Novelty Journals

International Journal of Novel Research in Electronics and Communication
Vol. 3, Issue 1, pp: (15-22), Month: March 2016 - August 2016, Available at: www.noveltyjournals.com

Algorithm Based Personal Identification Using IRIS Recognition

[1]Dr. G.R. GNANAKING, [2]A.Kanimozhi, [3]V.Kaviroja, [4]S.Manonmani, [5]A.Nandhini

[1]Assistant professor of ECE, [2,3,4,5] B.E Department of Electronics and Communication Engineering, Kathir College of Engineering, Neelambur, Coimbatore, India

Abstract: **Biometric information is widely used in user identification systems. Iris is one of the most reliable and accurate biometric Information. In an iris recognition system, the iris localization is one the most important parts because the performance of an iris Recognition system is highly dependent on the accuracy of iris Localization. Iris recognition is on automated method of biometric Identification that uses mathematical pattern-Recognition techniques on video and images of one or both of the irises of an individual's eyes, whose complex random Patterns are unique, stable, and can be seen from some distance. Retina scanning a different, now obsolete, ocular-based Biometric technology for which iris recognition is often Confused with has been supplanted by iris recognition. Iris Recognition uses video camera technology with subtle near Infrared illumination to acquire images of the detail-rich, Intricate structures of the iris which are visible externally. Digital templates encoded from these patterns by mathematical and statistical algorithms allow the identification of an Individual or someone pretending to be that individual. Several Hundred millions of persons in several countries around the World have been enrolled in iris recognition systems for Convenience purposes such as passport-free automated border- Crossings, and some national ID programs. A key advantage of Iris recognition, besides its speed of matching and its extreme Resistance to false matches is the stability of the iris as an Internal and protected, yet externally visible organ of the eye.**

Keywords: **DCT, FFT Algorithm, Iris localization, Hough Transform, Gray scale Conversion, Guided Filter, Microcontroller.**

I. INTRODUCTION

Biometric systems have witnessed a large scale deployment in a wide range of security applications. Among the available biometric modalities Iris recognition is one of the most promising and widely adopted modalities. Iris biometrics has been the core technology component in very large scale deployments such as the Indian UIDAI (Aadhaar) project.Many advantages including reliable identity recognition, iris biometric systems are highly vulnerable especially at the sensor level to various kinds of presentation attacks[1-2]. The goal of a presentation attack is to subvert a biometric system by presenting a biometric artefact of the legitimate image using wavelet transform[3-4]. With the evolving knowledge in creating a biometric artefact (or spoof),it is possible to generate a high quality attack instrument in a cost manner that can be used to subvert an iris system[5-7].

Among various ways one can perform a presentation attacks in iris recognition system by DCT and binarizedimage[8-10]. The feasibility of these attacks on both visible and near infrared(NIR) iris recognition systems are acknowledged by the number of recent publications in this field the organizationof competitions and the evolution of standards that show the strong importance of micro-texture analyse to successfully detect and mitigate the presentation attacks in real-life scenarios[11]. Thus in this work, we address presentation attacks at the sensor level using cost effective attacks namely: photo print attack and electronic screen (or display) attack. The easiest way is by presenting an image of a legitimate

International Journal of Novel Research in Electronics and Communication
Vol. 3, Issue 1, pp: (15-22), Month: March 2016 - August 2016, Available at: www.noveltyjournals.com

enrolee either by printing a photo or by displaying a photo using electronics screens such as tablets or mobile phone displays[12].

II. PREVIOUS WORK

In case of Robust scheme for iris presentation attack it used an iris localization method of noisy iris images captured in various environment and devices for biometric iris recognition system. The iris localization method consists of two types: pupil boundary and iris boundary localization. For localizing a pupil boundary, the block-based minimum energy detection method is used. Then, the secular reflection regions are removed in the pre-processing step for correctly localizing a pupil boundary. In the NICE.IIdataset, the original color images and the binary mask images are provided, however, numerous poor binary mask images are contained as well. Therefore to refine the poor binary mask images, a guided filter is used in the iris boundary localization step.

