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Home security surveillance

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ABSTRACT

Advancing technology in the field of facial recognition systems (FRS) and optical character recognition(OCR), closed-circuit television (CCTV) and automatic license plate readers could make it possible to create a system that could make the gates of society/ homes intelligent. This project examines the convergence of these technologies to design an efficient system and improve the speed and accuracy of potential burglary or break-in identification, also through facial recognition systems and optical character recognition, we aim to automate Guest Authentication and to provide another layer of protection and create a deterrent to burglary, and also automate guest authentication via FRS and OCR (which will make the process safer as well as efficient).

Keywords: Facial recognition system(FRS), optical character recognition(OCR)

1. INTRODUCTION

We propose a simple but surprisingly effective approach on "HOME SECURITY SURVEILLANCE" by installing a camera at the entrance of home/society that will be used for detection of any kind of activity in front of or near the gate of home/society. If there is some sort of activity near the gate of home/society, camera will capture the activity in the form of an image and that image will be sent to the administrator who will use the capture image to compare with the data stored in the database using facial recognition to allow access to the premises if it verifies or else the access is denied and in case of intruder, an alarm will be set off instantaneously.

In our project we have aimed to build a surveillance system which will detect motion of an object.

The flow of the work is as follows-

- Detects motion near the door through the camera.
- Captures the image of the object from the place where motion is detected.
- Image is sent to the administrator who will compare it to the database.
- If matches with the database, access is allowed and entry is cleared.
- If it doesn't match with the database, access is denied.

We have categorized objects into 2 categories after the object has been identified by the camera-

1. Object is a car belonging to a resident of home/society.
2. Object is a human(resident of home/society).

If the object is a car belonging to a resident of home/society, then an image of the car is captured by the camera and using optical character recognition, we can extract the alphanumeric of the licence plate from the whole image and the licence plate number will be stored and compared with the database to verify whether the car belongs to the resident or not. Once it verifies, then entry will be allowed inside the premises. If an object is a person, then there are 2 scenarios-

- If the person is the resident of home/society.
- If the person is a guest visiting home/society.

If the person is a resident of home/society, then an image is captured and using facial recognition, it is determined that the person is a resident and is allowed access to home/society if the captured image at the entrance matches with the image in the database or else access is denied.

If the person is a guest to a resident of home/society, then an image of the guest will be captured and a notification will be sent to the resident along with the image captured at the entrance and the resident will respond to the notification to determine the entry of the guest to the premises.

2. LITERATURE SURVEY

Chanthaphone Sisavatha, Lasheng Yub [1] have designed and implemented a similar project of security system for smart home based IoT technology. This design adopts the idea of “Internet of Things close to life and easy to use” as a design concept, and builds a smart home system based on the internet of things.

Jun Hou, Chengdong Wu, Zhongjia Yuan, Jiyuan Tan, Qiaoqiao Wang, Yun Zhou [2] have designed and implemented a similar project based on “Intelligent Home Security Surveillance System Based on ZigBee”. To implement real-time surveillance of the home security, the intelligent remote monitoring system was developed for home security based on ZigBee technology and GSM / GPRS network.

Andreas, Cornelio Revelivan Aldawiraa, Handhika Wiratama Putraa, Novita Hanafiaha, *, Surya Surjarwoa, Aswin Wibisurya [3] have also designed and implemented a similar project “Door Security System for Home Monitoring Based on ESP32”. They proposed an application called Door Security System which is based on Android using Internet of Things (IoT) technology to monitor the status of the door, controlling the door and increasing security in a house.

3. EXISTING SYSTEMS

The systems that are currently existing for the security and safety of homes aren't that efficient. When a person who isn't a member of the society/house wants to enter the premises, the security guard can take information from him about his name and who he wants to meet and with the help of an existing application he can ask the owner of the house whether he knows that person or not, if the response from the owner is positive then only the person is allowed to enter. The owner beforehand may also let the guard know about a particular person coming. Systems existing for recognizing licence plates and determining whether the vehicle belongs to a resident or not are crude in the form of car stickers and that alone is used to determine whether the car belongs to a resident of the society or not. Car stickers are not applicable for guests visiting the residents because guests do not reside in the society.

