

# Note to Coin Exchanger with Fake Note Detection using Image Processing

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**Abstract**— Every year RBI (Reserve Bank of India) faces problem of fake Currency notes. Fake notes in India are of Rs.100, 500 and 1000 are being available into the system. In order to deal with such problems, an automatically fake note detection of currency notes is introduced with the help of color recognition technique. In our day to day life requirement of coins is also increasing at places like bus stop, mall, park, railway station. The main objective behind this project is to be design an efficient and simple machine which will fulfill the need of coins for exchange so that people does not facing problem of coins and also fake notes. This idea is based on the color recognition technique.

**Key words:** Coin Exchanger, Fake Note Detection, Processing

## I. INTRODUCTION

The interest in reliable automatic coin recognition systems within cultural heritage and banking enforcement institutions rises vastly. Traditional methods to fight the illicit traffic of ancient coins created manual, periodical search in auctions catalogues, field search by authorized institute, controlling management at specialist dealers, and a heavy and unrewarding internet search, followed by human searching. Applied pattern recognition algorithms are manifold ranging from neural networks to, decision trees, edge detection and gradient directions, and texture features. Tests performed on image processing both of medieval and modern coins show that algorithms performing well defined. Main difference between ancient and modern coins is that the ancient coins have no rotational symmetry and consequently their diameter is not present as per standard. Since old coins are all too often in poor condition, in between recognition algorithms can easily fail.

The features of that most impact the quality of recognition process are yet unexplored. The aim of this project is to be providing coins equivalent to note. The circuit uses controller with mechanical assembly which have motors to perform requested tasks. Here the machine accepts note and checks while a note is fake or real. If a

Note is original, camera takes picture of note and with the help of computer using MATLAB software checks which note it is (Rs 10 or Rs 20). Once the note is accepted coins will be taken out by coin dispensing unit.

## II. BLOCK DIAGRAM & DESCRIPTION

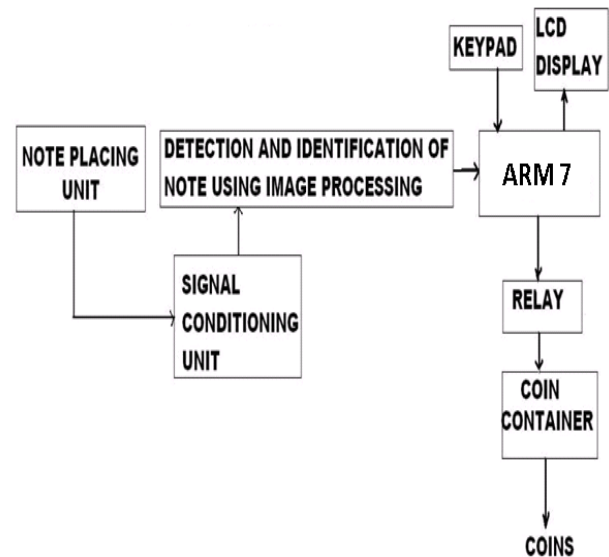


Fig. 1: System Block Diagram

The block diagram of our idea is shown in above figure. Unit which consists of checking the reality of the currency and sorting between 10 rupee and 20 rupee note and controller part from where the work is provided to the customer. There are various blocks each performing as per standard functions.

The main blocks are:

- a) Note Placing Unit
- b) Signal Conditioning Unit
- c) Detection And Identification Of Note Using Image Processing
- d) ARM7
- e) LCD
- f) Keypad
- g) Relay
- h) Coin Container

### A. Note Placing Unit

It will accept the note from the user; it consists of mechanical assembly design of relays to take the respective note from the user. It required 12v to drive a DC motor of 10RPM. They are required 3 relays and 2 DC motors at the user side to accept the note inside the machine. This information is sent to the controller for further processing.



Fig. 2: Note Placing Unit

### B. Signal Conditioning Unit

To identify whether the note is duplicate or original, the specialty of a currency note is that it absorbs the UV light and a duplicate note reflects the UV light. This work is done by the UV LED transmitter and UV receiver or detector. The UV rays coming from the UV LED. If the note is original it will absorb the UV rays. If the note is duplicate then the rays will be reflected towards the detector BPW34. This output of the UV receiver it gives to the INVERTING TRANSCONDUCTANCE AMPLIFIER CA314. This output is increased with the help of amplifier and then gives to the single supply comparator LM 311. The output of the comparator is gives to the microcontroller and then further processed.

