and the wireless doorbells. The former requires a wire to connect both the front door button and the back door button to a transformer, while the latter transfer the signal wirelessly using telephone technology.

III. EXISTING SYSTEM

The Categories that could be used to describe the general use of doorbells in this classification system could go using a generational numbering wherein higher generations have more advanced features. Generation 1 could be defined as the baseline doorbell that simply plays a noise when pressed. Generation 2 can have basic connectivity via Wi-Fi or Bluetooth. The key feature of this generation would be video streaming when the button is pressed. Generation 3 would have added integrations, such as Amazon Alexa or IFTTT, which allows greater usefulness in the IoT era. Generation 4 would be more futuristic, including all of the above in addition to advanced vision, such as face and event recognition which could be greatly utilized in many smart home IoT applications. Of the doorbells discussed, the SimpliSafe, Wisenet, and Ring Video Doorbell models would be classified in Generation 2. The rest would be included in Generation 3. Because the models compared are all being currently manufactured, no Generation 1 (too basic) or Generation 4 (too futuristic) have been compared.

After looking at the models that have currently been published, possible areas of expansion include doing a formal application of motion detection from the camera. This could include smart motion detection that only consider the motion of humans or other applicable items, such as packages or wild animals. It could also be used to reduce the effect of cars in motion. Another area that could be added would be to create a system that could interface with a network-attached storage (NAS) server in order to locally save large amounts of video data without impacting the performance of the local microprocessor when excess videos have been recorded. Finally, package arrival and protection could be improved. Using object detection, an instant notification could be deployed when a package arrives or if an unidentified person walks away with the package. This could improve the ease of use in going through old videos as it could ensure the user has an idea of which videos are more important, such as a potential robbery.

In recent years the simple doorbell has grown into a complex system that goes well beyond simply notifying house dwellers that they are being requested at a door. Modern systems can alert the homeowner wherever they may be. They even give the owner the capability to see and speak to their visitor from thousands of miles away. From there, the door can sometimes be unlocked remotely. These systems are relatively cheap (most range between $100 and $250) and aim to be easy to install and operate. Most systems either record everything for complete playback later or stick with still images that have been deemed important, such as when the button is pressed. Systems that do identify key video clips are those that do so in the cloud, which also requires a subscription to the service. This creates a void in terms of what is cheap and convenient for the customer

IV.　LIMITATIONS IN EXISTING SYSTEM

The Smart doorbell systems offer convenience and enhanced security, but they also come with their own set of disadvantages:

1. **Cost**: Smart doorbell systems can be expensive, especially when considering the initial purchase price and any ongoing subscription fees for cloud storage or additional features.
2. **Dependence on Internet Connection**: These systems rely heavily on a stable internet connection. If the connection goes down, the doorbell may not function properly, potentially leaving your home vulnerable.
3. **Privacy Concerns**: Smart doorbells often come equipped with cameras and microphones, raising concerns about privacy. There's a risk that these devices could be hacked, leading to unauthorized access to your footage and audio recordings.
4. **Technical Issues**: Like any technology, smart doorbells can encounter technical glitches or malfunctions. This might include issues with connectivity, software bugs, or hardware failures, resulting in unreliable performance.
5. **Limited Compatibility**: Some smart doorbell systems may not be compatible with older wiring systems or certain types of doors, limiting their usefulness in certain homes.
6. **Power Source Dependency**: Many smart doorbells require a power source, typically through hardwiring or battery power. If the power source fails or the battery dies, the doorbell may stop working until it's recharged or the power issue is resolved.
7. **Installation Challenges**: Installing a smart doorbell system may require technical expertise, especially if it involves wiring or integrating with existing doorbell systems. Improper installation could lead to functionality issues or even damage to your home's wiring.
8. **Potential for False Alerts**: Motion detection features in smart doorbells may trigger false alerts, especially in areas with high foot traffic or frequent movement. This can be annoying and may desensitize users to real security threats.
9. **Legal and Ethical Concerns**: Recording audio and video of individuals without their consent may raise legal and ethical questions, especially if the footage is shared or used in ways that infringe on privacy rights.
10. **Reliance on Manufacturer Support**: If the manufacturer discontinues support for a particular smart doorbell model or goes out of business, users may be left with a device that becomes obsolete or lacks necessary security updates.

V.　PROBLEM STATEMENT

Flawless identification of individuals is a very a basic societal requirement. Just a few decades ago when technology was not at its peak, people in small tribes and villages knew everyone and recognized everyone else, just because there were manual face-to-face interactions between them. One could easily detect a stranger or identify a potential breach of security.

In today's larger world where the society norms are getting more rigid, it isn't that easy. In today's age where interactions take place electronically, security becomes a crucial factor where a person's individual identity is something which cannot be compromised. Until now, magnetic swiping cards or passwords were

used. But lately, these aren't considered to be secure as they can be lost or easily misused by some other person. So, the solution to this was Biometric systems.

