

Review of Security System based on P.I.R Sensor using Face Recognition Concept

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Abstract— Security can be considered as a measure that is taken with a specific end goal to protect a place, an individual or group of individuals or nowadays also data stored on the computer and ensures that people with particular permission have the privilege to get the secured entity. Importance of security is at most while taking into consideration safety of an individual's house and dear ones or safety of information-sensitive data of particular organization. Automation has now played an important role in the field of security systems due to advances in the technologies related to Internet of Things (IOT). Internet of Things enables the various components of security systems to interact and communicate with each other taken with a specific end goal to transfer the information. Security Cameras installed in the various localities just captures the footage, however human intervention is necessary in order to detect any problem occurring in the frame. In this paper, Internet of Things along with facial recognition is used to detect the faces of people by making use of the camera and Passive Infrared sensor (PIR) and camera. The PIR sensor and the camera are mounted to a computer system. The sensor gets notified by the movement of the person which then triggers the camera. The camera captures the images and detects the face by making use of Facial Recognition algorithm of the computer system. This information is then sent to the concerned person, via mail on their smart phones or computer, by taking advantage of the facilities provided by IOT.

Key words: IoT, Security System, Face Detection, Face Recognition, PIR Sensor, Camera, Computer System

I. INTRODUCTION

Security and safety is a crucial subject in most of the aspects like home, offices, surveillance, and smart environment and in a general sense as well. To secure the above aspects against theft, intrusion or security breach a powerful system is required that may detect as well secure or prevent any kind of security breach or theft. Most of the conventional security systems make use of CCTV (Closed-Circuit Television) cameras which requires high cost of hardware and setup as well as maintenance. The IoT (Internet of Things) realizes the interconnection and intercommunication among various computer systems and thus, promotes natural and seamless convergence of physical space and cyberspace. The various computer systems such as sensors, mobile computer systems like smartphones, tablets, laptops, etc. are connected to the internet as a part of it in various applications. As a special physical object, even, human may interact with cyber components. In this paper, we are proposing a PIR (Passive Infrared) Sensor based cost effective as well as power effective security system for office or organization security applications.

The PIR (Passive Infrared) Sensor is able to sense the presence of the human body as it can detect the infrared radiations propagated from the human body. The PIR sensor and a camera module interface with the computer system. As the PIR sensor detects the human presence it relays signals to computer systems and the system triggers the camera to capture images of the intruder. A dataset comprising of images and information related to respective images is present in the system. The captured image is then contrasted with the images present in the dataset of the system with the help of face recognition algorithms. If the captured image matches with images present in the dataset, then the image along with the information is sent to the owner or administrator via email, otherwise if no match is found in the dataset then only the image of the intruder is sent to the owner or administrator via e-mail.

II. LITERATURE SURVEY

Ilhan Aydin and Nashwan Adnan Othman proposed Security system based on face detection concept. The system consists of raspberry pi interfaced with PIR sensor and camera. The face detection technique is done with help of open CV. As the face is detected, the image is captured and that image is sent to an android application along with notification [1].

Rekha. E, Dr. Ramaprasad. P. proposed an automated attendance system for college or an institution. System consist of camera that captures the real time image of person and check whether that face matches with the saved eigen faces or not, if match the person in present and then record is maintained and if not matched then data is not updated [2].

Shrutika V. Deshmukh, Prof. DR. U. A. Kshirsagar proposed a system of face recognition used for door automation. In this system camera is used for capturing the images and those images are compared with the help of DCT face recognition algorithm which is generally used for 2D images along with GSM module that provides messaging service so that admin can get all the notifications regarding the security [3].

Ishaan Sathe, Chiman Patel, Prasad Mahajan, Tanmay Telang, Sejal Shah proposed Door locking system that consist of camera, and for detecting the face of human they used Viola-Jones face detection method and capture the images and those images are recognized with the help of PCA face recognition algorithm using the Eigen faces stored in dataset. If the image matches the door will open and if image does not match door will remain close [4].

Narayan T. Deshpande, Dr. S. Ravishankar proposed face detection using Viola-Jones algorithm and face recognition using fusion of two general known algorithms PCA and ANN [5].

