Design and Methods Of Object DetectionBased On Secured System

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Abstract- In planned system Surveillance systems provide the capacity to collect the required information and form proper decisions to enable safety. Generally, images captured from the cameras are sent to the users. The purpose of surveillance is to every minute monitor the image views. But, this is a time consuming process .So, mobile image surveillance represents the new system that encompass video acquisition and image viewing both computer based and mobile based surveillance.JPEG2000 format is a flexible image compressor format.it is an efficient way of utilizing the resources. It contains software motion detection technique that gives the exact progressive access to each stored content. It enables pi's camera to detect the motion and save the image as well as video streaming .Python script is one way to give suggestions to pi to send email every time the motion of any object is detected. With some cost effective components efficient security camera is to be implemented .This paper concludes brief summary and future scope of surveillance safety. There are many applications in these aspects such as. Python with Open source Computer Vision (OpenCV) is also one of the best way to give computer vision to the computer to detect and track the objects. Using SMTP to send the image of the area and SMS alert to give the status of the area.

Keywords- Raspberry Pi 3, face recognition system, OpenCV, Python, USB Camera, Object detection, Mail, SMS API.

I.   INTRODUCTION

The Present world is revolving around the new trend where in before purchasing a new product and capability regarding the usage of technology and also with low cost.so, in this aspect raspberry pi   plays major role .this creates the present trend that goes with the fast developing technology. Raspberry pi is cheaper and also very effective computer which can be used these days .raspberry pi can be used for having many possibilities like from a security system to VPN server .this accepts many programming languages including python. Today's generation is mainly looking forward for security which has become important in day to day activities. Pi is one of such processor which is capable to operate and also provide the requirements for the users in a very cost effective manner almost under 80 dollars. Regular security systems are very costly almost in the range of thousands. Presently, people doesn't want to waste their valuable time and money if there is a possibility of getting things done in range of low cost. The main criterion here is that using this technology person can get notifications through emails and messages by which they can assess the situation. Raspberry pi make our communication more secure information and automation which increases the efficiency of the project implemented in this paper.

A.   Monitoring & Control

The proposed system also includes an intelligent system for the intelligent face recognition using Open Source Computer Vision (OpenCV).

This technology plays a crucial role in enabling remote access to a person/ owner which requires the face recognition of the person. If the person want to control or monitor the area from the remote area the person have to make database of the images who are authenticated.

Also if any unauthenticated person came it will detect and also will send the mail to the owner by capturing the image and attaching it to the respected E-mail id using SMTP. This subsystem is implemented using Python programming language along with the OpenCV modulerunning on the Raspberry Pi 3.

II.   SYSTEM DESIGN&ARCHITECTURE
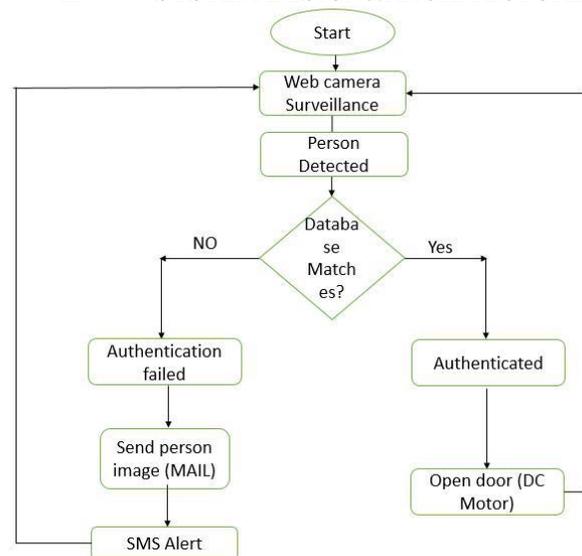
Fig.1: Flow Chart

As with any system, initial stage is to monitor the location using USB webcam which will be in surveillance mode always. As the person detected it fetch the face using haar_cascade_frontal_faceclassifier and compare with the database and accordingly give the result.

