IOT BASED SMART HOME SECURITY SYSTEM

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ABSTRACT

In recent years, the safety constitutes the foremostimportant section of the human life. At this point, the value is that thegreatest factor. this technique is extremely useful for reducing the valueof monitoring the movement from outside. during this paper, a real-time recognition system is explained which will equip for handlingimages very quickly. the most objective of this paper is toprotect home, office by recognizing people. For this purpose, thecamera is employed to detect movement within the specific area.Afterwards, the Raspberry Pi will capture the pictures. Then, theface are going to be detected and recognized within the captured image.Finally, the pictures and notifications are going to be sent to asmartphone based IoT. The proposed systems are real-time, fast and has low computational cost. The experimental results show that the proposed face recognition system is often utilized in a true time system.

Keywords: **Internet of things, Computer Vision, Raspberry Pi3, Face recognition.**

INTRODUCTION

Today, the safety system field may be a vital area in smart cities, offices, and homes. Security of the house and therefore the family is vital for everyone. Likewise, smart systems can provide Internet of Things (IoT).

The IoT are often applied in smart cities so as to offer various benefits that enhance citizens. In other terms, smart homes are often made by utilizing the IoT. it's the power to regulate and automate exact things of homes like lights, doors, fridges, distributed multimedia, windows and irrigation systems. The IoT is becoming popular in many sides of life, like smart security, smart cities, healthcare, smart transportation, smart grids and online business. The objectivity of utilizing IoT is to share information and knowledge with everyone in everywhere round the world. Computer vision can present more security system within the IoT platform for smart houses. it's abilities to acknowledge an individual within the incorrect area and at the incorrect time because this person could also be a malicious one for the environment. Face recognition system grow to be one among the foremost active research areas especially in recent years. it's an assortment of huge applications within the ranges: peace, access control, Mastercard verification, criminal identification, enforcement commerce, information security, human computer intelligent interaction, and digital libraries. Generally, it recognizes persons publicly areas like houses, offices, airports, shopping centers and banks. This mechanism permits secure access to the house by detecting motion controlled by the embedded system. The face is that the most vital a part of human's body. So, it can reflect many emotions of an individual. Long year ago, humans were using the non-living things like smart cards, plastic cards, PINS, tokens and keys for authentication, and to urge grant access in restricted areas like ISRO, NASA and DRDO. the foremost important features of the face image are nose, eyes and mouth which are associated with facial extraction. Face detection and recognition system is easier, cheaper, more accurate, and non-intrusive process because it is compared to other biometrics. The system will fall under two categories; face detection and face recognition.

There are many methods to implement face detection like Haar -like features, Eigen face and Fisher-face. Then, analyzing the geometric features of facial images, such as, distance and site amongst eyes, nose and mouth were

provided by several face recognition techniques [8]. There are a couple of techniques for fetching the foremost important features from face images to implement face recognition. one among these features is extraction technique called Local Binary Pattern (LBP). LBP technique was produced by Ojala et al. LPB describes the form and texture of digital image. this system provides good results and efficient for real-time applications. Haar-like features and LBP are robust in comparison to the others. consistent with many studies to urge fast discriminatory performance and good results, LBP technique was chosen for face recognition. LBP generates the code that describes local texture pattern. From the LBP face image, the nose and eyes area are extracted, and for every image's pixel the LBP histograms are going to be drawn. during this paper, Raspberry Pi 4 is employed and Raspberry Pi camera is connected there to. The system will take a picture when detects any movement. Then, computer vision is applied to the captured images. Subsequently, the systems ends the pictures to a sensible phone via the web. during this case, within the paper, the Raspberry Pi single-board computer may be a heart of the embedded face recognition system. It controls each of the peripherals.

PROBLEM STATEMENT

- Monitoring the Home security is important task as everybody working away from home.
- We cannot continually monitor our web cam feed at remote location.
- Recognizing the person entering our home is necessary.
- Everybody ordering many things online now a days so there is need of identifying when parcel is delivered.

EXISTING SYSTEMS

In the present day, researchers and developers have come up with a wide range of surveillancesystems that are used for remote monitoring, alerting as well as controlling tasks throughaffordable and easy to implement hardware systems. Some have so far been realized while othersstill remain a proposition.

D. Jeevan and worked on designing of a networked video capture system using Raspberry Pi. The proposed system works on capturing video and distributing with networked systems besides alerting the administration person via SMS alarm as required by the client. Their system was designed to work in a real-time situation and based on Raspberry Pi SBC. Contrasting to other embedded systems their real-time application offers client video monitor with the help of alerting module and SBC platform [4].

Sneha Singhd and his team described IP Camera Video Surveillance system using Raspberry Pi technology. The Researchers aimed at developing a system which captures real time images and displays them in the browser using TCP/IP. The algorithm for face detection is being implemented on Raspberry Pi, which enables live video streaming along with detection of human faces. The research did not include any of surveillance reactions [5].

In 2014, Sanjana Prasad and his colleagues worked on developing a mobile smart surveillance system based on SBC of Raspberry Pi and motion detector sensor PIR. Their development boosts the practice of portable technology to offer vital safety to our daily life and home security and even control uses. The objective of their research is to develop a mobile smart phone home security system based on information capturing module combined with transmitting module based on 3G technology fused with web applications. The SBC will control the PIR sensor events and operates the video cameras for video streaming and recording tasks. Their system has the capability to count number of objects in the scene[8].

IMPLEMENTATION

In this IoT based Smart system ,the security system with intruder detection with automation Using Raspberry Pi is designed. This system will help user to being confident about security of the area where system is installed. It helps the user for the security of home using Raspberry Pi that works in real time. The system consists of a camera which will be activated either on the motion detection or the request from user for live stream. It used machine learning based face recognition algorithm based on tensor-for known person data as the system will be outside of home so for night vision it will automatically activate light for clear detection. The alert can be generated using speaker connected to Raspberry Pi. As the system is connected to the internet it will require either Wi-Fi or internet connection.

