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FPGA BASED FVRS FOR REAL TIME APPLICATIONS

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ABSTRACT

A system for acquiring images of finger veins and processing them using MATLAB for the purpose of authentication is developed. It includes designing of hardware for image acquisition, coding the matching algorithm for processing the finger vein pattern and provide security for the devices. Biometric system is very useful as it employs biology features of an individual. Finger vein features are one of the good biological characteristic that is stable and distinct for everybody. Thus, it can ensure a higher security of the developed system. Compare to other biological traits such as finger mark, finger vein provides more advantages in terms of their uniqueness.

Keywords: Finger Vein Recognition, Image, FPGA, Real Time System.

I.INTRODUCTION

Today, security is very much essential in all kind of activities. Illegal activities are happening in every place today. So government and corporate sections are concentrating mainly on the security levels with their every invention. This will bring privacy all over the world. Unlike other conventional biometric features such as face, iris, finger print, palm print, hand shape, voice and signature, finger vein patterns do not leave any traces or information that can be used to duplicate the biometric data. As finger veins exist beneath human being's skin, they are completely hidden and unexposed even during the authentication process.

The personal information can be protected in the form of biometrics. The traditional authentication systems like identity card or password can be easily stolen or acquired by unauthorized person. The biometric authentication system is chosen over conventional authentication system because of their distinctiveness and highly secured nature. Out of these biometric systems, finger vein biometric is one of the emerging techniques. In this type of biometric system the vascular pattern under one's skin is utilized as a unique feature for authentication.

Veins are hidden underneath the skin surface and are mostly invisible to human eye, they are not prone to external distortion and also the vein patterns are much harder to replicate as compared to other biometric traits. Vein patterns are unique for each individual and are stable over a long period of time. Because of its uniqueness,

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stability and high resistance to criminal attacks, vein pattern is more reliable biological feature for a secure biometric authentication system

Biometric system is often implemented in an un trusted environment that uses an insecure and non-reliable central server for the storage of the biometric templates This can be the source of biometric information leakage. The solution to this problems is given by recent development in vein authentication by hardware implementation of the system It provides secure information storage and tamper resistance, hence it provides the protection from physical and software attacks.

II. DESIGN OF THE PROPOSED SYSTEM

Finger vein recognition is of the prime importance in real time applications like providing security to the mobiles and attendance system where digital data transmission is done and verification is done. Security is becoming essential in all kind of application. This work is implemented in a way to improve the security level. As the finger-vein is a promising biometric pattern for personal identification in terms of its security and convenience. Also the vein is hidden inside the body and is mostly 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 is thus more acceptable. So this system is more hopeful in improving the security level.

In this work, the finger vein recognition by using Spartan 3A FPGA that is supposed to replace the existing software is proposed. In implementation of finger vein recognition system we mainly require two sections for transmitting and receiving data for recognition that is from transmitter to receiver. For recognition mainly consists of 2 sections i.e, card section and receiver section as in fig.1 and fig.2.