B. System Architecture

The proposed system is new approach to the identification and recognition of the person using the live surveillance method, Here Raspberry pi is used which is connected to the USB camera for the surveillance database is made of the people who are authenticated. As the camera detects a person using Haarcascade frontal face classifier it fetches the data of the face and compares with the database by training it using theCreateFisherFaceRecognizer module in OpenCV. As the personis authenticated automatically it opens the door (DC motor) and if the person is not authenticated it will capture the image of the person and send it to the mail using SMTP and also give an alert message using the Twilio API.
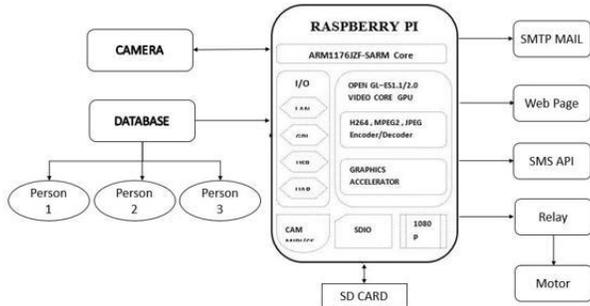

Fig.2: Block Diagram

The heart of this system is the core module which is realized using the Raspberry Pi 3, its responsibilities include, and acquiring images from the camera, processing the acquired image as required maintaining and updating the information through SMS alert and send MAIL with the attached image and switching on the required hardware automatically.

III. SYSTEM DESCRIPTION

This section gives an overview of the various concepts, components and modules of the proposed system which are been used and implemented in this project.

A. Imaging Module

The imaging module in the proposed system is realized using a USB web Camera, the main reason behind choosing USB Camera over the Pi camera is the cost effectiveness. The camera features a high-quality CMOS sensor, with an image resolution of 25 MP (Interpolated), an adjustable lens for focus adjustment, a frame rate of 30 fps and f2.0 lens.
The USB camera also is equipped with night vision for low light photography. The camera interfaces with the Raspberry

Pi via the USB 2.0 port and is responsible for capturing images when requested, the pictures are captured by using the command fswebcam.

Fig.3: USB Camera

B. Raspberry Pi Core Module

The core module of the system is realized using a Raspberry Pi 3 board; it's a $ 35 bare-bones computer designed and developed by the Raspberry Pi Foundation, the Pi 3 features a BCM 2837 System-on-Chip which includes a Quad-Core 64-Bit ARM Cortex A7 CPU clocked at 1 GHz paired with 1 GB of RAM. It also has VideoCore IV GPU for graphical processing applications, it also includes four USB ports for peripherals and 40 Pin General Purpose Input Output (GPIO) pins for interfacing the Pi with external electronic circuits, these GPIO pins are used to interface the Pi to the door lock module. The Raspberry Pi is designed to run various Linux based operating systems and has Raspbian as its official operating system and Python as its official programming language.
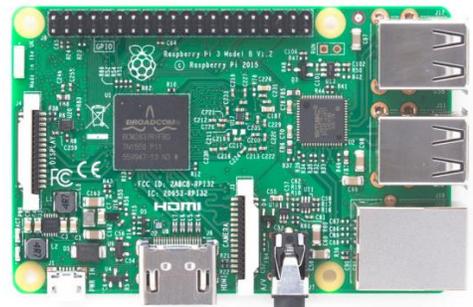
Fig.4: Raspberry Pi 3 Module

In this system the core module plays a highly pivotal role and is responsible for various functions, the core module is responsible for acquiring the images from the camera, processing and send mails. It's also responsible for maintaining the update of the location with the image capturing process. It is in charge of employing the authenticated remote access to the server with the controlling and monitoring part. It's responsible for monitoring the senor,

controlling modules by sending commands using Python code via GPIO to the motor driver.

C. Embedded Server & IoT

Another crucial function of the core module is to act as an embedded web server, the primary responsibilities of this server include, transmitting the visitor/ visitors images via email to the owner, look for emails to the owner and send the images of the unauthenticated person in case of any problem.

This system employs an embedded server approach for communicating with the user and with the internet/ intranet. Python code is used to program certain aspects of this system such as sending and receiving emails. Standard Python libraries corresponding to the E-MAIL such as urlib2, cookielib, imaplib, poplib, email, SMTP, etc. for sending and receiving emails are imported and used accordingly.

This system uses OpenCV with python which plays an important role for person detection and recognition.

