Review on Automatic Note to Coin Exchanger

V. G. Wadikar[1], I. A. Joshi[2], Prof. A. R. Suryawanshi[3]

[1, 2, 3] Department of Electronics & Telecommunication
[1, 2, 3] Pimpri Chinchwad Collage of Engineering, Pune, India.

Abstract- *This paper proposes an easy system for Note to Coin Exchanger based on Microcontroller. The paper is the review of the papers published under title of 'Note to Coin Exchanger". Through this we are going to propose a system which will be combination of the systems proposed by different authors from all over the world. Also, this will give the proper idea for reducing or completely overcoming all the shortcomings of the proposed systems. The emerging scenarios made us to rethink a lot for the availabilities of coins at various public places (when we are out for buying some stuffs) in daily life. The need of coins has been increased. Rather coins are used more instead of note in various places like bus station, railway station, malls, parks, Telephone Booth (mostly). So we thought to develop an exchanger machine which will give us coins in exchange of notes.*

Keywords- Coin Dispenser, Coin Exchanger, Currency Exchange, Note to Coin, Review of Note to Coin

I. INTRODUCTION

Now days, we have to suffer a lot for the change in various public places in daily life. The need of change has been increased. Rather coins are used more instead of note in various places like bus station, railway station, malls, parks, even in rural areas where nowadays also coin telephone system is used. The coin vending machine used at the Madurai railway station has eased the pressure of coin shortage on passengers as well as railway staff The machine put up by KarurVysya Bank, near the unreserved ticketing counter has been useful in ensuring a continuous supply of coins. The vending machine spews coins in the denominations of Rs. 5, Rs. 2 and Re 1 when currency notes are inserted. Passengers who are short of coins are advised by the counter staff to get coins from the vending machines. The vending machine functions between 8 a.m. and 8 p.m. Coin Vending Machine's which is also known as Cash and Check Deposit Machine, these are automatic machines that dispense coins against receipt of bank notes. The offered vending machines are widely used for exchange of bank notes to coins by customers. Owing to the attributes such as low maintenance cost, excellent performance and longer service life, these vending machines are widely appreciated in this highly competitive market.

II. LITERATURE REVIEW

The literature review of this paper is performed through various international papers mentioned inside the table below:

Table 1. Literature Review

Title of the Paper	Methodology Used	Conclusion Drawn
Note to Coin Exchanger	Image Processing using MATLAB & PIC16Fxx uC Control.	Automatic system for 10Rs, 20Rs notes to 1Rs & 5Rs coin exchanger.
Note to Coin Exchanger using Image Processing	Image processing using MATLAB & PIC16Fxx uC control.	Automatic system for 10Rs, 20Rs note to 1Rs, 2Rs & 5Rs coin exchanger in combination.
Intelligent Note to Coin Exchanger with Fake Note Detection.	Image processing using MATLAB & Microcontroller control.	Automatic system for note to coin exchanger for 10 & 20 □. Notes only using solar energy.
Robust & Effective Coin Exchanger system with Fake Note Detector	Image processing using MATLAB & ATMEGA32 uC control.	Automatic system for note to coin exchanger for 10 & 20 □. Notes only.
Note to Coin Exchanger using Image Processing	Image Processing using MATLAB	Interactive system for currency recognition & exchange.

In [1], the basic idea of developing a machine to exchange currency coins instead of notes is very adaptive in

implementation. It's a fully automated system to accept 10Rs or 20Rs note and dispense 1Rs & 5Rs coin respectively. This system can be placed at railway stations, bus stations, malls and parks, etc.

Further it may be developed to exchange 1000Rs, 500Rs notes with various Indian currency coins, such as 10Rs coins which will be available henceforth. Simultaneously, fake note identification will be easily known to all.

