CURRENCY NOTE DETECTION AND NOTE TO COIN CONVERTER USING DIGITAL IMAGE PROCESSING

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Abstract - Coin necessity has been increasing day by day, in the area like bus stop, railway station, shopping malls, petrol pump, parking place, parks and even in rural areas. Lot of time there is need of coins rather than notes. This issue is solved by note exchanger machine which will convert notes into coins. There are various techniques to detect the INDIAN CURRENCY NOTES such as, water marks checking, pattern based, texture based and color based recognisation. The most preferable technique is color based recognisation. The Indian Currency notes will be identified with the help of image processing. MATLAB algorithm is used to detect the value of note and have an implementation of UV light LED and photodiode for fake note detection.

Index Terms—Note, Coin, Image processing, MATLAB

I. INTRODUCTION

In recent year the used of notes to coin converter has been increased in various countries including India, but in our country many people are unknown to this technique. In actual case the need of this technique is more at the public place but it is only available in some reputed bank. So the purpose is to implement this system which is lighter, smaller and useful for the society.

The function of note to coin converter is to check originality of notes using image processing technique and detect weather the note is fake or real. Camera takes picture of real note and find's the value of it using Image processing and according to value notes we get equivalent number of coins. Note detection is done using MATLAB algorithm and output is process by controller which will manipulates coin dispensing unit through motors and relays. The keypad is used to select the require coins of desired value like one rupee, two rupee and five rupee as per the user requirement.

II. CURRENCY NOTE DETECTION USING IMAGE

PROCESSING

Pattern based, texture based, watermarking checking, the micro lettering, color based recognition are the different image processing technique. Along all of them color based recognition is the most preferable technique. It is based on counting number of pixels of each color. To represent color information of digital images color model is used. As we required three parameters to represent the color, their color model must be three dimensional. RGB, CMY, HSI are some color models.

A. RGB color model

The RGB color model is nothing but additive color model in which broad array of color is reproduce by adding red, green, and blue color together. The red, green, and blue are the primary colors. Such as adding red and green we get yellow, adding red and blue we get magenta and by adding green and blue we get cyan. The line from the origin coordinate of red (0,0,0,) to coordinates of white(1,1,1) of the cube represent grey level values.
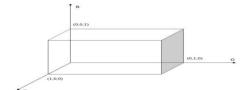

Fig. 1. RGB Model

The image is taken by camera and stored it into 3D array. The coordinate of pixels of 2D image is given first and second index of array and RGB color intensities for each coordinates is store in third index. First to indices of array determine resolution of image. The limit for first index is 640 and for second index it is 480. The images are taken considering following assumptions:

- Images are taken in the clear environment.

- Resolution of images is high and fixed, so that we can used any camera for capturing image.

- The object distance from camera is nearly fixed.

- The currency notes are of good quality.

B. HSI model

In HSI model, I is the intensity of light, H is hue of color that measured purity of color, S is the saturation(amount of white color). If the color is with high saturation value, it means color is with low white color. Color points of HSI are describes in cylinder whose central axis ranges from white at the top and black at the bottom with a neutral colors between them, where "saturation" is distance from the axis, and "intensity" is distance along the axis , " hue" is the angle around the axis.
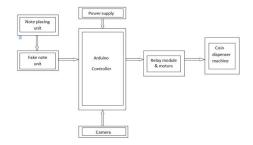
III. BLOCK DIAGRAM

Fig. 2. Block diagram

A. CAMERA

The note should be inserted in slot from which camera will take picture of it. Note will be clearly distinguished from the background so background must be dark. Camera will take picture of it and further send it to the MATLAB for preprocessing.

