

# Note to coin converter

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**Abstract**— In present time people require coins at various places such as temple, railway station, buses and many other places and to carry so many coins is tedious task. So in order to avoid this situation we are building a system known as note to coin converter where there is an easy access to coins. A user will place the note and then with the help of image processing the Indian currency note will be identified and also checked for legitimacy using segmentation algorithm and depending upon it the user will get the coins and the user can also select the type of coin denominations such as Re.1, Rs.2 or Rs.5 according to the requirement.

**Index Terms**—Coins, note to coin converter, indian currency.

## I. INTRODUCTION

At present note to coin converter is being used in various countries including India, but in India such systems are scarce and very few people know about it and also their availability is limited to few banks, but not at public places where the need is more. The system which are available are also huge and bulky and also with no security other than the banks own security. So our idea is to implement such system at public places which is smaller, lighter and does not require a supervision as it is provided with the GSM security. The basic need of the project arises due to requirement of change at various places. For this image processing is used to identify the currency note to tender the change required and using image processing we can also identify and detect that the note is real or fake. The note to coin converter machine helps to get the change required. The main process of the project is to identify which note is placed in the machine. There are lots of techniques to detect the Indian currency note, these are texture based, pattern based, checking by the watermarks, checking the micro lettering, color based recognition technique. The most preferable technique along all these is color based recognition. It constructs by counting the number of pixels of each color. For detecting which kind of note, the software algorithm runs and the result is given to the controller which will manipulate the coin container through relays & motors, the user can 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.[1]

## II. IMPLEMENTATION OF NOTE TO COIN CONVERTER:

The note to coin converter is designed to give the coins in according to the currency note placed into the machine along with GSM security. The flow of the project depicting various blocks is shown in Figure1.

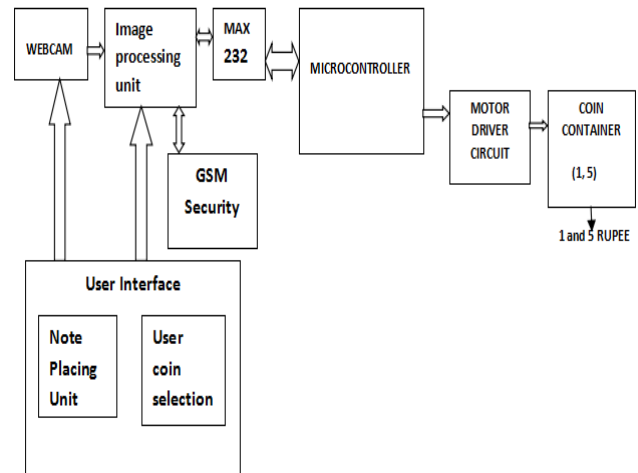


Figure1 Block diagram of note to coin converter with GSM security.

### Note placing unit:

The note is placed in a proper position in this unit and the webcam is focused to take the picture of the currency note placed and then it is sent to the image processing unit for further processing. The note should be placed in proper position and should not be folded.

### Image processing unit:

A number of edge detection based on a single derivative have been developed by various researchers. Amongst them most important operators are the Robert, Sobel, Prewitt, Canny operators. The Canny edge detector is regarded as one of the best edge detectors currently in use, Canny's edge detector ensures good noise immunity and at the same time detects true edge points with minimum error[2]. Also it requires less RAM to run on the memory.

### Segmentation Algorithm:

Segmentation in simple terms is edge detection. An object can be easily detected in an image if the object has sufficient contrast from the background. The object to be segmented differs greatly in contrast from the background image. Changes in the contrast will be detected by operators that calculate the gradient of image. The gradient image can be calculated and a threshold can be applied to create a binary mask containing the segmented cell. A region of interest (ROI) is a portion of an image that you want to filter or perform some other operation on. You can define a ROI by making a binary mask, which is a binary image that is of the same size as the image you want to process with pixels that define the ROI set to 1 and all other pixels set to 0. The binary gradient mask shows lines of high contrast in the image. The lines do not quite delineate the outline of the objects of interest. As Compared to the original image, you can see gaps in the lines surrounding the object in the gradient mask. These linear gaps will be deleted if the Canny image is dilated using linear structuring elements, which we will create with the strel command. The dilated gradient mask shows the

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outline of the cell quite nicely, but the holes are still present in the interior of the cell. To fill these holes we have used the imfill command. The cell of interest has been successfully segmented, but its not the only single object that has found. Any objects which are connected to the border of the image can be removed using the imclear border function.[3],[4]. Thresholding is also done by keeping a threshold value that is we only allow 200 to 255 pixel values to pass behind a black background so that the 0 pixel value which is black is not passed and all the white pixels are passed.