D. Person Authentication.

Designing a local database of the person who are authenticated in a folder with just running a simple python program and capturing each frame by extracting the face of the image and saving it in the database with the name of the person as the folder name with as much features as possible. This database plays an important role in authentication if the image quality is less or if the features of the person is not accurate it may affect the authentication process of the person. As the person is authenticated with the correct database automatically the door will open.

IV.   HARDWARE IMPLEMENTATION

This section emphasizes on the actual hardware implementation of the proposed system, the various modules, components, peripherals and the interconnections between them are discussed here.

The first stage of the implementation is to prepare the Raspberry Pi 3 module for its first boot; this is done by downloading the latest version of the Raspbian operating system from the official Raspberry Pi website. A microSD card is the formatted using SD Formatter; it's then flashed with the Raspbian OS using Win32 Disk Imager. The first boot is then completed on the Raspberry Pi connecting the required peripherals, such as power supply, keyboard, mouse, Ethernet cable, etc.

The Raspberry Pi for optimal operation requires a quality power supply; the Pi can be driven by using any Micro USB based mobile phone chargers with a good current rating, and this system is powered by a 5V 2.5A power bank for uninterrupted operation.

Since the Raspberry Pi 3 has inbuilt Wi-Fi and Bluetooth is used for connectivity; the Pi also has an Ethernet port which can be used to gain wired internet access.

Using Python programming language preinstalled on Raspbian the source codeof the system is provided and tested

appropriately. The USB Camera is interfaced, the GPIO pins are programmed using commands in Linux and Python in this stage. The camera is interfaced to the Pi via the USB port and the door lock module is interfaced via the GPIO pins on the Pi.

V.   EXPERIMENTAL RESULTS

This section emphasizes on the final results of the proposed system, the system has USB webcam which acts as the live surveillance and tracking with the help of OpenCV module in python integrating OpenCV with the Camera for fetching the face of the person with tracking and recognition of the person. The system automatically detects the person face automatically using the OpenCV modules.
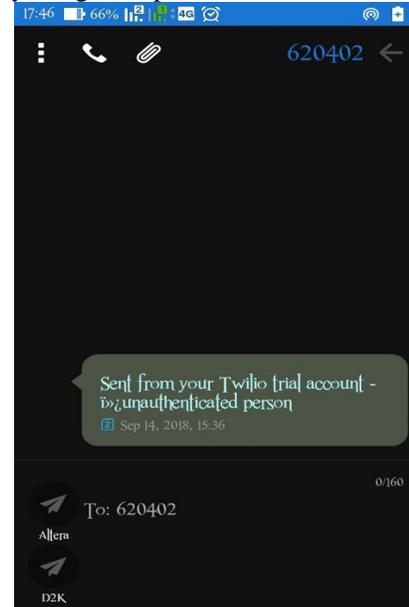

Fig.5: Twilio SMS API

With an alert section SMS is sent using Twilio API and send the image of the person using SMTP mail. Also the main part of this project is the controlling of the authenticated person from anywhere throughout the world by an automatic database system and using the Twilio SMS API and SMTP mail which plays a crucial role by giving alert to the owner.

The below figure shows the final display of the project with all the hardware included in that.
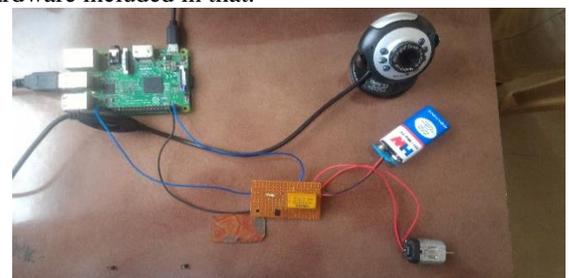
Fig.6: Final Setup

VI. CONCLUSION

This paper presents the design and implementation of a Smart authentication system which performs at a high speed and accuracy with the live surveillance using the USB webcam without any initial button to capture the image of the person. OpenCV plays a crucial role in implementing this project as we are using OpenCV module for capturing, extraction and recognition part of the person accordingly. This reference style is used for authentication in home security, and alternative public places. So for a security purpose in real time we have a tendency to design a face recognition system in minimum expenses exploitation raspberry pi, open Cv.

VII. REFERENCES

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