

# NOTE TO COIN EXCHANGER

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**Abstract** - The significance of coin today is more; in fact coins are valued more in places such as bus stations, malls, railway stations, even in rural areas where now days also coin telephone systems are used. Due to these many applications at grass hood level, we thought of making an exchanger machine that will provide coins instead of notes. In this, note is first checked for its trueness i.e. whether the note is fake or real and after that it will provide the change in returns. There are lots of techniques to detect the Indian currency note, these are texture based, pattern based, checking by the watermarking, checking the micro lettering, color based recognition technique. The most preferable technique along all these is color based recognition. For detecting kind of note the M algorithm runs and the result is given to the controller which will manipulate the coin container through relays and motors, the user simply press the keypad for which type of change he wants whether one rupee coins or five rupee or mixed and hence in the output we get coins as user requirement.

**Key Words:** PIC-16F877A, Image processing, MATLAB, DC motor, Fake note detection.

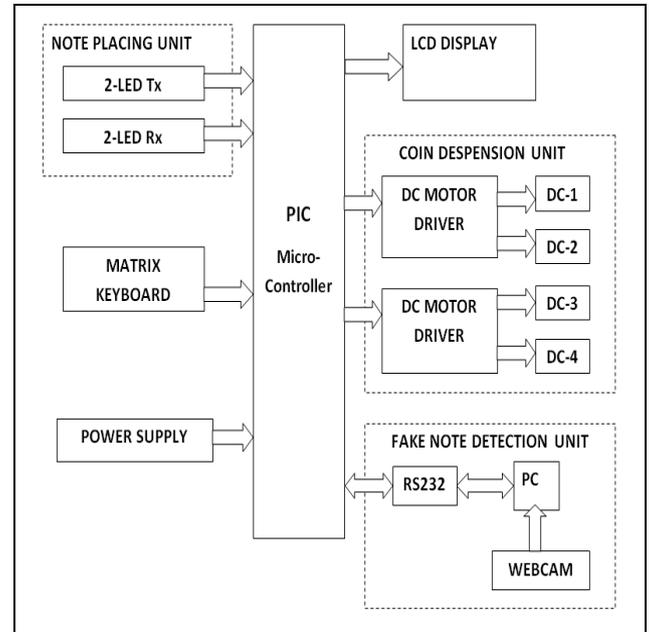


FIG.1: Block dig of note to coin exchanger

## 1. INTRODUCTION

In our daily life we come across with problem of not getting change in various public places. The importance of coins today is more in fact coins are valued more in places such as bus station, malls, railway station. For this many application coins are widely used. So in order to help people we are developing an interactive system that generates currency recognition system using colour recognition based technique with the help of MATLAB. In this system note is first checked whether the note is fake or real and after that it will provide change in return .As mentioned in the application this project is a real time application for all real time places .In the future this system can also be applied in the buses itself. This will be a relief for the conductors and passenger.

## 2. SYSTEM ARCHITECTURE

### 2.1 Methodology

Here aim of this project was to provide coins equivalent to note. The circuit used microcontroller with mechanical structure which had motors to perform requested tasks. Here the machine accepted note and checked whether a note was fake or real. When a note was real, camera took picture of note and with help of computer having MATLAB program checked which note it was (Rs 10 or Rs 20). Once the note is recognized coins had dispensed by coin dispensing unit.

### 2.2 Note Placing Unit

It had accepted note from the user. It consisted of mechanical Design of relays to take the respective note from the user. It took 12v to drive the DC motor of 10RPM. There had DC motors attached to roller at the user side to take the note inside the machine. Here we used two IR sensors, one before the roller and other after it, when first sensor was cut roller started and took in note and stopped when second sensor was cut. This information was sent to the microcontroller for further processing. If note was fake motor rotated in opposite direction which gave out the note.

