

# Face recognition based Access Control of Door and Home Security system

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**Abstract-**The paper presents a theoretical model and a system concept to provide a smart electronic aid for blind people. The system is intended to provide measures such as face detection. This paper also presents a computer vision system for visually impaired. This system understands face around the subject up to 1 feet in front, left and right direction using a camera module. This proposed system uses Raspberry Pi board to process real time data collected by camera module. The module contains a secured face recognizer for automatic door unlocking. The camera catches the facial picture and compares it with the image which is stored in the database. If the picture is found in the database then the door lock opens otherwise it relevant pre-recorded speech message stored in memory is invoked. This pre-recorded speech messages are invoked using easy text to speech software which is installed in the raspberry pi board. Such speech messages are conveyed to the visually impaired using earphone or speaker.

**Index Terms-** Facial Recognition; Image matching; Sensor System; Digital camera; Raspberry Pi 3; Person Identifications

## I. INTRODUCTION

Blindness is actually a visual impairment which has an effect on a 0.7 % of the people. Based on the most recent estimates, nearly one million folks in Spain suffering from visual disabilities and because of to retinal diseases described, approximately 70,000 people have complete blindness. Based on estimates of the World Health Organization (who), around 285 million individuals suffer from some kind of visual impairment, of which 39 million are actually blind, meaning a 0.7 % of the world's population [1]. Visual impairment impacts of unevenly to various age groups to be incisive in individuals older than fifty years representing 65% of the complete (while this particular team just represents twenty % of the

entire population) [two]. The adjustments that happen in the perception as a consequence of age include [1]:

- Loss of the sensitivity of the retina to lighting effects which originates a want to take brighter lighting.
- Opacity of the lens which causes decreased eyesight & annoying reflections
- Elasticity Of the crystalline lens as well as loss of capability to focus
- Degeneration of the vitreous that triggers the perspective of stains
- Reduction of the capability of the conjunctiva as well as lacrimal glands to effectively lubricate the eyes.

All of this leads to portion of the visual capability is actually lost with age and create diseases such as dryness, eye conditions, macular degeneration, glaucoma, or cataracts of the eyes. The technologies of info interaction (technology ICT) are actually a fantastic opportunity for the advancement of new methods and answers that provide generally up the quality of living for people with visual disabilities. In this feeling, the computer vision could be beneficial to enhance the day life of the individuals.

In these modern times, home security is the need of the hour for the development of society as a whole which in turn will help make our cities smart, so the concept of facial recognition to gain access of the house is an idea which is used to make our place of living more secure. A facial recognition system is a system which captures facial images and verifies the identity of a person using a digital camera. The human face assumes an essential part in our social association, passing on individuals' character. Utilizing the human face as a key to security, biometric confront acknowledgment innovation has gotten tremendous consideration in the previous quite

a while because of its potential for a wide assortment of utilizations. A facial acknowledgment framework is a framework which gets facial pictures and confirms the character of a man using a propelled camera. It is an application fit for distinguishing or checking a man from a computerized picture. One approach to do this is by looking at chose facial components from the picture and a face database.

As stood out from other diverse biometrics frameworks utilizing unique mark/palm print and iris, confront acknowledgment has unmistakable favorable circumstances due to its non-contact handle. Face pictures can be caught from a separation without touching the individual being recognized, and the ID does not require participating with the individual. It is normally utilized as a part of security frameworks and can be contrasted with different biometrics. It has additionally turned out to be main stream as a commercial recognizable proof and advertising instrument.

II. RELATED WORK

People always remain busy in their day to day work also wants to ensure their safety of their beloved things. Sometimes they forget to look after their necessary things like keys, wallet, credit cards etc. Without these, they are unable to access their home or any place they want. To prevent such incidents many scholars came into action and tried to prohibit them. Like YanboZhao ; ZhaohuiYe introduced “A GSM/GPRS based wireless home security system [2] but the system is not cost effective as the GSM/GPRS charges a fixed amount from each sms/call or data transfer. Hasan,H. ; Bakar,R.A. ; Mokhtar,A.T.F. also introduced ” “Face recognition based on auto-switching magnetic door lock system using microcontroller”[3][5] but face recognition means complex algorithms and sometimes the system may be unable to detect the visitors identification correctly and keeps a computer chip busy for longer time. Assaf, M.H. ; Mootoo, R. ; Das, S.R. ; Petriu, E.M. ; Groza, V. ;Biswas, S. invented “Sensor based home automation and security system”[4] designed a sensor based system. Lots of paper work has been done so far. In this paper, a new system is designed which would control the door through the internet without any complexity. It’s very convenient and serves as a plug and play system. The user can see from anywhere in this world that who is at his door steps.

The system keeps a picture of the visitor as evidence that would be needed if any unwanted situation occurs like stealing, robbery etc. The user can control the door with a single command through the internet by mobile, pc, tablets etc. This system can also be used for industrial automation wirelessly. Also for any kind of accident like fire, or stolen keys the door can be opened by a single and simple command. As a result the security is confirmed also the mental peace. [3]

III. PROPOSED SYSTEM

The system that is built for the authentication process is a set of different biometric techniques integrated as a single system using the Raspberry Pi processor. It contains a web camera module followed by a microphone, Voice recording and Playback module. Other sources like power supply, speakers, monitor and memory card are present. These all components combine to perform the identification and authentication process. The details of the components used in this system and the methods they follow for accessing are discussed in the below. Most important input device is the wireless camera.

