

Monitoring of the Presence /Absence of a Person in office Cabin using Raspberry Pi

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Abstract:

Many times, the students required to visit a teacher in a cabin frequently for some work. But it is somewhat tedious if the teacher is moved out of the cabin and at the same time student came to visit him. If we try to minimize the efforts of a student coming frequently without getting job done by means of a system, we can save the time of people. This Project deals with the monitoring of a person in office cabin whether he/she is present or not at that time. It uses a raspberry pi module integrated with pi camera and Face Recognition toolbox. Firstly, the pi camera will take the image of a person present in the cabin. Then it will check the image with the image database of same person and will decide the person present in the cabin or not. The outside people will come to know the presence or absence with the help of LED indicator placed outside of the cabin. This will save the time of people visiting the person and will make it suitable for them to communicate with the person in the cabin

Keywords - Face recognition, Raspberry pi, OpenCV, Haar-cascade classifier algorithm.

1. INTRODUCTION

Absent present detector uses computer applications and information technology for control. Its application changes from basic system to complex microcontroller-based system. Absent/present detector results in ease of work, increased efficiency, and security benefits prompting improved personal satisfaction. The prevalence of system empowered home automation has been expanding incredibly as of late because of straightforwardness and a lot

higher affordability. Notwithstanding, the new and energizing chances to expand the availability of person inside the office is the end goal of providing security. The main virtue of absent/present detector can be stated as its security facilities where one can be notified if there is any threat caused to someone's privacy. This project enables human beings to take advantage of high-tech functionality that was almost impossible to visualize a few years back. The convenience factor here is huge. Having the capacity

to keep the majority of the monitoring task inside office associated through one interface is a huge step forward towards innovation and security. It will provide security cautions relying upon the time of day and detect continuously whether someone is in the house/office. A very important part of this security virtue of this system is keeping surveillance through cameras and by certain identities which are granted permission. For this doing face recognition where if the face is recognized then the Green LED activates otherwise Red LED activates. In this proposed scheme face recognition, which generally involves two stages which are face detection and then face recognition is done. Face Detection where the picture is searched to feed a face, then the picture is processed to crop and extract the person's face for easier recognition. Face recognition is the part where that detected and processed face is compared to a database of known faces, to decide who that python. raspberry pi-cam has been used to capture the picture of the faces that we are going to store in the database. here in this proposed scheme one will basically go through three stages which are face detection, data gathering (where we will click picture of the faces of the respective identities) and the final stage is going to be the face recognition part which will match the live faces with the pictures of the faces in the database and give us the identification details of the given entity and work further for extra requirements. if the matching index is 50% or more then only it can be said that it is a successful facial recognition process. OpenCV has got lot of algorithms but in this particular project. here haar-cascade algorithm haar cascade algorithm has been used mainly. this whole setup is done on the operating system of raspberry pi which is known as raspbian. python has been used here as the platform to perform the functions and keeping OpenCV the main domain. Finally, home automation can be summed up as the most convenient form of modern-day technology. this project is actually a mixture of a lot of virtues coming together like safety, control, comfort, convenience and most importantly peace of mind. this form is a very flexible form of technology which is growing in the market very rapidly and is on the upsurge for

being a game changer in the field of modern security system.

Face Recognition: Face detection is one of the current research topics in the computer vision field. It is very easy for human beings to detect faces on the other hand it is difficult for computers to detect faces. The difficulties associated with face detection are variations in scale, pose, orientation, lighting condition, facial expression etc. Many approaches have been implemented but each has its own advantages and limitations. The proposed system is relay on the appearance based approach. Here the face detection is done by extracting facial features like eye feature, bridge of the nose feature, mouth feature etc. which are present in a grey scale image. These features are proportional to the change in contrast values between adjacent groups of pixels but not to the intensity values of a pixel. The features used in this system are named as rectangular features and are reminiscent of Haar basis functions.