III. PROPOSED METHOD

IRIS is one of the most promising biometric modalities, and is in regular use in large-scale applications such as UAE port of entry and India's UIDAI projects. Median filters, which influence the distributions of the bits to identify the Hamming distance of phase. Wearing of contact lenses, both soft contacts and textured "cosmetic" soft contacts, degrades the accuracy of iris recognition.Our post-processing techniques are normalization, segmentation using phase-based, texture analysis methods. It is our hypothesis that applying a lens detection algorithm to first reject the cases with obfuscated patterns and allowing only without lens and soft lens iris images can improve the performance of iris recognition algorithms and reduce the false matches at higher verification rates. To test this hypothesis, the experiment was conducted and the performance of the iris recognition was then evaluated. Segmentation is obtained using commercially available iris recognition. Segmentation for each image was verified by hand and adjusted manually in the case of large segmentation errors.

The boundaries of the sclera region are determined by two circles with the same centre point as the limbic circle but with different radii. The inner radius is 20px smaller than the limbic boundary and the outer radius is 60px larger than the limbic boundary in original image coordinates in an attempt to capture contact lens boundaries that may have shifted into the iris region while also limiting the amount of eyelid and eyelash occlusion. Modified pattern analysis is applied to each of the regions of each image at multiple scales to produce feature values. Finally we are matching the score value to recognize the iris. If the IRIS is authenticated LED will glow for indication if it is unauthenticated a buzzer alert will provide for alert the person.

The overview of iris recognition system block diagram is given below in the figure 1.

BLOCK DIAGRAM:

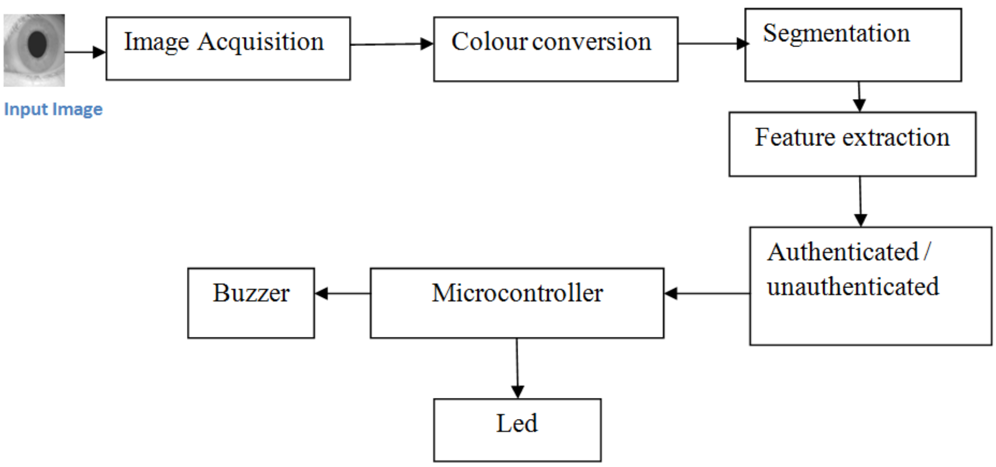

Fig.1 Overview of Iris recognition system

International Journal of Novel Research in Electronics and Communication
Vol. 3, Issue 1, pp: (15-22), Month: March 2016 - August 2016, Available at: www.noveltyjournals.com

A. ACQUIRING DATA:

MATLAB lets you access data from files, other applications, databases, and external devices. You can read data from popular file formats such as Microsoft Excel; text or binary files; image, sound, and video files; and scientific files such as net CDF and HDF. File I/O functions let you work with data files in any format.

Using MATLAB with add-on products, you can acquire data from hardware devices, such as your computer's serial port or sound card, as well as stream live, measured data directly into MATLAB for analysis and visualization. You can also communicate with instruments such as oscilloscopes, function generators, and signal analyzers.

B. COLOUR CONVERSION:

When converting an RGB image to grayscale,we have to take the RGB values for each pixel and make an output as single value reflecting the brightness of that pixel. In gray scale images we do not differentiate how much we emit different colors,we emit the same amount in each channel. The "optimal projection" calculates how we should combine the RGB channels in the selected image to make a grayscale image that has the most variance.

