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Research paper

A Smart Watchdog - Intruder Detection System

[1]P Vasuki, [2]Sesu Priya A, [3]Soundarya R

Department of IT, SSN College of Engineering, Chennai - 603110
**Corresponding author E-mail: [1]VasukiP@ssn.edu.in , [2]priyaantony62@gmail.com , [3]soundarya2011@gmail.com*

Abstract

In todays world, Security is a matter of great concern. Security controls play a vital role in protecting resources from espionage, sabotage, damage and theft. Our proposed system is to develop a security system with improved facilities, which tries to eliminate the limitations posed by the existing security systems. The current manual security system depends mostly on human involvement, which is prone to error, and the security is concentrated only at the front door which requires subjects cooperation. To solve these issues we have proposed a Smart Watchdog System. The system watches the environment, and if there is a human activity, the system captures it. The system automatically detects faces of the individual from the activity using firmware. We have planned to maintain the database of authorised inmates and workers of a place and verifies of every individual arriver. This feature enables the system to automatically recognises the unauthorised users and gives an alert when it encounters entry of unauthorised users even without the human assistance. The system also detects the unauthorised entry in the mass. The entire system is planned to be ported to Raspberry-Pi based Embedded System supported with DC power back up. This method can be employed in ladies hostels as well as to the secured places like the data centre, atomic research centre and military where the unauthorised entry is restricted.

Keywords: Security system, Biometrics, Face Recognition, Machine learning, Image processing, Deep neural network.

1. Introduction

Security controls play a vital role in protecting resources from illegal usage. In todays world, the safety of women is a matter of great concern. Even in girls hostel, provision of security is sometimes taken for granted. The application of this project involves theft-free and safe environment for prestigious resources as well to provide better protection to girls from the threat of intruders.

In this project, with the help of cameras present in and around the hostel, Face recognition of individuals has been done. Face Recognition is done using convolution network of deep learning framework If the face recognised does not match with the database of allowed users, then an alarm will ring at the security room. New user can also be given authorization to enter the hostel. Even workers have been given temporary approval with a specified time limit. The existing manual security system put pressure on people to be correct in all details of their work at all times, which is not always possible. Even the Automatic Door Access System using face recognition provides better security only at the doors, but trespassers can also enter through some other means. The System eradicates the problems faced by using the existing systems. This proposed work enlightens the technology advancement in the field of security.

As the necessity for higher levels of security rises, technol-ogy is bound to swell to full fill these needs. Any new solution or development should be simple and available to all user. This high demand for user-friendly systems which can secure our assets and protect our privacy without losing our identity in a sea of numbers grabbed the attention toward what's called biometrics, one among which is Face Recognition.

2. Motivation

Target beneficiaries of the proposed work: " This project can be used to identify an individual but also to unearth other personal data associated with the individual such as other photos featuring the individual, blog posts, social networking profiles, internet behaviours, travel patterns etc., " In ATMs, instead of using an ATM card and pin, the ATM would capture an image of the customer's face and compare it to the account holder's photo in the bank database to confirm the customer's identity. " This can also lead to a 'Total Surveillance Society' in which the government can know the activities of all the citizens around the clock, to prevent violent actions. " It can be used for information security in which once the user logs on, and it is assumed that the same person would control the system. Using face recognition technique the user can be monitored periodically. If the authenticated user's face disappears, then the system automatically performs a log-off operation.

The existing manual security system depends mostly on human involvement, which is prone to error, but our proposed system doesnt require any aid from the subject. Even the Automatic Door Access System using face recognition pro-vides better security only at the doors, but trespassers can also enter through some other means. Hence this project focuses on developing a security system that monitors the subject all the time without the subject being aware of the system.

3. Literature Survey

Automatic system for door access using face recognition is used in some parts of the country.

Novel Approach for Efficient Usage of Smart WatchDog is

Mobile Ad Hoc Networks is recently proposed. In this, the system is used to monitor activities to detect any intrusions in the network.Enhanced security for ATM with OTP and facial recog-nition features has been proposed to provide additional security from violators

Enhanced security system using cameras are used in the much international organisation. In such security systems, the power failure may result in security breaches. This problem has been resolved in our system by providing backup for power and network connectivity problems.