Simarjit Sing Saini, Hemant Bhatia, Vatanjeet Singh, Ekambir Sidhu proposed Rochelle salt integrated PIR

sensor Arduino based IDS. This system consists of PIR sensor for motion detection and Rochelle salt sensor for vibration detection to activate alarm as the person comes in range [6].

Anshika Chaturvedi, Praveen Kumar, Seema Rawat proposed security system using PIR sensor interfacing it with a normal microcontroller so that camera is activated for capturing images and turn on the alarm, which makes it very low power consumption system [7].

Priya B. Patel, Viraj M.Choksi, Swapna Jadhav, M. B. Potdar proposed a system for motion detection using PIR sensor. The system detects the human low radiation with the help of PIR sensor which interfaced with the Raspberry PI and with help of camera picture are captured and sent via internet to admin android application [8].

Swathi .V, Steven Fernande proposed Raspberry Pi based human face detection system for comparison between in image dataset as input and detected face by camera. It real time system that checks the blurriness and noisiness of particular image on the basis of input image and detected face image [9].

III. PROPOSED SYSTEM

The proposed system architecture shown in figure (a) is a security system based on the ethics of image recognition. The system consists of a P.I.R sensor, camera, and computer system along with internet connectivity. The whole working of the system starts with PIR sensor and camera which connected to the computer system. As the human body low level infrared radiation comes in contact with PIR sensor then sensor sends signals to the computer system to activate the camera, this feature of the sensor allows us to implement a power efficient system. After activation of the camera, it clicks the facial image of the person present in the range of cameras. Detected image is then matched with the dataset saved in the computer system. If the image matches, then all the information of that person is sent to admin via email and if the image does not match, then the recently clicked image is sent to the admin via email. And then the further action taken from the admin. As in the given description of proposed system, an idea of M2M (machine to machine) interaction based system which makes this system works in an efficient way.

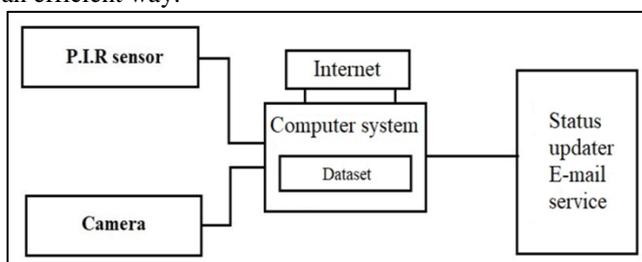


Fig. 1: Architecture

IV. SYSTEM IMPLEMENTATION

A. Human Body Detection:

Each human body emits some low level infrared radiations to capture those radiations we are using PIR (Passive Infrared) sensor in our system. So that system can activate the camera.

B. Face Detection and Recognition:

As in our computer system we have a dataset of images, those are the images of authorize person from each view such as front view, right side view, left side view with their RGB format, those image set are the Eigen faces of authorize person. In PCA algorithm we required set of Eigen faces of person to maintain the accuracy for face recognition according to the RGB format. And if the image match with the image present in dataset further action is taken otherwise captured image is sent.

V. CONCLUSION

In the proposed system we have made use of PIR sensor which consumes less power and is cost effective as well. It has a wide focal point extend and is easy to interface with the system. The affectability scope of the sensor is 3 to 4 feet, yet it can be expanded up to 20 feet. In the proposed system we likewise make use of camera module the specifications of the camera may change according to user or application. The images captured are matched with images in the dataset using the Eigen faces algorithm. The face recognition consists of two phases viz. include extraction and classification. Feature extraction is transforming face space to feature space which is achieved with the help of Eigen faces algorithm. The Eigen faces makes utilization of PCA (Principal Component Analysis) which evaluate and analyse the eigenvectors of the covariant matrix of the input face space. The benefit of PCA is that it removes features of images which are not valuable and decomposes the structure of the face into components which are interrelated and are called as Eigen faces.

In the proposed system we have utilized PIR sensor, a camera module and a face recognition algorithm which is capable of capturing images of the intruder and sending the image and information of intruder (if intruders image matches with the image in the dataset) to the owner or administrator via an e-mail. The constant reconnaissance of workplace can be made conceivable with the assistance of the proposed system.

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