To convert a color from a colorspace based on an RGB color model, gamma expression is defined as

$$C_{linear} = \begin{cases} \dfrac{C_{srgb}}{12.92}, & C_{srgb} \leq 0.04045 \\ \left(\dfrac{C_{srgb} + 0.055}{1.055}\right)^{2.4}, & C_{srgb} > 0.04045 \end{cases}$$

C. IMAGE SEGMENTATION:

Image segmentation is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries in images.

Each of the pixel in the region are similar with respect to compound property such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristic. The result of image segmentation is a set of segments that collectively cover the entire image or a set of contours extracted from the image.

D. FEATURE EXTRACTION:

Feature extraction a type of dimensionality reduction that efficiently represents interesting parts of an image as a compact feature vector. This approach is useful when image size are large and a reduced feature representation is required to quickly complete tasks such as image matching and retrieval.Feature detection,extraction and matching are often combined to solve common computer vision problems such as object detection and recognition.Feature extraction involves computing descriptor,which is typically done on regions centered around detect features.Descriptors on image processing to transform a local pixel neighbourhood into a computer vector representation.This new representation permits comparison between neighbourhoods regardless of changes in scale or orientation.It is encoded into binary vector.

(1) FAST FOURIER TRANSFORM:

Fouriertransform decomposes an image into its real and imaginary components which is representation of the image in the frequency domain.If the input signal is an image then the number of frequencies in the frequency domain is equal to the number of pixels in the image or sptial domain.

The mathematical representation is given as

$$F(X) = \sum_{n=0}^{N-1} f(n)\, e^{-2j\pi} \left(\frac{n}{N}\right)$$

The fft that is implemented in the application requires that the dimensions of the image are a power of two. Another property of fft is that transform of N points can be rewritten as the sum of two N/2 transforms. It is important of the computations can be reused thus eliminating expensive operation. The output of fft is a complex number and has a much great range than the image in the spatial domain. Therefore to accurate represent these values,they are stored as floats. The dynamic range of Fourier coefficients are too large to be displayed on the screen,these values are scaled to range of values that can be displayed.

(2) HOUGH TRANSFORM:

The Hough transformis a feature extraction technique used in image analysis,computervision,and digital image processing .The purpose of the technique is to find imperfect instances of objects within a certain class of shapes by a voting procedure. The voting procedure is carried out in a parameter space,from which object are obtained as local maxima in a accumulator space that is explicityconstructed by the algorithm for computing the houghtransform.circlehough transform is used to find circle imperfect image inputs.

The mathematical representation is given as

$$(x-a)^2+(y-b)^2=r^2$$

(3) DISCRETE COSINE TRANSFORM:

It expresses a finite sequence of data points in terms of a sum of cosine functions oscillating at different frequencies. DCTs are important to numerous application. A DCT is a Fourier related transform similiar to the discrete Fourier transform but using only real numbers. DCTs are equivalent to the DFTs of roughly twice the length operating on real data with even symmetry. Computing a two dimensional DCT by a sequences of one dimentional DCT along each dimension is known as row column algorithm. The image to the right shows combination of horizontal and vertical frequencies for an 8×8 two dimensional DCT. Each step from left to right and top to bottom is an increase in frequency by half cycle. The source of data is transformed to a linear combination of these 64 frequency squares.

The mathematical representation is given as

$$X_{k1,k2}=\sum_{n1=0}^{N_1-1}\left(\sum_{n2=0}^{N_{2-1}} x_{n1,n2}\, cos\left[\frac{\pi}{N_2}\left(n_2+\frac{1}{2}\right)k_2\right]\right) cos\left[\frac{\pi}{N_1}\left(n_1+\frac{1}{2}\right)k_1\right]$$

E. 8051 MICROCONTROLLER:

The 8051 is a Harvard architecture, CISC instruction set, single chip microcontroller (µC) series which was developed by Intel in 1980 for use in embedded systems. Intel's original MCS-51 family was developed using NMOS technology, but later it is modified with CMOS technology and referred as 80C51which consume less power than their NMOS predecessors and gives high switching speed than NMOS technology. This made them more suitable for battery-powered devices. 8051 models may also have a number of special, model-specific features, such as UARTs, ADC, OpAmps, etc…Microcontroller 8051 is basic among all the MCUs and excellence for beginners.Here we use AT89C51, in which AT mean ATMEL, C mean CMOS technology. and rest numbers indicates family identification. 8051 is an 8-bit microcontroller which means that most available operations are limited to 8 bits.