In surveillance and monitoring systems, say a public place, people cannot be asked to punch in their thumbs or cards always. So, something that won't require physical touch and easy to recognize an individual same up, which is nothing but the face recognition technology. The problem statement highlights the multifaceted challenges of the system to notify the person in house about the visitor at the doorstep by giving a sound or pop-up message notification, store the image of an unknown person.

VI.   PROPOSED SYSTEM

The Flawless identification of individuals is a very a basic societal requirement. Just a few decades ago when technology was not at its peak, people in small tribes and villages knew everyone and recognized everyone else, just because there were manual face-to-face interactions between them. One could easily detect a stranger or identify a potential breach of security. In today's larger world where the society norms are getting more rigid, it isn't that easy. In today's age where interactions take place electronically, security becomes a crucial factor where a person's individual identity is something which cannot be compromised. Until now, magnetic swiping cards or passwords were used. But lately, these aren't considered to be secure as they can be lost or easily misused by some other person. So, the solution to this was Biometric systems. In surveillance and monitoring systems, say a public place, people cannot be asked to punch in their thumbs or cards always. So, something that won't require physical touch and easy to recognize an individual same up, which is nothing but the face recognition technology. In this paper we are trying to build a system for the disabled persons.

The main aim of the system is to:
1. Notify the person in house about the visitor at the doorstep by giving a sound notification.
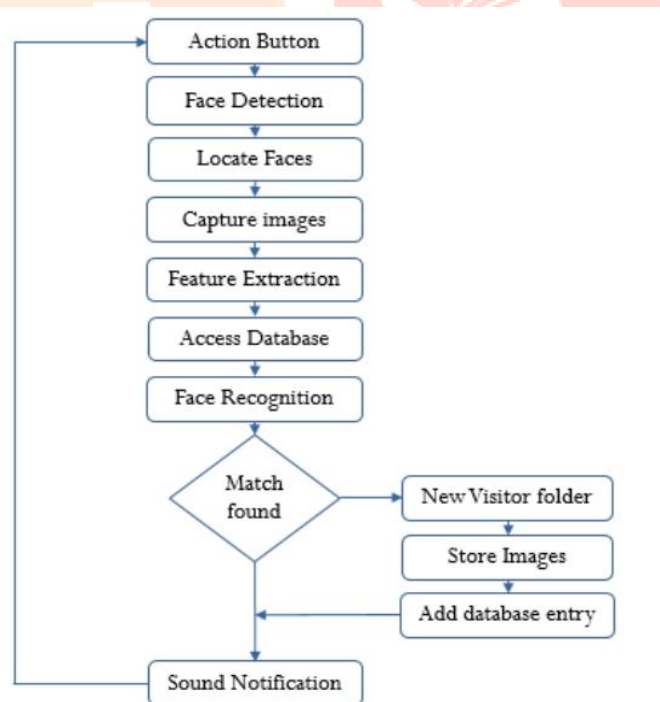2. Store the image of an unknown person.
3. Safety and Security.

Figure 1. Flowchart

The main goal of this work is to create a smart doorbell system mainly based on human face identification. The face recognition method is broadly classified into 3 distinct phases: Face Detection & Data Gathering, Face Extraction & Face Recognition. The extracted details from faces are analyzed and compared with the already existing similar face operated details within the database. The proposed system will be helpful for those who aren't at home most of the times and need to keep track on visitors. Its utility is to be set as an alert

for home visitors and provide information about the visitors in a dynamic website and phone application, could be used in other fields like industries, offices and even air-ports for identifying wanted people.

6.1 Face detection

Face Detection has a very crucial aspect wherein the inputs can either be collected from surveillance videos, objects tracking, expression analysis and template matching. This phase itself has got 3 aspects to it namely pre-processing, classification and localization. Initially, in the pre-processing stage before the images are fed to the network, it is converted from RGB to Grayscale because it is easy to detect faces in grayscale. After that, the images are manipulated by resizing, cropping, blurring and sharpening. Regions that are extracted are still worked on factors like the lighting conditions, resolution, levels of zoom and orientation to tell us whether it is a face (positive) or non-face (negative) image.

6.2 Face Extraction:

Human-faces are extracted after detecting them from an image and stored to reduce dimensions and noise. The face image is taken, extracted and transformed into a vector with fixed dimension with space vector containing points and locations in an XML or PCD file. Both of them are considered to be training files and shows training the recognizer with features extracted from an image and that being converted into a trainer file so that minimum space is required for storing the facial features.