## 3. IMAGE PROCESSING USING MATLAB

### 3.1 Currency Note Localization

A UV light source was use to highlight metallic elements in note and webcam was used to take picture of note. The image obtained from the camera may not be directly used for localization and requires enhancement. It involves applying some procedures like "Noise Reduction" "Normalization" and "Contrast Enhancement". Next we subtracted the background from the image and converted it from RGB to gray. After this conversion of the image, we detected the edges present in the image using some edge detection techniques present in the Image Processing

Toolbox of MATLAB. Canny operator was selected in our technique to detect the edges prominent in the note. Currency note localization was done by applying scan line algorithm on the image after edge detection. The number of pixels present in each line is counted while the image is scanned from left to right line by line. The line that contained the number of pixels greater than the set threshold is highlighted (marked). Likewise is applied from top to bottom.

### 3.2 Fake Note Detection

Thus image obtained from localization had been binaries using Mat lab algorithm, thus obtained image is binary which had only two colours present black and white. The metallic elements present in note were highlighted by UV light appear to be white and rest part of note was black. So by checking presence alternate weaving of metallic strip in note we could detect whether note was real or fake. In original note five bands of metallic strip could be observed from one side but we had set threshold as 2 when bands were equal to or greater than two, note is shown as original.

### 3.3 Note Value Recognition Unit

Image processing technique was a vast in this there were lots of techniques to detect a note these were texture based, pattern based, checking by the watermarking, checking the micro lettering, colour based recognition technique. The most preferable technique along all these is colour based recognition. It is constructed by counting the number of pixels of each colour. Histogram described the global colour distribution in an image. The computation of colour histogram just involved counting the number of pixels of specified colour.

We used correlation function of MATLAB which compared whole note with standard image of original note, it checked all the parameters and output of this function was true whenever 90% of parameters are matched with standard image. In such way it recognized 10Rs or 20Rs note and gave information to microcontroller.

## 4. USER INTERFACE

Keypad and LCD had used as user interface. Keypad has 4 keys namely 1, 2, 3, Enter. These were useful to select desired amount of coins in exchange to a particular value of note. LCD had used to display values entered by keypad also it displayed essential information to user.

## 5. MICRO CONTROLLER PIC- 16F877A

This is main element which performs all controlling. The work of controller had to identify the data sent by the PC MATLAB in the form of 2's and 1's. The controller knows that a.1 = 10 rupee NOTE. b.2 = 20 rupee NOTE. The controller had known that now it had to generate coins in the multiples of 5, 2 and 1 coins.

## A. COIN DISPENSION UNIT

This unit contains coin container and motors with blades to dispense coins. Motor 1 had let out the 1 rupee coins, motor 2 had let out the 2 rupee coins, motor 3 had let out the 5 rupee to the coins to the user. In case of mix coins, the controller had checked for availability of coins in the coin container and then as per the wants of the user from the keypad, it calculates value entered and checks with value of note and the mix coins have be let out to the user. When the coins as per the need of the user were not present in the coin container then a message had displayed on the LCD "INSUFFICIENT COINS".

## 4. PROJECT FLOW



1. Initialize LCD
2. Display Project name
3. "A"
4. Is note placed in the roller? No → "A"
5. Yes → Start roller take the note in
6. Send the indication to MATLAB on PC via RS232
7. MATLAB will take the snap of note
8. Enhance and Binaries the image
9. Is the value above set point, No → Note fake, give note out → "A"
10. Yes → Display note is original



11. MATLAB will process using colour segmentation and give us the reading in RGB format.
12. Once the colour is identified the note is recognized as RS.10 / RS.20
13. Turn ON DC motor 1, Deposit the Note in the container
14. Wait for Keypad I/P from user for denomination in 1,2 or 5 Rs coin



15. Turn on the Coin dispensing mechanism to give the respected number of coins according to coin denominations
16. "A"

## 5. CONCLUSION

This Project provides an automated interactive system that generates currency recognition system using

colour model and binarization technique with the help of MATLAB. The system adopts the interactive techniques of image binarization using specific threshold depending upon surrounding environment and correlation function to provide exact value of currency note. The proposed system is robust, power efficient, and real time operating will be useful in day to day life of every common man where people have to suffer for change at many public places. In the future this system can also be applied in the buses itself. This will be a relief for the conductors and passengers.

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