F. BUZZER:

A buzzer or beeper is a signalling device, The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep.

This novel buzzer circuit uses a relay in series with a small audio transformer and speaker. When the switch is pressed, the relay will operate via the transformer primary and closed relay contact. As soon as the relay operates the normally closed contact will open, removing power from the relay, the contacts close and the sequence repeats, all very quickly...so fast that the pulse of current causes fluctuations in the transformer primary, and hence secondary.The speakers tone is thus proportional to relay operating frequency. The capacitor C can be used to "tune" the note. The nominal value is 0.001uF, increasing capacitance lowers the buzzers tone.

G. LED:

A light-emitting diode (LED) is a two-leadsemiconductorlight source. It is a p–n junctiondiode, which emits light when activated. When a suitable voltage is applied to theleads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light

International Journal of Novel Research in Electronics and Communication
Vol. 3, Issue 1, pp: (15-22), Month: March 2016 - August 2016, Available at: www.noveltyjournals.com

(corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.An LED is often small in area (less than 1 mm^2) and integrated optical components may be used to shape its radiation pattern.

IV. EXPERIMENT AND RESULT

Iris recognition system involves menu creation fig.2, input imagefig.3,feature extraction fig.4,authentication fig.5, output fig.6 and also graph for input image fig.7 and authentication process fig.8

