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IoT based home security through image processing algorithms

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ABSTRACT

Most doors are controlled by persons with the use of keys, security cards, password or pattern to open the door. The aim of this paper is to help users for improvement of the door security of sensitive locations by using face detection and recognition. The face is a complex multidimensional structure and needs good computing techniques for detection and recognition. This paper is comprised mainly of three subsystems: namely face detection, face recognition and automatic door access control. Face detection is the process of detecting the region of the face in an image. Viola jones method is used for face detection in 'opencv' technique and face recognition is employed by using the RANSAC (RANDOM SAMPLE CONSENSUS). Face Recognition based on RANSAC. If a face is recognized i.e., present in the database, it is known, and else is unknown. The door automatically opens for the known person by matching with known database image. On another side, for an unknown person, the image will be sent through Google Cloud Messaging to the owner's Android app and based on owner command the door will be open or closed. Although many preliminary images are used, probabilistic efficiency cannot be decreased predominantly. Therefore, face recognition using Open CV using Android can be more useful for door security system than any other face recognition techniques.

Keywords: Viola jones, Opcncv, RANSAC, Database image, Google cloud messaging

1. INTRODUCTION

Automatic personal identification using access control has become popular by using android with image processing data instead of using pattern, cards or passwords. Main details of the image specifics have to be gathered and used as known images. Once person stands in front of the door face is detected by utilizing face detection technique in "OpenCV" and the whole face recognition process is realized without using any hardware. Face detection is the initial step of the face recognition method. The execution of the entire face recognition part is mortmain by the dependability of the face detection. Using the face detection method, it can detect only the facial part of an image irrespective of the background of the image. In the system, Viola-Jones face detection technique is used. Viola-Jones rescale the detector rather than the input image and run the detector numerous times through the image – each time with diverse size. Viola-Jones has devised a scale characteristic detector that requires the same number of estimations whatever the size. This detector is established using a so-called integral image and some simple rectangular features evocative of Haar wavelets. Face recognition generally consists of feature extraction, feature reduction, and recognition or categorization. RANSAC is an operative feature extraction method based on the face as a global character. If the taken image is matching with trained dataset image the door will be open automatically.

Else if doesn't match the image will be sent to the house owner android application through Google Cloud Messaging. Based on the Owner command the message will be sent to the door to open or close.

1.1 Literature Survey

On Effective Offloading Services for Resource-Constrained Mobile Devices Running Heavier Mobile Internet Applications: Rapid advances in wireless mobile network technologies and mobile handsets (MHs) facilitate ubiquitous infrastructure that can support a range of mobile services and applications in addition to conventional mobile Internet access. One recent trend is to effectively run desktop PC-oriented heavier applications on MHs. However, due to their miniature, portable size, MHs are resource-constrained and therefore, running these applications directly on an MH is not satisfactory given a user's presumptions. To endure with this knot, the paper intends an innovative unlading service that can dauntlessly

offload some of the tasks of a mobile application from an MH to neighboring, resource-rich PCs (known surrogates). The key components and system architecture of the proposed offloading service are demonstrated, prototyped, and calculated. The results of Stimulation and experiments have demonstrated the capabilities and accuracy of this migrating aid for mobile applications.

MC2 For Increasing The Lifespan Of A Cellular Device: In fashionable trendy infrastructure emerging new era of computing to boost up a business firm context application aids are provided through the internet via the technological prototype shift named cloud computing. Further cloud increases the technological concerns labeled with mobile intensity lifetimes and grants the better result to save potential energy presence. Cloud plays the fundamental role towards the business auditing resources such as processing needs, memory usage, and storage space do not exist at the users or client location. The resource management is owned by a service provider and which is available on the internet for further renewal. For mobile users, energy can be saved potentially by this way and it provides optimal service.

Door Phone Based System: In the earlier system, recognition of a visitor is done for the most part using direct communication with the group of the housing domain affected. A ringing up to the sets over the hands- free telephone is made by the framework at the entry. The visitors will enter inside through the gate by controlling it with the aid of the telephone device. The latest system video door phone surveillance uses a video camera to identify the visitors, developed by “Chau-Huang Wei et. Al”. The work used atypical power line communication chip to build up a digital system video door phone.

2.METHODOLOGY

In the Proposed system, face recognition and face detection are used to get an access to an automatic door access system. Automatic face detection and recognition are done using Image Processing Techniques using Android. ‘OpenCV face feature reorganization is used to control the door access system depending on the incoming data sent from the personal computer (PC). The door is opened immediately after confirming that the person is authenticated. After 2 seconds, the door is closed automatically. However, in real time, 2 seconds are not enough time to enter a person. So, longer time should be set for the real-time condition. Viola-Jones face detection method is used to detect the location of the face in an image. Since this detection method can detect only face images for frontal view correctly, this system has limitations in head orientation. For face identification, RANSAC method is used to extract the features of facial images. This technique can detect and recognize an image within a second. Hence, this system can be used in automatic verification of people to upgrade door security for outsides without any aid of security guards.