Haar-Cascade Classifier Algorithm: It is basically a classifier which is being used to detect objects for which it has been trained for. First and foremost, the algorithm needs a lot of positive pictures and negative pictures to prepare the Haar cascade classifier. Positive pictures are pictures with clear faces where negative pictures are those with no countenances. Each feature is represented as a single value obtained from the difference of the sums of pixels in white rectangle from the sum of all pixels in the black rectangle. All different possible sizes and locations of classifier is used for calculating of plenty of features. As the number of classifiers increase the arithmetic computations seems to take a long time. Instead of it, the concept of Integral Image has been used.

2.PROBLEM STATEMENT

The students required to visit a teacher in a cabin frequently for some work. But it is somewhat tedious if the teacher is moved out of the cabin and at the same time student came to visit him. If we try to minimize the efforts of a student coming frequently

by means of a system, we can save the time of people or student.

3.OBJECTIVES

The objective of this project is to minimize the efforts of the people/students visiting frequently to an officer/teacher in a cabin by means of an indicator which will show the presence or absence of the person in the cabin. The system will capture an image of a person in cabin and the status will be shown on LCD display mounted outside of the cabin.

4.BLOCK DIAGRAM

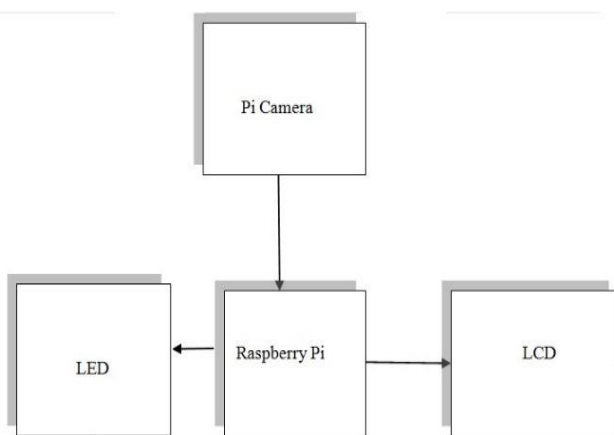


Fig 1: Block diagram

5.CIRCUIT DIAGRAM

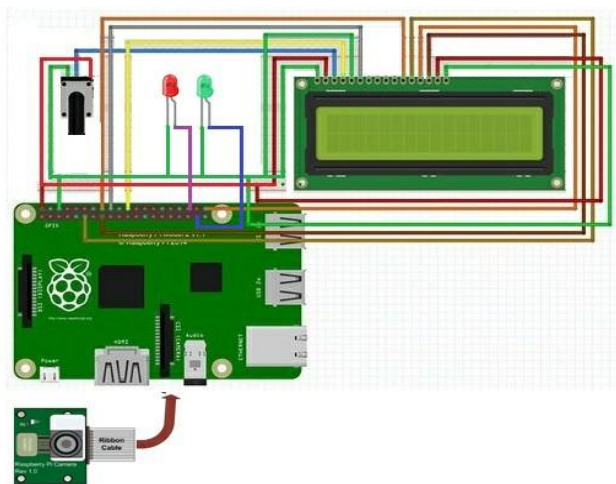


Fig 2: Circuit Diagram

6.RESULTS AND DISCUSSIONS

The main objective of the proposed work here is to create a system where it will be easy to operate home appliances and equipment very easily by making this system user friendly. Developing a smart home system was not easy at first. The most important part of this proposed work is human surveillance which is important due to the security issues of smart homes. For surveillance using face detection and face recognition is being used which are the most modern form of surveillance. For this purpose, Raspberry Pi is being used camera and OpenCV which is open source which is a part of Python language. Python here acts as the main platform where most of the work is going to be done. Image processing needs to be done for the Face recognition. OpenCV is an open source computer vision software library. The library has a lot of optimized algorithms, which can be used in many IOT related sectors including face detection and recognition. As the libraries of our project we liked to use the Haar classifier, LBPH (Lower Binary Pattern histogram) face recognizer. Face recognition is ought to be successful if the matching index after recognition is more than 45%. The whole system is depicted where one can see there is a box like structure which is holding the Pi camera upright so it could take clear and proper pictures for the purpose of face recognition.