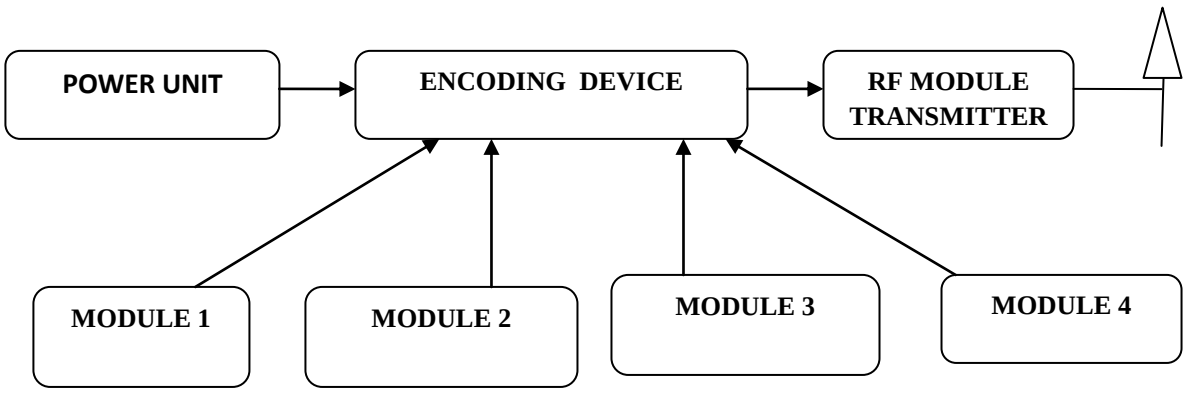

Fig.1. Card section

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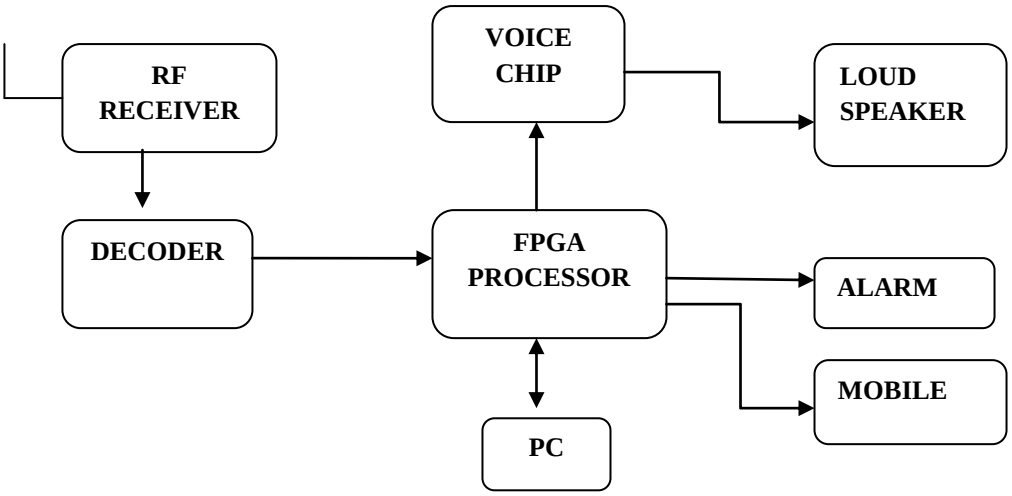

Fig.2. Receiver Section

In card section we mainly have 3 different users with digital input has some frequency for transmitter that is taken and transmitted by rf transmitter and received by rf receiver which has certain frequency and signal is decoded and sent to FPGA which is verified by pc already content images of finger vein and says authorized or unauthorized based on the user information. If a person vein is authorized then a voice chip is obtained that user is authorized so that he can perform the operations and if a person vein is not present in data base then he is unauthorized and cannot use the application where we get an buzzer that someone is using our mobile and a message is sent to the particular person hence by using this process we successfully completed the recognition of finger vein by using Spartan 3a. The sections used in this project implementation are RF transmitter, RF receiver, UART, RS232, Alarm unit ,GSM, voice chip.

III SIMULATIONS & RESULTS

After making all possible connections and connecting hardware kit to the personal computer the following observations are made

STEP 1:

After sending RF signal the RF receiver automatically decoded and below pop up is opened to select the finger vein for recognition

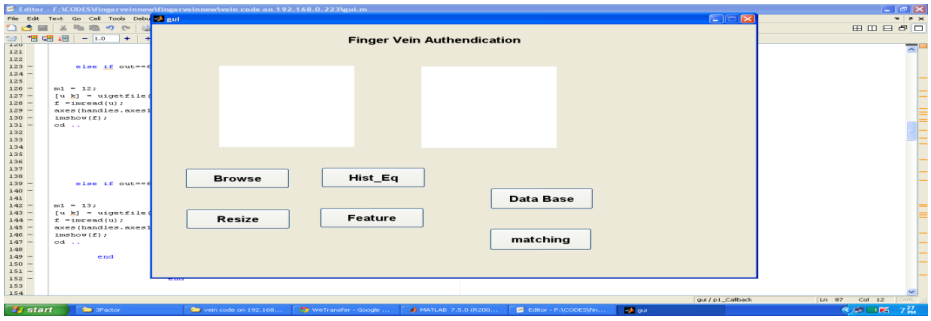

Fig.3.Selection of Finger Vein

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STEP 2:

For selecting user browse button is selected such that a person vein can be opened and the pop up is shown below

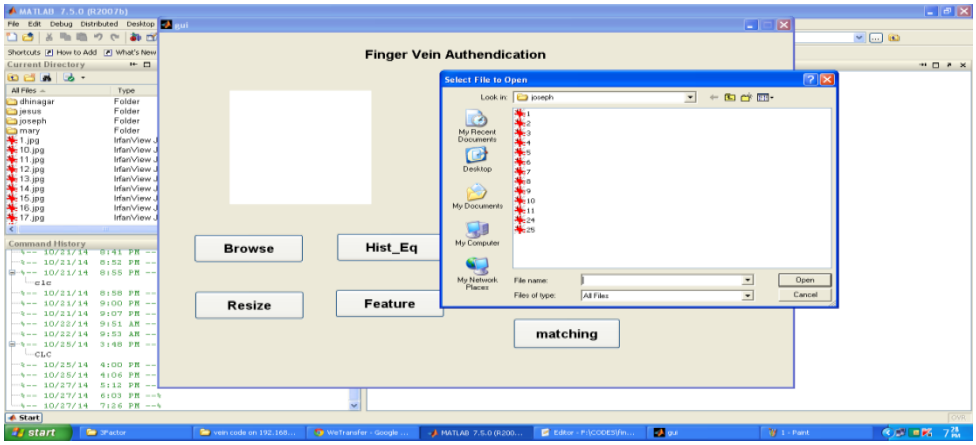

Fig .4. Browsing the finger vein

STEP 3:

After selecting a user finger vein image of the user then image resize is done such that all the pixel values of the captured images are equal for execution then the below pop is shown after resizing