B. RELAY MODULE

A relay is an electrically operated switch. The first application of relay was a long distance telegraph circuits. A simple electromagnetic relay consists of a coil of wire wrapped around a soft iron core, movable armature, spring, switch point contact. It is used in applications to turn on and off a circuit by a low power signal. Electromagnetic relay are still commonly used in application because They are simple and cheap. to avoid danger of injury or damage from leakage current the electromagnetic relay is better choice
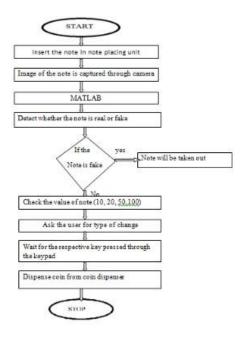
C. DC MOTOR

This motor converts dc electrical energy into mechanical energy or force and then into rotational force. It is the first form of motor which is widely used. It works on principal of Flemings left hand rule, a current carrying conductor is place in a magnetic field and it experiences a torque and which has tendency to move. small dc motors are used in tools, toys etc. Large do motor used in propulsion of electric vehicles, steel rolling mills, elevator etc.

D. COIN DISPATCHING MACHINE

MATLAB detects the currency note whether it is real or fake and assign the variable the value of note. The user enters the no of coins he wants such as 1 rupee, 2 rupee, 5 rupee or 10rupee using keypad. The accurate value is send to the microcontroller through the serial ports by comparing the total amount of change with the note value. For each set of coin one motor is used such as motor 1 for 1 rupee, motor 2 for 2 rupee etc. As the user selects required no of coins then the corresponding motor has been rotates for a fixed time to dispatch the single coin. Therefore as there are N no of coins motor is rotated for N times.

IV. FLOWCHART

Fig. 3. Flowchart

V. CONCLUSION

This project developed machine that will provide currency recognisation system using color recognisation with the help of MATLAB. In this system we interfaced camera and UV light in machine which detect metal strip in particular note. As the system is fully automated it is more efficient that can provide us the coin in exchange of note and reduces human efforts.

VI. FUTURE SCOPE

As the system is furthered design Indian currency can be exchange in foreign currency. That will function as excellent exchange automated system.

1) REFERENCES

[1] Archana Bade,Deepali Aher, Prof.Smitha Kulkarni, " NOTE TO COIN EXCHANGER USING IMAGE PROCESSING", International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2277- 4804 Volume: 1 Issue: 3, MAR 2013.

[2] Sanjana, Manoj Diwakar, Anand Sharma "An Automated Recognition of Fake or Destroyed Indian Currency Notes in Machine Vision", International Journal of Computer Science Management Studies, Vol. 12, Issue 02, April 2012.

[3] Rubeena Mirza, Vinti Nanda, "Design and Implementation of Indian Paper Currency Authentication System Based on Feature Extraction by

Edge Based Segmentation Using Sobel Operator", International Journal of Engineering Research and Development Volume 3, Issue 2 August 2012.

[4] Rubeena Mirza, Vinti Nanda," Paper Currency Verification System Based on Characteristic Extraction Using Image Processing", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1, Issue-3, February 2012 .

[5] A. Bade and D. Aher, "Note to Coin Exchanger Using Image Processing ," IJRITCC, vol. 1, Mar. 2013, pp. 154-158.

[6] Kajal Gawali and S.Patil, "Note To Coin Exchanger with Fake note Detection", ICRIEM-16, ISBN:978-81-932074-5-1, March-2016

[7] Angelo Frosini, Marco Gori, "A Neural Network-Based Model for Paper Currency Recognition and Verification," IEEE Transaction on NN Vol.7 No. 6

[8] Parminder Singh Reel, GopalKrishan, SmartiKotwal," Image Processing based Heuristic Analysis for Enhanced Currency Recognition," Vol 2, No 1 (January 2011) International Journal of Advancements in Technology http://ijict.org/ ISSN 0976-4860K. Elissa, "Title of paper if known," unpublished.

[9] Amol A. Shirsath, S. D. Bharkad, "A Review of Paper Currency Recognition System", IOSR Journal of Computer Engineering (IOSRJCE) e-ISSN: 2278-0661, p-ISSN: 2278-8727Volume 10, Issue 1 (Mar. - Apr. 2013), PP 71-76

[10] A. Bade and D. Aher, "Note to Coin Exchanger Using Image Processing ," IJRITCC, vol. 1, Mar. 2013, pp. 154-