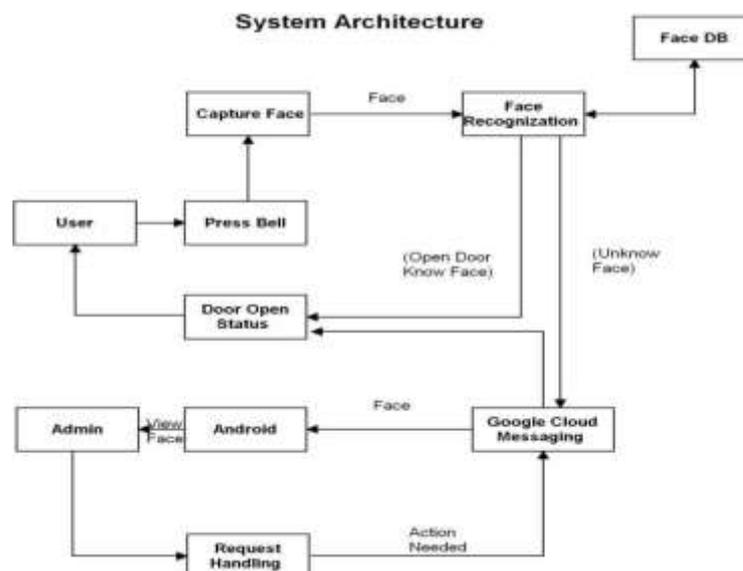


Fig. 1: System architecture

3. IMPLEMENTATION

Steps to Configure Application Development

Install JDK: Go to <http://developers.sun.com/downloads/>, Expand choice Java SE and Click on: Java SE (JDK) 6.

Setting up the Android SDK

Performing the following steps one can set-up Android SDK

- Prepare your computer and make sure it meets the system requirements.
- Install the SDK starter package from either one of this depending on the platform OS.
 - i. Windows installer_r08-windows.exe, MacOSX(Intel)android-sdk_r08-mac_86.zip, Linux (i386)android- sdk_r08-linux_86.tgz
- Install the ADT Plugin for Eclipse
- Add Android platforms and other components to your SDK.
- Explore the contents of the Android SDK

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Install Eclipse IDE

Eclipse is a multi-language software development platform comprising an IDE and a plug-in system to extend it. It can be used to develop applications in Java and, by means of the various plugin, in other languages.
Go to <http://www.eclipse.org/downloads/>, Download the current and save it to drive C:\, Unzip the compressed file to your hard drive (c:\eclipse)

Installing the Eclipse ADT Plugin

The **Android Development Tools (ADT)** plugin for Eclipse adds extensions to the Eclipse IDE. It allows you to create and debug Android applications easier and faster.

Steps involved are

- i. Start Eclipse, then select Help>Install New Software.
- ii. Click Add, in the top-right corner.
- iii. In the Add Repository dialog that appears, enter "ADT Plugin" for the Name and the following URL for the Location: <https://dl-ssl.google.com/android/eclipse/> and Click OK.
- iv. When the installation completes, restart Eclipse.

Creating an Android Virtual Device (AVD)

- i. Android Virtual Devices (AVDs) are configurations of emulator options that let you better model an actual device.
- ii. In Eclipse, choose Window > Android SDK and AVD Manager.
- iii. Select Virtual Devices in the left panel and Click New.
- iv. The Create New AVD dialog appears and then Type the name of the AVD, such as "AVD23API9".
- v. Choose a target (such as "Android 2.3 –API Level9").
- vi. Optionally specify any additional settings (SD, camera, trackball...) YES to all.
- vii. Click Create AVD.

Testing the Emulator

Android Virtual Devices (AVDs) are configurations of emulator options that let you better model an actual device.

- i. In Eclipse, choose Window > Android SDK and AVD Manager.
- ii. Select Virtual Devices in the left panel.
- iii. Click on an AVD and Click Start.

4. RESULT and DISCUSSION

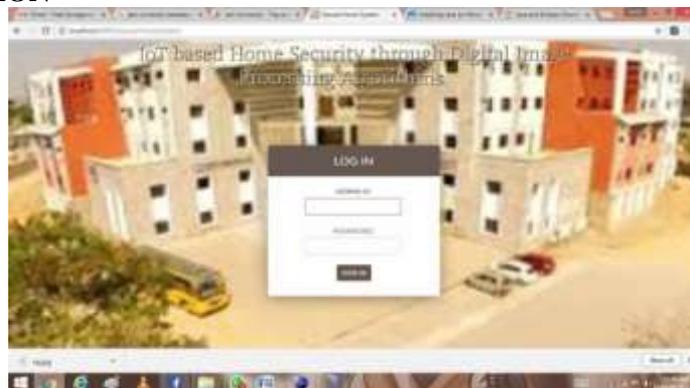


Fig. 2: Admin Login Page

Description: This is the page where admin logins with his admin id and password to visit admin page.



Fig. 3: Admin page

Description: This is the admin page where the admin can view members, add members, view and upload photos of members and change the password.



Fig. 4: View member page

Description: This is the page where the admin gets the information about the members in database



Fig. 5: Add members page

Description: This is the page where the admin can enter the details like, member name, the relation with admin, contact number and email id(optional) of the members he wants to add to the database.



Fig. 6: Photo upload page

Description: This is the page where the member's image is captured and is stored in the database.

5. CONCLUSION AND FUTURE SCOPE

The face is a complex multidimensional structure and needs good computing techniques for detection and recognition. This paper is comprised mainly of three subsystems: namely face detection, face recognition and automatic door access control. Face detection is the method of identifying the regions of the face in an image. Viola-Jones method is used for face detection using 'OpenCV' application and RANSAC (RANDOM SAMPLE CONSENSUS) technique is applied for face recognition. Face Recognition based on RANSAC.

If a face is recognized, the door will open, else it doesn't.

The door will automatically open for the person whose face is matched with the known database image. On the other hand, for the unknown individual, the image is captured and is sent through Google Cloud Messaging to the admin (owner's) android application and based on the admin's wish the door will open or close. Although many training images are used, computational efficiency cannot be decreased significantly.

6. REFERENCES

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