If the intruder is present, the system differentiatesbetween pets and human beings. If intruder is a pet or ananimal, processing stops. If not, the information is sent tothe face recognition system. The face recognition system displaysthe status of intruder with date and time.

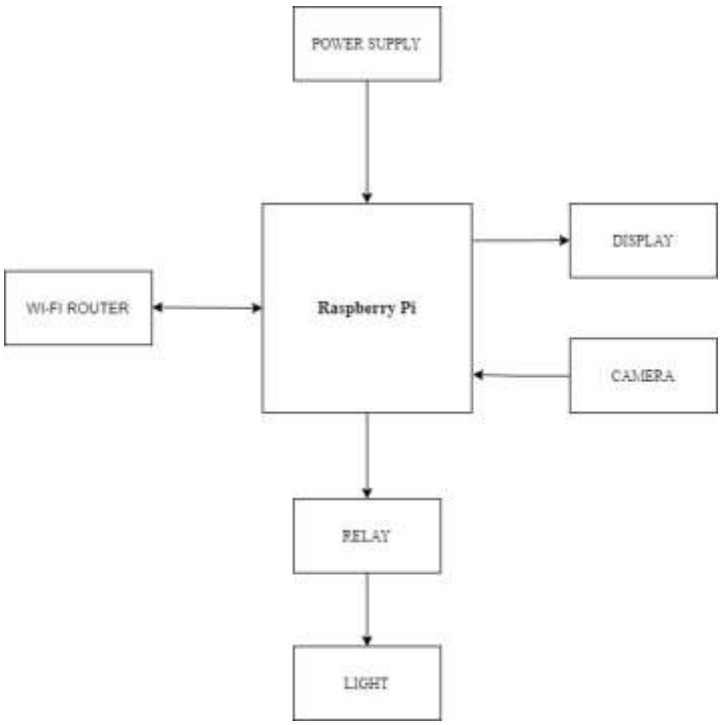

Fig 1: Block Diagram

- **Raspberry Pi: -**

In intruder detection system, Raspberry Pi isused as a microcomputer. The Raspberry Pi is a credit-card sized computer that plugs into a computer monitor or TV,and uses a standard keyboard and mouse and used in place of CPU. It is low in cost compared to CPU. It is mainly used for students for learning programming languages like pythonand scratch. In this project, we use Raspberry Pi 4 model Bv1.2 which is a fourth-generation model. Raspberry Pi 4 is a development board in PI series and can be considered as a single board computer that works on LINUX operating system. The board consists of many features and also has a very good processing speed which is suitable for advanced applications. The Raspberry Pi is an open-source platform that has a thriving community of its own, which is similar to that of the Arduino.

Fig 2: Raspberry Pi

In the very beginning of the process of Open CV methoda database of images is been given to the system. These images are of the persons who live in that particular home or office or shop etc. Now, using Open CV method encodings are created on the faces present in the database. Then the video starts recording and detects particular face excluding the pets. Encodings are created on the face of a person present in the video. Now these encodings are compared to the encodings of pictures present in database. If both the encodings match, then he is not an intruder, otherwise it again goes back and compare with encoding of another image in database. This process continues till the database is completely compared. Even though the face is not getting matched, then the person is an intruder. The whole process of creating encodings of face is done in python language.

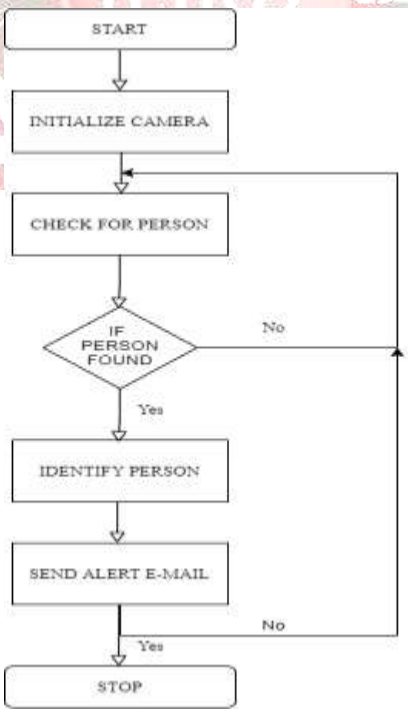

Fig 3: Flow Chart

The system then checks for any text data through OpenCV OCR. The EAST text detector requires that we are running OpenCV 3.4.2 or OpenCV 4 on our systems. The algorithm is called “EAST” because it’s an: Efficient

and Accurate Scene Text detection pipeline. This algorithm detects is there any parcel available and sends an email for the same.

RESULTS

The overall Project of IoT based Smart Home Security System is consist of Raspberry pi 4, webcam, openCV. Once the device is ready and by providing required commands it starts acquiring the video. Now, it compares the person in the video with the database pictures present init. Then an email is sent along with the picture of the person.

Fig 4: Hardware setup

The hardware setup looks like in the above image. Consisting raspberry Pi with encloser and the camera module which is integrated.

Fig 5: Screenshot of Email (Output)

CONCLUSION

There are a lot of devices which are developed to monitor the security based on different technologies. Some of them uses sensor like PIR Sensor for person detection. In PIR, false alarm can occur which provide wrong information about security.Some system uses camera to capture image and send it over email. Some systems are sending SMS as an alert which require external GSM modem for operation. This system is based on Raspberry Pi minicomputer with IOT integration Face recognition using advanced technology like tensor flow deep learning. This system also provide the live stream of video to user using internet. It also activates lights and alarm in required situation.

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