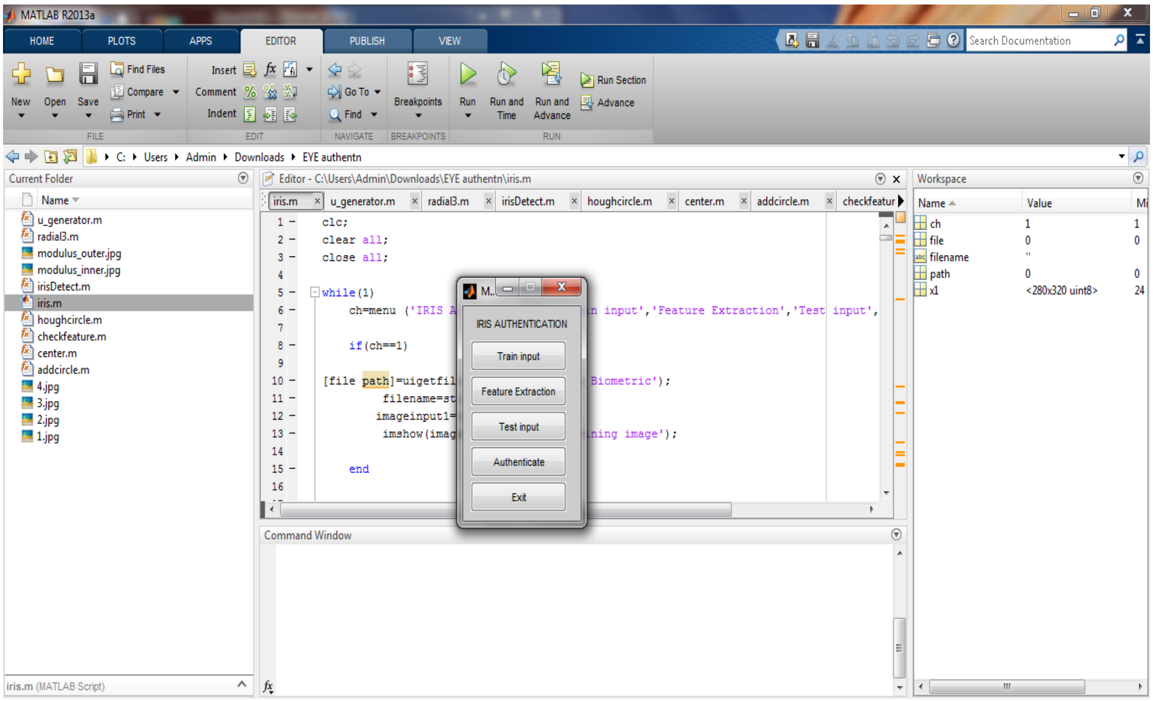

Fig.2 Menu creation

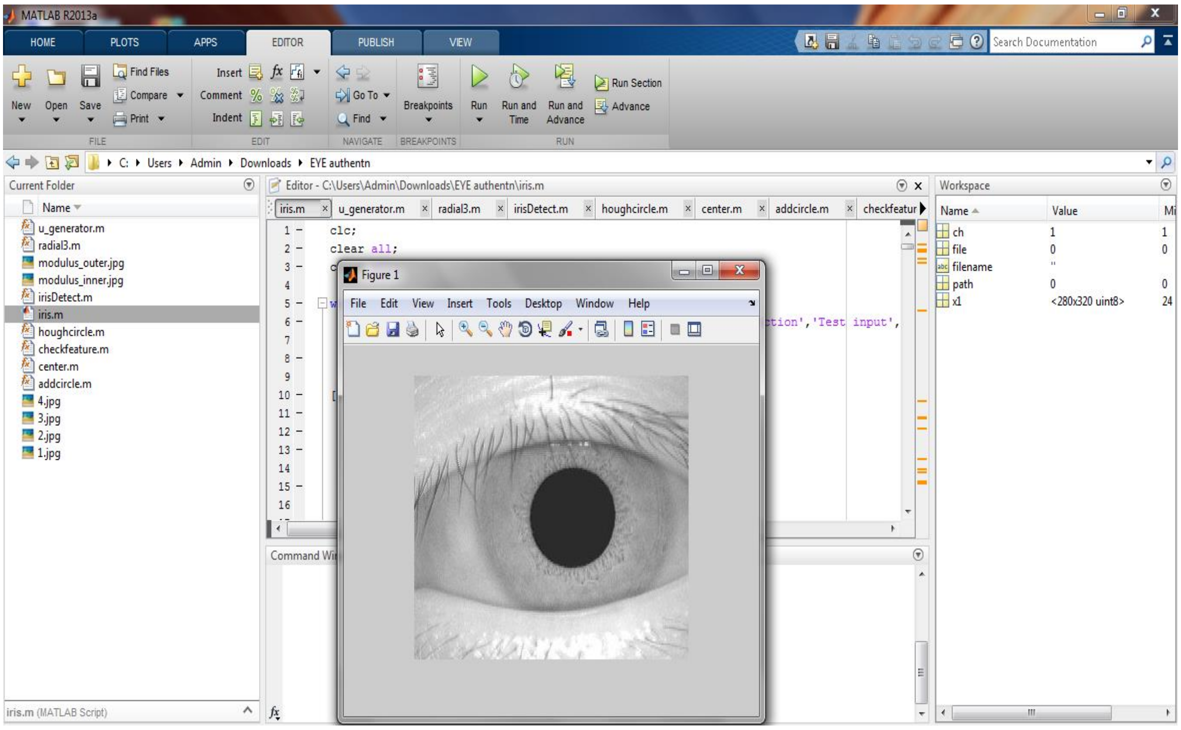

Fig.3 Input image

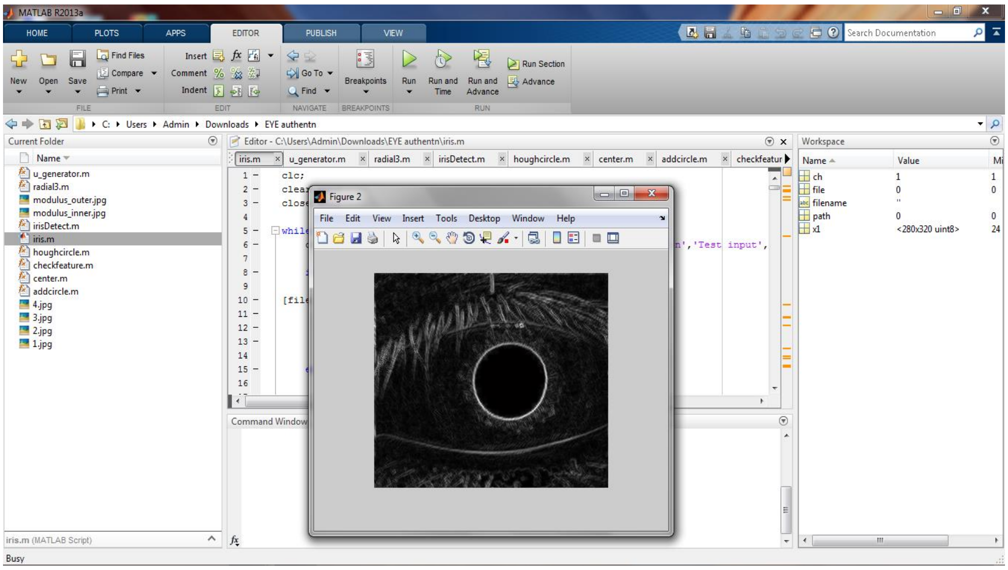

Fig.4 Feature extraction

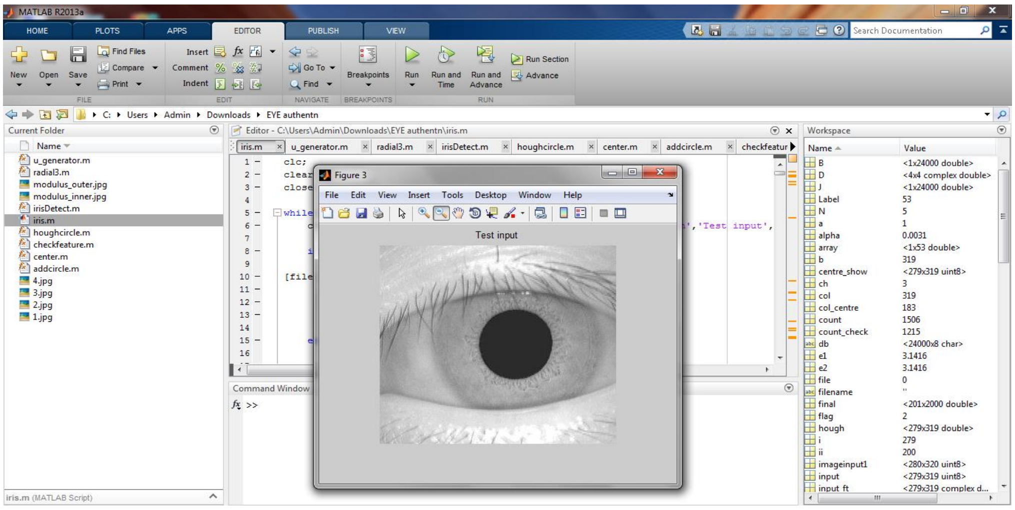