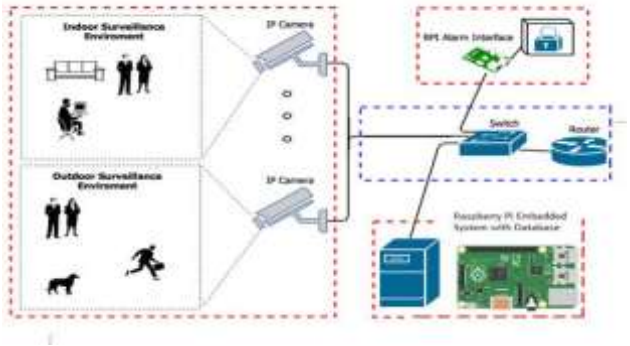

Fig1: Arcitecture of SMART DOG

4. System Design

This project describes efforts taken towards developing a robust face recognition system to overcome the security breaches. Wherein surveillance cameras are installed at various places to detect the presence of intruders by detecting and extracting the face features and comparing it against the dataset of authorised individuals. It often uses an advanced filtering procedure which is embedded in a Raspberry Pi board having Video Core GPU with 512MB of RAM, to distinguish locations that represent faces and filters them with accurate classifiers. The system has to detect the faces in all translations, scaling and rotational variations have to be dealt in the face detection phase. For example, regarding facial expressions and hairstyle changes or smiling and frowning face. If any discrepancies are found then the security is alerted by an alarm which has a battery backup in case of power failure or network failures. The schematic diagram of the proposed system is shown in fig 1 It restricts physical access to computer resources, usually by limiting access to the buildings and rooms in which the resources are housed and by periodically viewing the access granted to ensure that it continues to be appropriate. A higher level of Security is demanded in organisations like ISRO to commensurate the level of risk involved. Hence our proposed system aims to develop a security system with improved facilities, which tries to eliminate the limitations of the existing system.

The existing manual security system depends mostly on human involvement, which is prone to error. Even the Au-tomatic Door Access System using face recognition provides better security only at the doors, but trespassers can also enter through some other means. Almost all the security system requires the cooperation of the subject. Hence this project focuses on developing a security system that monitors the subject all the time without the subject being aware of the system.

The proposed system detects unauthorised users with the help of surveillance cameras present in and around the re-stricted areas. A database of authorised users faces has to be maintained, and all individual's face is to be detected and recognised. If the face recognised does not match with the database of authorised users, then an alarm will be raised in the security room and a message is sent to the cellphone of few consented persons. These persons will also be allowed to sanction authorisation for new users. Workers can get permission to enter the premises for a specified time limit, in such places the worker details and duration gets updated in the database.

This system is planned to be trained with Deep Neural Network algorithm as it helps to disentangle the abstractions and pick out the features which are useful for improving performance. It also helps to make the training process less time-consuming. The algorithm is planned to be installed on a Raspberry Pi board which has a Broadcom BCM2835 system on a chip (SoC), an ARM1176JZF-S 700 MHz processor VideoCoreIV GPU, with 512 MB of RAM. It uses an SD card(8GB) for backups and long-term storage which to in the event of power failures.

This System eradicates the problems faced by using the existing systems. Hence the proposed work enlightens upon the advancement in the field of security.

The Block diagram of Face Recognition system is shown in Figure 2

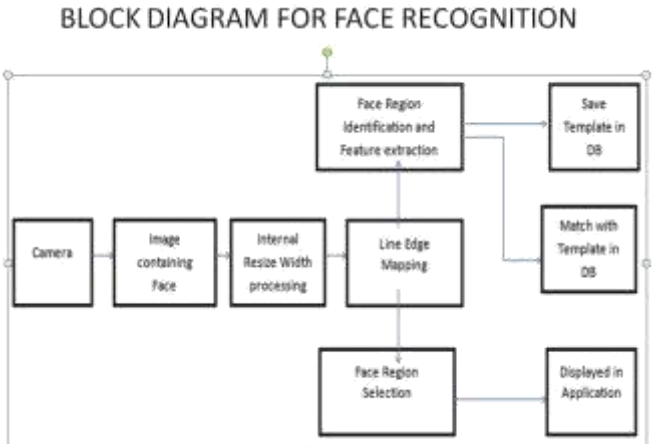

Fig 2: Block Diagram of Face Recognition System

5. Functional Blocks

The system has been divided into followig functional blocks. The Face Recognition Process can be divided into Three Phases namely,

Enrolment Phase
– Face Detection
– Feature Extraction
– Model Creaton and database ubdation
Recognition Phase / Query Phase
– Face Detection
– Feature Extraction
– Comparing with the models in DB.
Action Phase
– Identification of unauthorised entry
– Alert the person concerned using phone and alarm

6. Conclusion

In this project, we have planned to implement face recogni-tion which can identify individuals among the crowd without passers being aware of the system. Whereas in other biometrics like a fingerprint, iris scan and other systems like the automatic system of door access using face recognition cannot perform this type of mass identification. The maintenance of secured biometric information of authenticated inmates of a specific place should be dynamically updated. Upon detection of the intruder, the system has to alarm the environment fastly and immediately notify the registered administrator and security officer to take further steps. The temporary worker's informa-tion is also appended to the database along with their valid duration of presence in the premise. The automated intelligent security is system is proposed in the home institution and awarded for funding. We propose our

idea here in this paper, the result of the implementation of this current two years project is not available right and thus not provided.
One of the main advantages of this system is it doesn't need human intervention
Deep Neural networks improve the accuracy of intruder detection
The system identify the intruder even when the intruder enters among the mass.

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