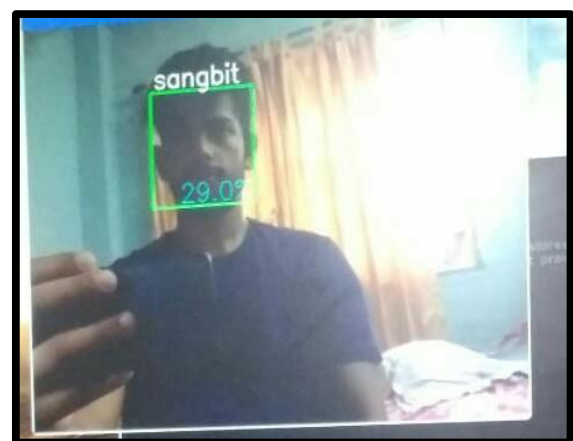


Fig 3: Output of face recognition

The above figure is the outcome of the Face Recognition. This picture is taken by the Raspberry Pi camera which is used for the face recognition. Firstly, taking the pictures and storing it in the database then during the recognition process the outcome shows the name of the identity if it is stored in the database. It also shows the matching index which is previously mentioned that if it is 45% (Fig. 4) or more then it is successful otherwise not. Here clearly it is not the case as the matching index is showing 29.0% (Fig.3).



Fig 4: Output of face recognition

In the above figure it is the output of the face recognition and the person is identified properly. The matching index here is 44% which is almost 45% so one can say here that it is approximately successful.

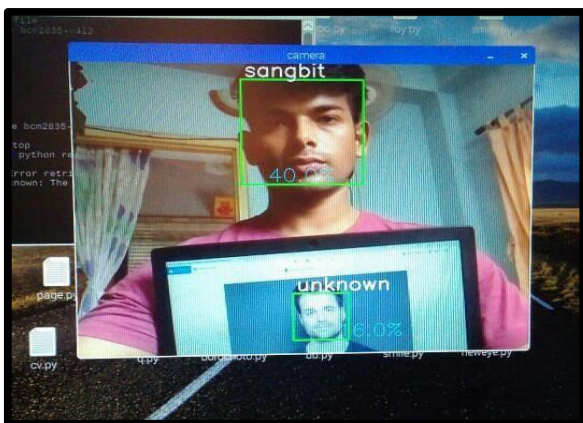


Fig 5: Output of face recognition

In the above figure one can see that one face is being recognized as it is stored in the database and another face is not properly recognized and is showing “Unknown “from here one can conclude that if the face is not stored in the database previously then the face won’t be recognized and will show unknown. The results are summarized in the following table:

Table 1: Present/Absent status of person

Sr. No.	Person to be checked	No of times image captured	Success	Accuracy (%)
1	Same Person	20	18	90%
2	Different Person	20	0	0%

In this proposed scheme it has been already decided to introduce absent present detector system where a LCD and two LED will be used. The Red LED indicates absence and Green LED will indicate presence of person. The Pi camera is attached to the camera slot. LCD and LED is attached to the GPIO pins of the Raspberry Pi. The green LED glows after a successful recognition process, when the face is stored previously in the database and that image has got the access to glow LED then it will work otherwise red LED will glow

7. ADVANTAGES AND DISADVANTAGES

7.1 ADVANTAGES

- Save time of people visiting the person.
- Easy to implement
- Economical

7.2 DISADVANTAGES

- Accuracy is less
- Initial cost is high

8. CONCLUSIONS

Our project is used to check the status of a person whether he/she is present or not in his/ her cabin for the people visiting him. This system will save the time and efforts of the people visiting frequently to

the person in the cabin for some work. this project is easy to implement with less cost of implementation also it is easy to use.

9. FUTURE WORK

The future scope of this system is to add the facility to show presence/absence of faulty member in his/her cabin directly in the classroom. This will save the time and efforts of students visiting the teacher frequently during college hours.

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