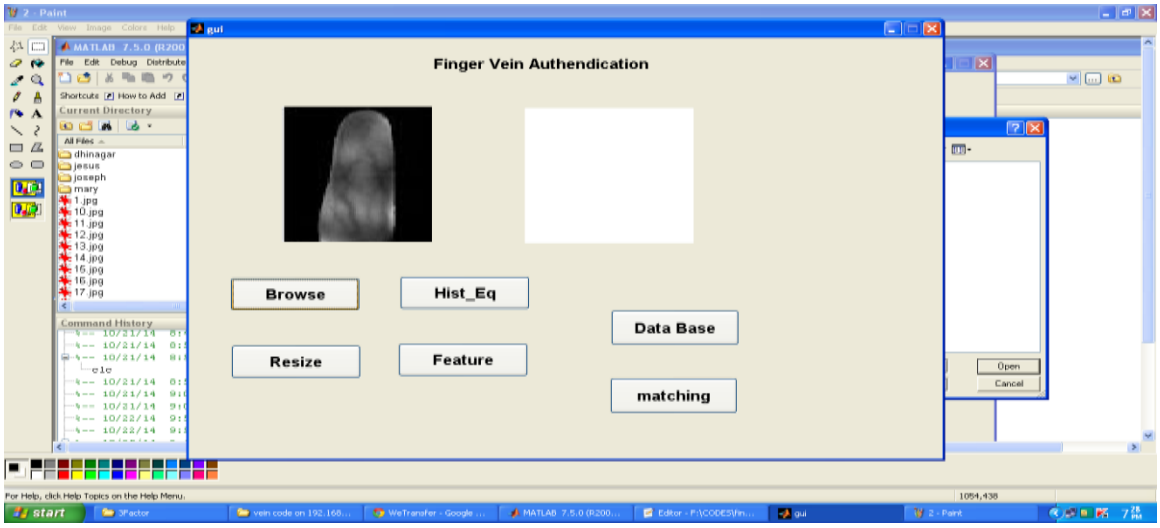

Fig.5. Resize the image

STEP 4:

After resizing the image the image is histogram equalization such complete image is converted into 4 parts and upper part is shown be removing complete noise present in the vein of the persons image and the below pop is shown how the image is histogram equalization into parts i.e ll,lh,hl and hh

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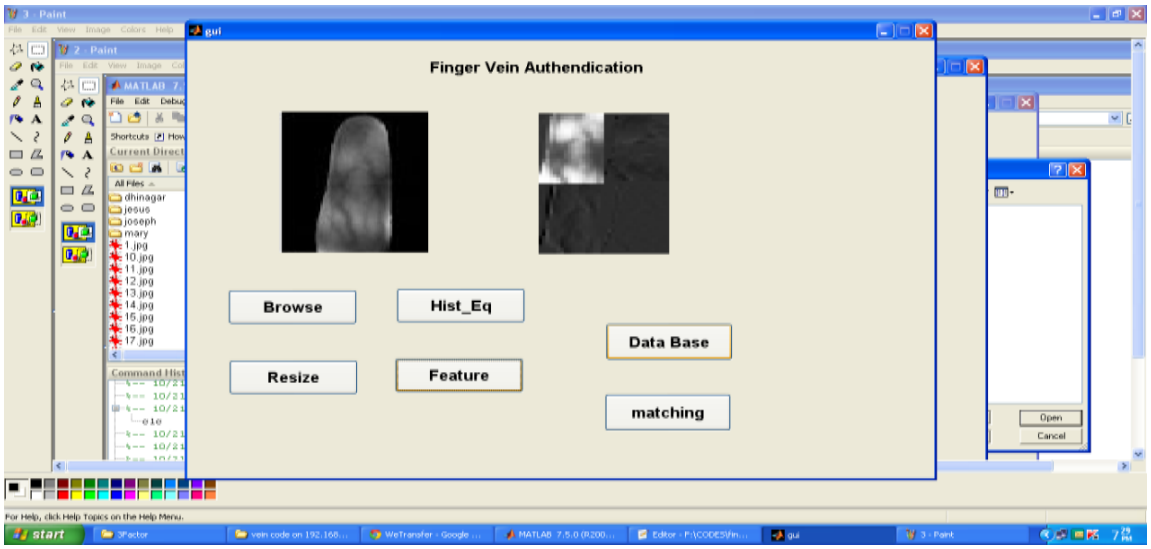

Fig.6. Histogram equalization and feature extraction

IV. CONCLUSION

Security is becoming essential in all kind of application. This project is implemented in a way to improve the security level. As the finger-vein is a promising biometric pattern for personal identification in terms of its security and convenience. Also the vein is hidden inside the body and is mostly 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 is thus more acceptable. This system is more hopeful in improving the security level. The system provides effective and efficient features using FVRS which is been implemented on MATLAB platform and FPGA. The classifier implemented is classifier which gave an accuracy of 96% when run real time and an accuracy of 70% for the database images.

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