Finger Vein Extraction and Authentication for Security Purpose

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Abstract:
The main objective of the project is to use finger vein for secured transaction instead of ATM Card. Finger vein recognition technology is one of the new bio metric technology, which is hidden inside the human body, difficult to steal and imitate etc. If the finger vein relates with an authenticated person it becomes a successful transaction. If the finger vein corresponds to an unauthenticated person the ATM door closes automatically with a buzzer sound outside the ATM alerting the people outside that person tries to rob or steel the money from ATM.

Keywords: Arduino Controller, GSM, Finger vein Recognition, Biometrics.

1. INTRODUCTION

Personal identification is a matter of great importance and is used in a wide range of systems where restricted access is essential, such as ATM systems in banks, access to PCs, companies, hospitals military buildings However conventional methods, such as passwords and PIN numbers, can be stolen, forged or lost. Biometric identification has appeared in order to offer systems of high security, efficiency and stability and also to overcome the disadvantages the conventional methods have. Biometric identification includes systems that utilize voice, iris, face recognition, fingerprints, etc. [1].Finger vein recognition is a new biometric method for identification of individuals, that has emerged in order to offer higher security, ease of use, accuracy and low cost compared to other biometric methods of identification [2,3].

2. EXISTING SYSTEM

In existing system, many problems are identified. Personal identification number (PIN) is given for an each person to secure their amount. But this seems vulnerable to the risk of exposure and it must be easily forgotten. Fake cards can also be made for stealing the amount from the ATM. Recently many hackers have hacked people's account. For example, finger print and palm print is usually frayed; voice, signatures, hand shapes and iris images are easily forged. So we use biometric authentication process.

3. PROPOSED MODEL

The finger-vein is a biometric pattern used for personal identification. The vein is hidden inside the body and is invisible to human eyes. So it is difficult to forge or steal. The non-invasive and contactless capture of finger veins ensures both convenience and hygiene for the user, and thus more acceptable. The finger-vein pattern can only taken from a live body. Hence, it is a natural and convincing proof that the subject whose finger –vein is successfully captured is alive. In this technology, we proposed that automatically the door will be closed, when unauthenticated finger is pressed.

4.PROPOSED DIAGRAM

The proposed model block diagram is represented as follows:
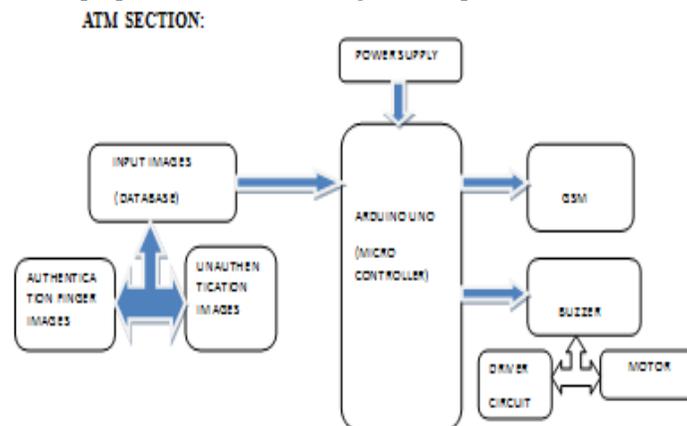
Figure.1:Architecture Diagram

5. BLOCK DIAGRAM DESCRIPTION

The Database consists of information about Authenticated and unauthenticated finger vein images. These images are given as a input to arduino microcontroller which runs with the help of power supply. The controller process the given data and sends the messages using GSM to indicate whether the finger vein is authenticated or not. The unauthenticated outputs are indicated by the buzzer connected to the microcontroller. The Motor connected to the controller will run indicates that the finger vein is authenticated.
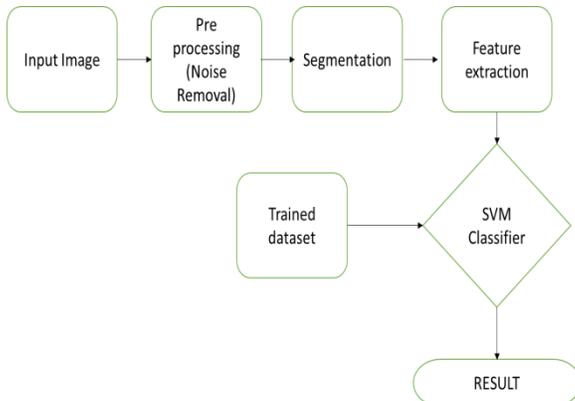
6.SOFTWARE

Figure.2. Software Architecture

7.SOFTWARE DESCRIPTION

The user finger vein is given as input image to the preprocessor where the noise of image is removed by using Gaussian Bilateral Filter.The segmentation of the image can be done by using OTSU's thresholding method.The segmented image is enhanced using dilation process. Features such as mean, standard deviation, entropy, variance, skewness are extracted from the image by using HAAR wavelet transform.The Support Vector Machine (SVM) represents a clear better quality image.The obtained image is compared with the predefined data from the trained datasets.If the user finger vein matches the predefined data, then process is authenticated and if not, the process is unauthenticated[Refer Figure2].

8.FEATURES DESCRIPTION

The Features present in the proposed diagram are as follows:

8.1.ENHANCEMENT
In image processing, Gaussian filter results in the blurring of an image by Gaussian function.It is widely used effect in graphics software to reduce image noise and reduce detail.