Fig.5 Authentication

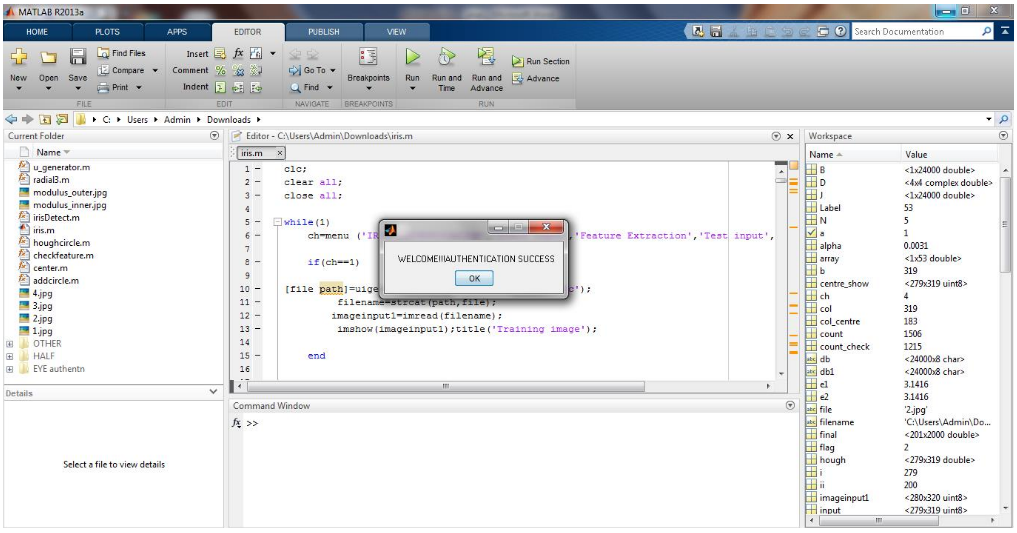

Fig.6 Output

International Journal of Novel Research in Electronics and Communication
Vol. 3, Issue 1, pp: (15-22), Month: March 2016 - August 