6.3 Face Recognition:

The process of face recognition is often confused with that of face detection. After preparing the training data file, its time to match the stored data and the input image. Numerous face recognition algorithms are available such as Eigen faces, PCA, LBP, IDA, Fisherfaces etc. to extract the image. In this system, LBPH (Local Binary Pattern Histogram) method is used to perform face recognition. The Eigen faces and Fisherfaces determine the most dominant features of the face in the training set and more time consuming methods as compared to the LBPH, however LBPH figure out all the faces in training set individually . LBPH is readily available in the OpenCV library. It represents faces extracted in a simple manner by monotonic grayscale transformations which reduces the processing time indeed .So, face recognition is not just detecting but verifying the faces.

VII. RESULTS AND DISCUSSION

The Single faces which are present in the backend database can be identified with name and those not present in the database are shown unknown. Two faces when shown simultaneously can be detected and recognized.
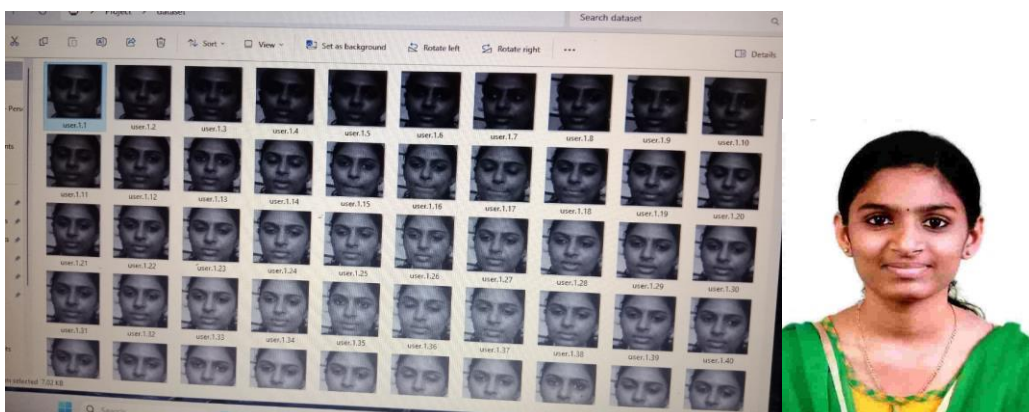

Figure 2. Training dataset and training images

Fig 3. Notification obtained through app

REFERENCES

[1]   Ayman Ben Thabet and Nidhal Ben Amor, "Enhanced Smart Doorbell System Based On Face Recognition," 16th international conference on Sciences and Techniques of Automatic control & computer engineering - STA'2015, Monastir, Tunisia, December 21-23, 2015.

[2]   Suraj Pawar, Vipul Kithani, Sagar Ahuja and Sunita Sahu, "Smart Home Security using IoT and Face Recognition," 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA).

[3]   Vijay Kumar Sharma, "Designing of Face Recognition System," Proceedings of the International Conference on Intelligent Computing and Control Systems (ICICCS 2019) IEEE Xplore Part Number: CFP19K34-ART; ISBN: 978-1-5386-8113-8.

[4]   Ciya James and David Nettikadan, "Student Monitoring System for School Bus Using Facial Recognition," Proceedings of the Third International Conference on Trends in Electronics and Informatics (ICOEI 2019) IEEE Xplore Part Number: CFP19J32-ART; ISBN: 978- 1-5386-9439-8.

[5]   Alen Salihbašić and Tihomir Orehovački, "DevelopmentofAndroid Application for Gender, Age and FaceRecognition UsingOpenCV," MIPRO 2019, May 20-24, 2019, Opatija Croatia.

[6] Vivek Kishor Bhanse and Dr.M.D.Jaybhaye, "Face Detection and tracking using Image processing on Raspberry Pi," Proceedings of the International Conference on Inventive Research in Computing Applications (ICIRCA 2018) IEEE Xplore Compliant Part Number:CFP18N67-ART; ISBN:978-1-5386-2456-2.

[7]   Nafis Mustakim, Noushad Hossain, Mohammad Mustafizur Rahman, Nadimul Islam, Zayed Hossain Sayem and Md. Asaduz Zaman Mamun "Face Recognition System Based on Raspberry Pi Platform," 1st International Conference on Advances in Science, Engineering and Robotics Technology 2019 (ICASERT 2019)

[8] M. Inoue, K. Uemura, Y. Minagawa, M. Esaki and Y. Honda, "A home automation system", IEEE Trans. Consum. Electron., vol. CE-31, no. 3, pp. 516-527, Aug. 1985.

[9] R. Williams, E. McMahon, S. Samtani, M. Patton and H. Chen, "Identifying vulnerabilities of consumer Internet of Things (IoT) devices: A scalable approach", Proc. IEEE Int. Conf. Intell. Secur. Inform. (ISI), pp. 179-181, Jul. 2017.

 [10] S. Notra, M. Siddiqi, H. H. Gharakheili, V. Sivaraman and R. Boreli, "An experimental study of security and privacy risks with emerging household appliances", Proc. IEEE Conf. Commu. Netw. Secur., pp. 79-84, Oct. 2014.