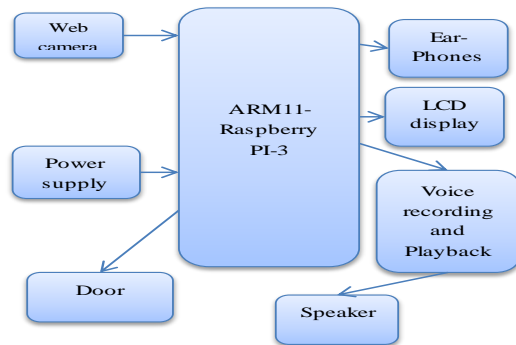


Fig.1 Block diagram

It is used to see video stream and also whenever a person comes it takes a snapshot of that person and transmit it to raspberry pi. Raspberry pi process these inputs like whenever it gets a calling bell as input it transmits a signal to wireless camera to capture an image of the visitor.

A. HARDWARE IMPLEMENTATION:

Raspberry Pi 3: The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the

Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs. The main features of Raspberry pi 3 are[4]

Processor: Broadcom BCM2387 chipset.1.2GHz Quad-Core ARM Cortex-A53 802.11 b/g/n Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE)

GPU: Dual Core VideoCore IV® Multimedia CoProcessor. Provides Open GL ES 2.0, hardwareaccelerated OpenVG, and 1080p30 H.264 highprofile decode.

Operating System: Boots from Micro SD card, running a version of the Linux operating system or Windows 10 IoT.

GPIO Connector: 40-pin 2.54 mm (100 mil) expansion header: 2x20 strip Providing 27 GPIO pins as well as +3.3 V, +5 V and GND supply lines

LCD Interfacing to Microcontroller: A liquid crystal display (LCD) is a thin, flat panel used for electronically displaying information such as text and integers. Its major features are its lightweight construction, and portability. Date and time are continuously displayed on LCD when the sensor values are being stored in EEPROM. Four data lines are used to send data on to the LCD. When RS=0 and EN pin is made high to low command is sent to LCD. When RS=1 and EN pin is made high to low data is sent to LCD. VEE is used to adjust contrast.

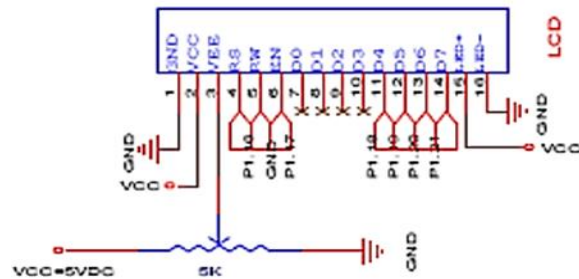


Fig.2. LCD connection

APR9600 board: This shortens the total length of sound recording to 32 seconds. Total sound recording time can be varied from 32 seconds to 60 seconds by changing the value of a single resistor. The IC can operate in one of two modes: serial mode and parallel mode. In serial access mode, sound can be recorded in 256 sections. In parallel access mode, sound can be recorded in 2, 4 or 8 sections. The IC can be

controlled simply using push button keys. It is also possible to control the IC using external digital circuitry such as micro-controllers and computers. The APR9600 has a 28 pin DIP package. Supply voltage is between 4.5V to 6.5V. During recording and replaying, current consumption is 25 mA. In idle mode, the current drops to 1 mA. The APR9600 experimental board is an assembled PCB board consisting of an APR9600 IC, an electret microphone, support components and necessary switches to allow users to explore all functions of the APR9600 chip. The oscillation resistor is chosen so that the total recording period is 60 seconds with a sampling rate of 4.2 kHz. The board measures 80mm by 55mm.



Fig.3 APR9600

Camera: Web camera is a video camera that feeds or streams its image in real time, Webcams are known for their low manufacturing cost and their high flexibility, making them the lowest-cost form of video telephony

### B. RESULT AND DISCUSSION

Here is the flow of the system. At first the system detects human and automatically raspberry pi take a snapshot which means the image acquisition part. After that image is processed and checked for authentication. Now the image matches with database, door lock or open according to users command the magnetic lock gets open or close.

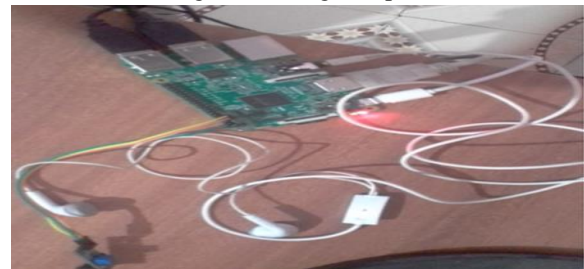


Fig.4 Hardware of the designed System

#### IV. CONCLUSION

The system can be used in several places like banks, hospitals, labs and other sophisticated automated systems, which dramatically reduce the hazard of unauthorized entry. Evidence can be given to the security department if any robbery issue occurs. But the system needs to be monitor always that the internet bills are paid in due time to keep connected with own home.

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