2016, Available at: www.noveltyjournals.com

GRAPH:

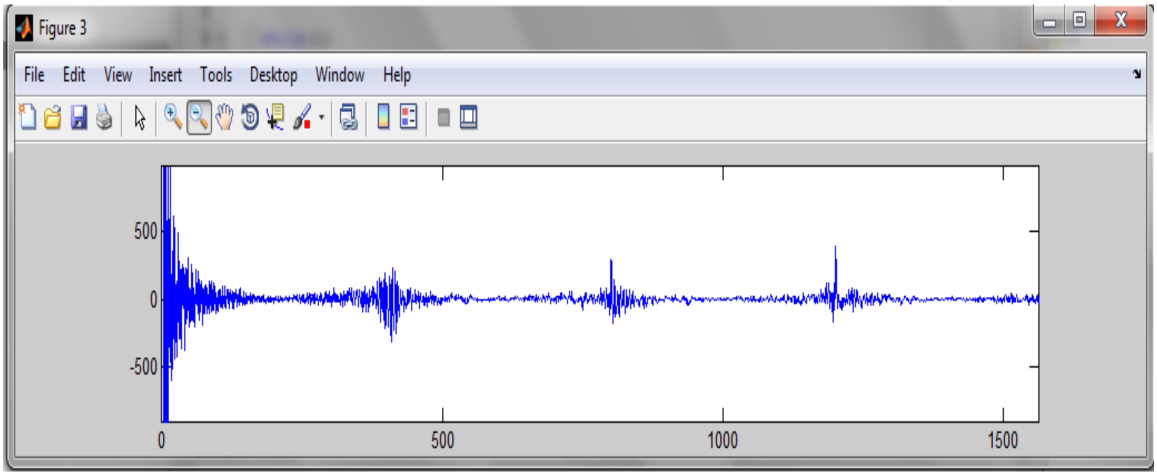

Fig.7 Graph for the input image

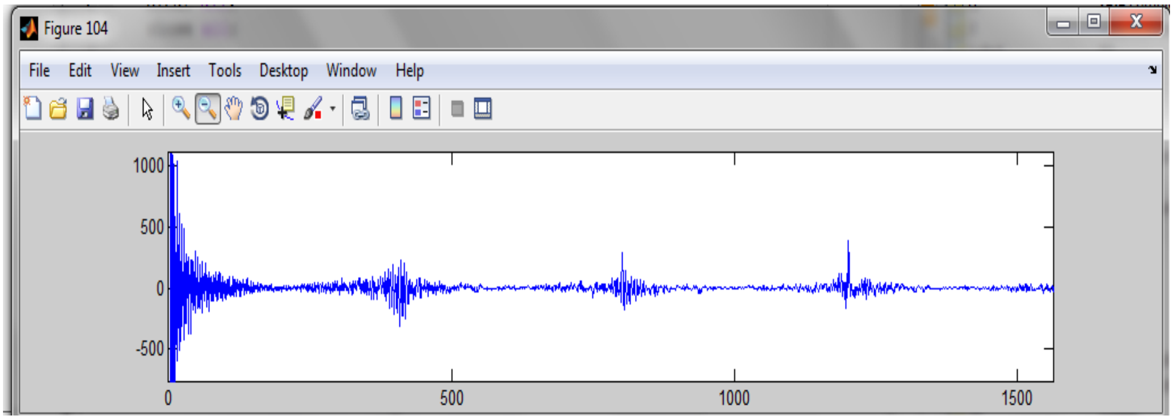

Fig. 8 Graph for the authentication process

TABLE:

Performance evaluation of iris recognition system

Input size	280×320
Hough matrix	$\begin{bmatrix} 9.46 & 15.48 & 20.71 \\ 8.48 & 13.54 & 14.45 \\ 10.09 & 14.58 & 10.21 \end{bmatrix}$
Radius	80-40
Baud rate	9600 HZ
Threshold	100
Output	$\begin{bmatrix} 1 & 3 & 3 \\ 255 & 3 & 255 \\ 255 & 254 & 3 \end{bmatrix}$

V. CONCLUSION

Iris biometric systems are highly vulnerable to presentation attacks that can be carried out using either a photo print or electronic screen display. In this work, we explored the vulnerability of iris recognition systems to various presentation attacks. Further, we also proposed a novel algorithm to accurately detect and mitigate the presentation attacks on the iris recognition system. If the iris is authenticated and LED will glow for the indication otherwise buzzer alert will be provided for the security reasons.

International Journal of Novel Research in Electronics and Communication
Vol. 3, Issue 1, pp: (15-22), Month: March 2016 - August 2016, Available at: www.noveltyjournals.com

REFERENCES

[1] J.Daugman,"Iris recognition and anti-spoofing countermeasures "in proc. 7th Int.Biometrics Conf., 2004, pp. 1-6.

[2] J.Galbally, S.Marcel,andJ. Fierrez, "Image quality for fake biometric detection: Application to iris, fingerprint, and face recognition," IEEE Trans. Image process. vol. 23,no. 2, pp. 710-724,Feb. 2014.

[3] W.Boles, and B.Boashash,"A Human Identification technique Using Images of the Iris and wavelet Transform",IEEE Trans. on Signal processing,Vol.46, No.4,1998,pp.1185-1188.

[4] N.Schmid, M. Ketkar, H. Sigh, and B.Cukic,"Performance Analysis of Iris Based Identification System the Matching Scores Level",IEEE Transactions on Information Forensics and Security,Vol.1,No.2,2006,pp.154-168.

[5] Yulin Si, Jiangyuan Mei, and Huijun Gao, Senior member, IEEE Novel approaches to Improve Robustness, Accuracy & Rapidity of Iris Recognition System IEEE Trans.on Ind.Inf.,8(1),(2012)

[6] X.He.et al.,"Statistical texture analysis-based approach for fake iris detection using support vector machines," in proc.ICB, 2007,pp. 540-546.

[7] M.Vatsa, "Reducing False Reflection rate in iris recognition by quality enhancement and information fusion,"M.S.Thesis, West Virginiauniv., Morgantown, W. V,2005.

[8] D.M Monro, S. Rakshit, and D. Zhang, DCT-based iris recognition," IEEE Trans. Pattern Anal, Mach, Intell.,Vol.29, no.4, pp.584-596, Apr.2007.

[9] JuhoKannala and EsaRantu, "Bsif. Binarized statistical image features"., pattern recognition (ICPR) 2012 21st International Conference. On,pp.1363-1366

[10] Mobile iris liveliness detection competition (mobilive2014)."http//mobilive 2014. In.escporto.pt".

[11] J.Matta, A.Hadid, and J.Pietikainen, "Face spoofing detection from single images using micro-texture analysis", in Proc. Int. Joint Conf. Biometrics (IJCB), Oct. 2011, pp. 1-7.

[12] R.Raghavendra and C.Busch, "Presentation attack detection on visible spectrum iris recognition by exploring inherent characteristics of light field camera," in Proc.IEEE IJCB, 2014.