### C. Fake Note Detection, Currency Note Localization and Currency Note Detction Using Image Processing

Image processing technique is most popular. There are number of technique to recognized a note these are texture based, checking by the watermarking, checking by micro lettering, color based detection technique .The most comfortable technique along all these is color based detection. It is constructed by measured by the number of pixels of each color. It is easy to equalize and is insensitive to small changes in viewing position. The calibration of color histogram just involves measuring the number of pixels of dedicated color. Therefore an image of resolution  $m*n$ , the time complexity of computing color histogram is  $O(mn)$ .

It is quite insensitive to small changes in VP this feature is particularly required in this project as the VP from which the image of currency note will be accepted can change. Fake note detection which is not worked by general LED illumination because the UV pattern is doesn't reflect under general LED illumination. To special inspect paper money using UV-LED, the paper money image must be divided into a pattern and a background. There is a method of dividing an image into a pattern and a background using a threshold value. These techniques find a histogram of the image, determines the threshold value, and classifies the image. At the based on Histogram-based threshold value decision methods exist such as Otsu's method and Huang and Wang's method. However, these methods are difficult to separate more than two objects, because complexity

increases gradually as the number of objects increases. Therefore, in order to divide an image into many objects, a suitable technique is necessary.

The method using Gaussian mixture model (GMM) can be segmented an image into more objects. This technique synthesizes of normal-Gaussian PDF to segment the image. These methods are explained widely, first, we obtained a UV-image of the paper money using UV-LED source. The UV image was divided into the RGB value and we selected the G value. Further finding the gray-histogram of the G value and then find minimum mixture component number selection by using BIC and as per standard deviation. Then GMM can be obtained by UV image segmentation.

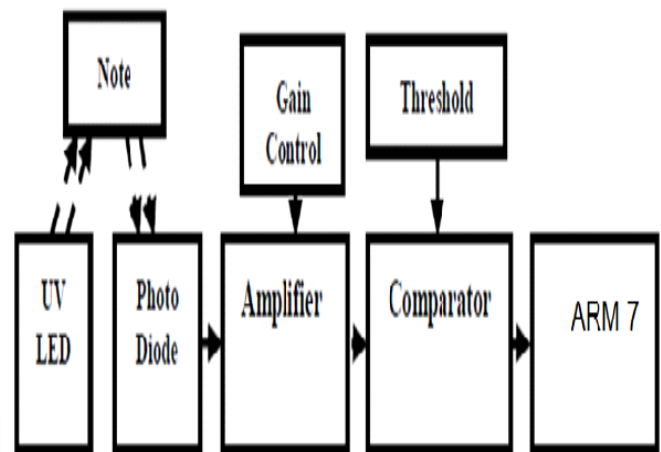


Fig. 3: Block diagram of fake note detection unit

As shown in Fig. 8, the UV-image was divided into five parts. Then it was specified as the background from the first part until the third part. And the fourth part and the fifth part were deviation in the ultraviolet pattern. However, this classification in small difference. Because, the size and shape of fluorescence pattern is different for each kind of paper-money. When the fluorescence pattern of the paper money was large, the UV pattern present in the fourth part and fifth part. However, when the fluorescence pattern was small, the UV pattern only present in the fifth part. Therefore, in order to part of that segment the UV pattern using GMM, we have to select the part from segmented UV-image. This judgment was worked according to the characteristic of the paper money. The divided image of the UV pattern according to the characteristic of the paper money. The color recognition algorithms scan every frame for pixels of a particular quality. To recognize a pixel as part of a specified object, it's Y, U and V components must take within the ranges defined in the Thresholds section of the color definition file.). A typical color definition file has the following design. A simple choice of these ranges can easily will obtained by using camera which will capturing the images continuously.

A video camera is designed to perform work which will capture an image – either a single “frame,” or a series of frames, over a cyclic manner. Video cameras used photosensitive “tubes,” similar to TV or cathode ray tubes (CRT), to transfer incoming light into an electronic signal that could be sent to be a monitor or transmitter, or to video recorders which used magnetic tape “heads” to capture the images on magnetic tape. Solid-state cameras can capture

images in a wide range of light conditions. It is possible to create an image using a very high speed of less than 1/800,000 second, or to leave a very high open for many seconds to access necessary light. Cameras are designed to work in both of this tremendous form. Examples will be a time exposure to photograph a dim star, or a high and quick very high speed to capture a bright explosion. The sensitivity of its cameras using the lux unit of measure, which is based on the amount of light emitted on a given area (1 lux = 1 lumen per square meter). A lens with an area of f/1.4 decreases the required sensitivity number roughly a factor of 10.