8.2. SEGMENTATION
Image segmentation is a method for portioning a digital image into multiple segments (set of pixels).The original image can be changed into something meaningful and easier way to analyze.

8.3.FEATURE EXTRACTION
HAAR wavelet transform is used for feature extraction .The image transforms are widely used in image filtering. In

mathematics, HAAR wavelet is a sequence of rescaled "square shaped function" together to form a wavelet family.

8.4.ALGORITHM-SUPPORTVECTOR MACHINE
Support Vector Machine is a supervised learning model with associated learning algorithms that analyze the data used for classification and regression analysis. A set of training examples are given, each of them is marked as belonging to one or the other of two categories, a SVM training algorithm builds a model that assigns the new examples to one category or the other, creating it a non-probabilistic binary linear classifier. An SVM model is a representation of an example as a point in space, mapped so that the examples of separate categories are divided by clear gap that is as wide as possible. New examples are then mapped into that same space and predicted which belongs to a category based on which side of the gap they fall on.
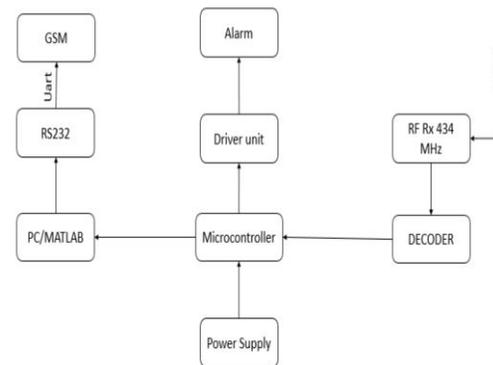
9. HARDWARE SECTION

Figure.4.Hardware Section

10. MODULES DESCRIPTION

The modules present in the proposed hardware diagram [Refer Figure3]are as follows:

10.1.ARDUINO MICROCONTROLLER

Arduino is an open-source electronic platform. Arduino boards are used to read input- light on a sensor, finger on a button, or Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

Figure.5.Arduino Microcontroller

10.2.GSM
The SIM card mounted on GSM modem can receive the digit command by SMS from any cell phone sends that data to the

MC through serial communication. While the program is executed, the GSM modem receives the command 'STOP' to develop an output at MC, the contact points are used to disable the ignition switch.
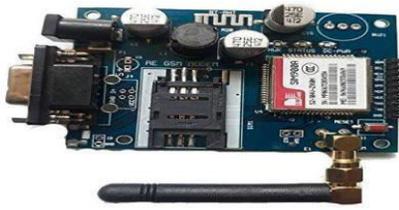

Figure.6.GSM Module

10.3. ALARM

A security alarm is a system which is designed to detect intrusion of unauthorized entry into a building or other area. Security alarms are mostly used in residential, commercial, industrial, and military purposes and personal protection against intruders. In this process if an unauthenticated person tries to take money from the ATM machine, it will alert the buzzer and further the process will be done.

10.4. BUZZER

A buzzer is an audio signaling device, it may be mechanical, electromechanical or piezoelectric. Typical uses of buzzers and beepers includes alarm devices, timers and confirmation of user input such as mouse click or keystroke.

10.6RS232

RS- 232 stands for recommend standard number 232.The serial ports on most computers use a subset of the RS-232C standard. The full RS-232C standard can specifies a 25pin"d" connectors of which 22 pins are used.
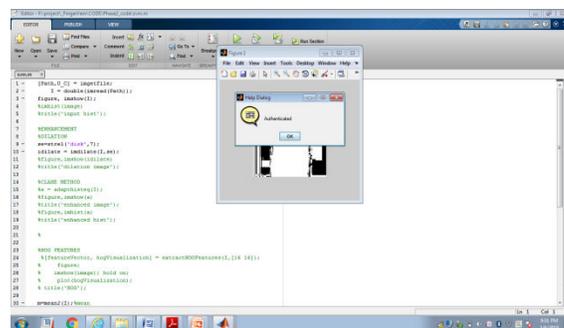
11.RESULTS AND DISCUSSION

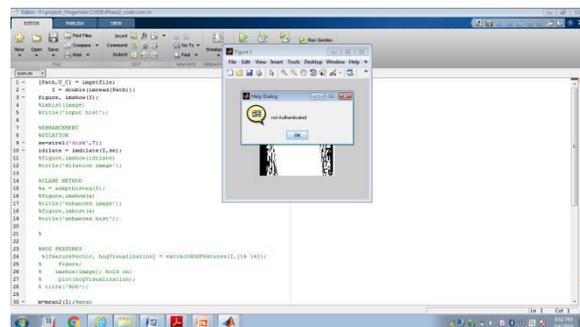**Figure.7.Authenticated Image**

Figure.8. Not Authenticated Image.

12. CONCLUSION

The requirement to achieve personal identification in a secure, robust and low cost way is a clear demand in nowadays. As this study shows, the proposed algorithm is in position to be used in vast variety of technologically advanced applications such as internet banking, physical access control systems and digital issuing of certificates. In addition, the extracted vein patterns can be considered as useful biomedical images as they contain information for significant features such as vein width, number and type of bifurcations etc. For example, vein extractions are used in vascular pathology for improving diagnosis and follow up of angiogenesis in human body.

13.REFERENCES

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