Figure2: Results of different images obtained

#### GSM security:

It is used for notification if someone tries to mess with the machine a message is sent via GSM modem connected to the machine to a nearby regulatory authority. The message to be sent is predefined. If the machine is shaken then a sensor will detect the vibration and send a signal to GSM modem.

#### MAX 232:

MAX 232 is 16 pins IC, that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuit. The MAX232 is a dual driver receiver and typically converts the RX, TX, CTS and RTS signals for communication between computer and microcontroller and vice versa.

#### Microcontroller:

The microcontroller receives commands from the image processing unit and drives the motor for dispatching the coins. The AT89C2051 is a low voltage, high performance CMOS 8-bit microcomputer with 2K bytes of Flash programmable and erasable read-only memory .

### III. THE PROCESS THE SYSTEM FOLLOWS IS EXPLAINED BELOW

#### 1.Note Identification

Image processing technique is a vast in this there are lots of technique to detect a note these are pattern based, texture based, checking by the watermarking and checking the micro lettering, color based recognition technique. The most preferable technique along all these is color based recognition. It is constructed by counting the number of pixels of every color. Histogram defines the global color distribution in an image. It is easy to compute and is insensitive to small changes in viewing position (VP). The computation of color histogram just involves counting the number of pixels of specified color. Therefore in an image of resolution  $m \times n$ , the time complexity of computing color histogram is  $O(mn)$ . It is quite insensitive to small change in VP this feature is particularly desired in this project as the VP from which the image of currency note will be acquired can change.

The image is captured using webcam and the coordinate of the pixel in 2D image is given by the first and second index of the array in grayscale intensities for each coordinate. Each element of array stores an unsigned 8 bit integer (0-255). The limit of first two indices of array determines the resolution of the image. In our current scenario, this limit is set to be 640 for the first index and 480 for the second index. . The currency notes should be of good quality i.e. they are not very much full of stains. The grayscale image is operated with various segmentation operators of which canny is the best. Then the numbers of white and black pixels are counted at a particular area and are compared with the reference values and then the note is identified. One more parameter is been added that the image of entire note will be taken and depending on it the user has the option of selecting number of coins of Re.1, Rs.2 and Rs.5 coins he wants.

#### 2. Coin Dispatching:

As the Matlab identifies the currency note it assigns a variable the value of the note. The user inputs the number of coins he wants. The total amount of change is compared with the currency value and if its proper the signal is sent to the microcontroller on the serial port. There is one motor for each set of coins. According to user selected number of coins the respective motor rotates for a fixed duration to dispatch a single coin. Thus for N number of coins the motor is rotated for N times for the duration fixed.

### IV. OPERATION

Initially the image of the currency note is taken by the webcam and a delay is been set to adjust the note and to capture the image, then with the help of MATLAB code the luminance (Y) and chrominance (Cb & Cr) of the image is taken and with the help of ycbcr2rgb which converts the ycbcr values in color map to RGB color space and equivalent true color image RGB. The image is then converted into grayscale and the image is converted to binary image using region of interest by passing a particular range of grayscale values. So by doing this we get the length of note as all the pixels along the length are 1. The entire picture of the note is taken and based on different parameters the note is being identified and it shows whether a 10 rupees note is detected or 20 rupees if any other note then it shows error, after the identification of the currency note an option is being set that how many number or 2 rupee or 5 rupee coins are needed and depending on it coins are dispatched.

V. APPLICATIONS

1. Railway Stations where people need change for the tickets.
2. Bus station.
3. Parks.
4. Temples.
5. Retail stores.



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VI. FUTURE MODIFICATIONS

1. In the future we can extend note and coin capacity up to 100 rupee notes.
2. Add feature of calling so no need to refill the coins constantly.
3. Record the events taking place (CCTV).
4. GSM security.



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VII. CONCLUSION

The proposed system will be useful in day to day life of every common man where people have to suffer for change at many public places. As mentioned in the applications this project is a real time application which is much lighter, portable, low power, faster and with security. The system can be easily equipped to identify foreign currency. We tend to make it available at as many places as possible and people do not have to worry about carrying coins.

REFERENCES

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Project Guide :

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