#### D. ARM Controller

The LPC2138 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time operating system emulation and embedded trace support, that combines the microcontroller with the 32 KB, 64 KB, 128 KB, 256 KB and 512 KB of embedded very high speed Flash memory. It has 128-bit wide memory interface and unique accelerator as per standard architecture enable 32-bit code execution at maximum clock rate. large range of serial communications interfaces and on-chip SRAM options of 8/16/32 KB, they are very well usable for communication gateways and protocol converters, soft modems, voice recognition and high processing power. The work of controller is to identify the data sent by the PC MATLAB in the form of 1's and 2's. 1's indicates a 10 rupee note and 2's indicates a 20 rupee note. Once the controller had received the indication it asks user related to denomination requirement in the form of 1, 2 and 5 rupees coin. It will also match the amount entered by user and the value of note. If the amount pressed is greater or less than specified value then it will note provide the change and note will be rejected. It also drives the LCD display and dc motor.

#### E. LCD

A 16x2 LCD screen is used in order to display various things such as the name of the project, indication about note being original or duplicate, in case of insufficient coins and to take input from the users. LCDs are the most popular electronic display device. LCD flat full color panels are now challenging the CRT as displays for TV and computers. While even a LED display required a few milliwatts of power. Hence, the LCDs are over 1000 times more preferable at their job than the LEDs.

#### F. Keypad

Keypad is used as a user interface. It helps user to enter the combination for the change. There are keys as:

- 1) Start
- 2) 1 rupee
- 3) 2 rupee
- 4) 5 rupee
- 5) Ok

The indication is given to the controller and based on that it provides the change.

#### G. Relay

A relay is usually an electromechanical device. Relays are like remote control switch and are used to many applications because of their relative simplicity, long life, and high reliability. Relay contain a sensing unit, the electric coil,

which is generated by DC or AC current. When the applied current or voltage exceeds a threshold value, the coil gets activate the armature, which operates either to open or close contacts. When a power is supplied to the coil, it generates magnetic fields that generate the switch mechanism. The magnetic force is, in effect, relaying the action from one circuit to another.

#### H. Container

Coins of 5, 2, and 1 are stored on the box which is implemented on a conveyor belt. Based on users choice indications are given to the driver IC to drive the respective motors. We have to use a switch at the corner in order to gives signals to the controller that the exact no. of coins is given. If the coins as per requirement of the user are not present in the coin container then a message will be display on LCD "INSUFFICIENT COINS".

### III. CONCLUSION

The object of this project is to present the system based on recognition of counterfeit currency Bank notes to avoid frauds. The proposed system will be helpful in day to day life of every common man where people have to suffer for change at many public places. This Project provides an interactive system that generates currency detection system using color method based and binarization technique with the help of MATLAB. In our project efficiency is near about 90%. Original and fake note are detected very perfectly and is accurate in detection of 10 and 20 rupee note.

### REFERENCES

- [1] ARCHANA BADE, DIPALI AHER, PROF SMITA KULKARNI, "International Journal On Recent and Innovation Trends In Computing and Tele-Communication", ISSN: 2277-4804, Pune, 2013
- [2] Mehmet Sevkli, Ali Türkyılmaz M. S. Aksoy, "BANKNOTE DETECTION USING INDUCTIVE LEARNING", Fatih University, Faculty of Engineering, Department of Industrial Electronics Engineering, Buyukcekmece, 34900, Istanbul, Turkey, pp. 2-3, 1997.
- [3] J. Sauvola, M. PietikaKinen, "Pattern Recognition 33 , Adaptive document image binarization", Machine Vision and Media Processing Group, InfoTech Oulu, A University of Oulu, P.O. BOX 4500, FIN-90401 Oulu, Finland, pp. 225-236, 2000.
- [4] J. R. PARKER: "Image Processing and Computer Vision", 2nd edition. New York: JohnWiley & Sons, Inc., 1997, pp. 23-29.
- [5] R. C. GONZALEZ, R. E. WOODS: "Digital Image Processing", 2nd ed., Addison- Wesley, 1992, pp. 416-473.
- [6] R. C. Gonzalez, R. E. Woods, "Digital Image Processing", 2nd edition. Prentice Hall, Inc., 2002, pp. 90-96.
- [7] Archana Bade, Dipali Aher, Prof Smita Kulkarni, "International Journal On Recent and Invention Trends In Computing and Communication System" ISSN: 2277-4804, Pune, 2013, pp. 154-158.
- [8] D. Dakopoulos and N. G. Bourbakis, "Wearable obstacle avoidance electronic Travel aids for blind: A survey," IEEE Trans. Syst., Man, Cyber. C, Appl. Rev., vol. 40, No. 1, pp. 25-35, Jan. 2010.