4. PROPOSED SYSTEM

What we want to ensure is that the person making the visit is authentic and he isn't an imposter. For this we will take the help of facial recognition techniques. The face of the person will be scanned and he will be asked who he wants to meet by the security guard, then the owner will be let know about the visitor along with his picture. Only after the owner agrees that the person is not an imposter, will he be allowed inside. Similar techniques will be deployed to use optical character recognition to extract alphanumeric from the licence plate image and stored in the database and will be used to determine entry of a vehicle in the premises. We intend to use tesseract engine for optical character recognition and OpenCV engine for facial recognition

5. SYSTEM DESIGN AND IMPLEMENTATION

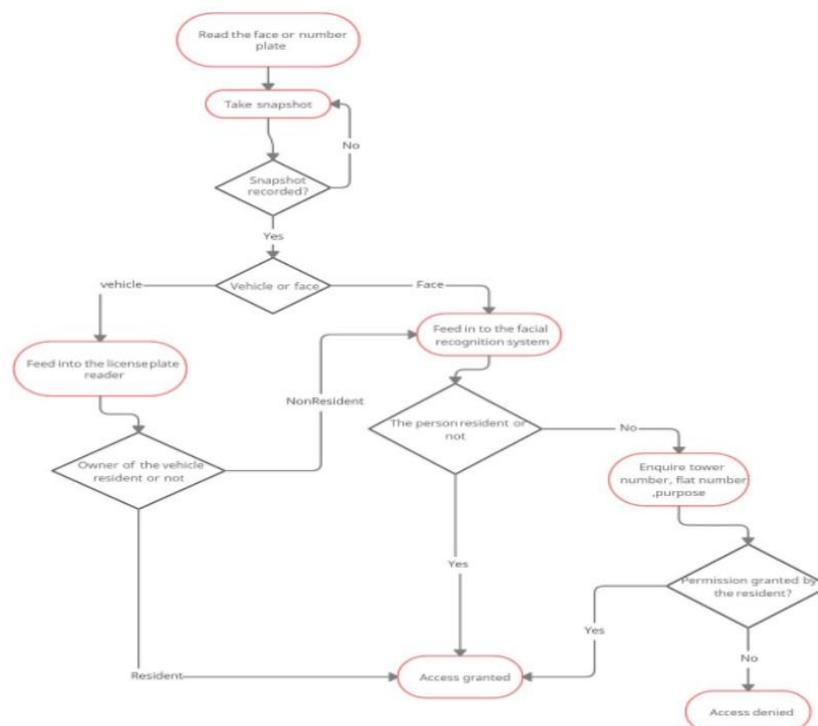


Fig. 1: System architecture

Working of tesseract engine is as follows -

1. The image-data is recognized and made to go through the tesseract engine.
2. In the tesseract engine the data is trained against feature extraction algorithms and it also extracts the text.
3. After that the extracted data goes through a segmentation method in which it is tested against many constraints and regular expression to rule out non useful gibberish text.
4. After extracting and constructing it into meaningful data, the details are displayed.
5. The end user can choose to store the details in a database file (JSON, CSV, SQL) or just discard it and extract other document details.

Working of OpenCV engine is as follows -

1. The image-data is recognized and made to go through the OpenCV engine.
2. OpenCV engine is coupled with external libraries (OpenCV is used to facilitate face recognition, OpenCV itself is not responsible for identifying faces).
3. In the OpenCV engine, face features are extracted from images and are used for recognition against our tested database.
4. After extracting and constructing it into meaningful data, the details are displayed.
5. The end user can choose to store the details in a database file (JSON, CSV, SQL) or just discard it and extract other document details.

[4] contains the code snippets for implementation of the tesseract engine.

[5] contains the code snippets for implementation of the OpenCV engine.

6. CONCLUSIONS

Facial recognition systems and optical character recognition will be significant everywhere especially in the security field which is looking to make a transition from manual security guards towards its automation without human interference. This report presents a concept and design of a home security surveillance system which will achieve a rapid, low cost system through traditional image monitoring system (eg. cctv cams).

7. REFERENCES

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- [4] <https://www.geeksforgeeks.org/reading-text-from-the-image-using-tesseract/>
- [5] <https://www.geeksforgeeks.org/face-detection-using-python-and-opencv-with-webcam/>