In [2], it is an interactive system that generates currency recognition system using localization and color recognition with the help of MATLAB. This system is also interfaced with the Machine having webcam and UV light system to detect metal strip in the note. It dispenses the coin with the help of PIC16F877A microcontroller. This technique is very adaptive to implement in real time world. Not only in banks, could such type of appliances also be used in shops or some other places. It will be quite beneficial for the person to check their banknotes and avoid to being fool.

In [3] the proposed system is an interactive system which is fully automated and robust. This unit saves a lot of manual labor and time as compared to manual ticketing system in present scenario. The unit designed is highly sustainable, as it uses solar energy as a form of power source. This makes the system cost effective by incorporated high electricity bills.The system authenticates the currency using localization and colour recognition techniques with the help of MATLAB which are simple to implement. This method of currency recognition will certainly help to identify different denomination of paper currency. This method can be used for counting of different denomination of note bunch. System can be implemented as a unit where purpose of self-ticketing and dealing with small return cash back in form of coins can be done

In [4], the controller used is ATmega32A controller; it has High Endurance Non-volatile Memory segments. The ATmega32A is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32A achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.The main function or task of this controller is to control the action of each and every block. It checks whether the note is inserted or note, it also controls the coin dispenser unit. According to the indication from MATLAB it will display the respective notification. Controller performs some mathematical operation in order to check the amount inserted by user in terms of coin is exactly matched with the amount of note or not. All the DC motors used for different purposes are controlled by this unit only.

In [5] Coin Recognition and Coin Detection was handful used interactive system for currency recognition & exchange. A coin verification technique was achieved and resultant system was highly efficient and sustainable system using localization and colour recognition with the help of MATLAB. 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 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 passengers. In the future we can extend note and coin capacity up to 100Rs notes and can make provision for the system to recognize the difference between 1Rs and 2Rs coin. This will make the system equipped with 2Rs coin.

III. PROPOSED IDEA FOR NOTE TO COIN EXCHANGE

A. Block Diagram:

The system uses microcontroller with mechanical structure which have motors to perform requested tasks. Here the machine accepts note and checks whether a note is fake or real. If a note is real, camera takes picture of note and with help of computer having MATLAB program checks which note it is (Rs 10 or Rs 20). Once the note is recognized coins will be dispensed by coin dispensing unit.

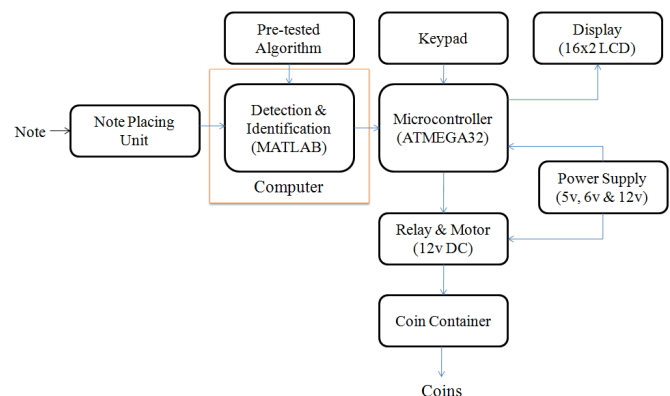The proposed Block Diagram is as shown in following Figure:

Figure 1. Block Diagram

- **Block Diagram Explanation:**

1)   Note Placing Unit

This unit consists of Drawer to place a note Coin stack to store coin inside a machine Motor driver board. Two motors for coin dispensing of Rs1and Rs5. Controller checks coin counter which indicates coin sufficiency. If coins are sufficient then motor rotates as per choice entered which dispenses the coins. After dispensing of coins motor will actuate to drop the note inside the machine.

2)   Fake Note Detection Unit

The Indian currency note absorbs the UV light and a fake note reflects the UV light. Fake note detection unit consist of UV LED, photodiode, amplifier and comparator. The UV LED source transmits the UV rays, if the note is real it will absorb some amount of UV rays and if the note is fake then the all rays will be reflected back towards the photodiode. This output of the UV Photodiode is given to amplifier. This output is amplified and then given to comparator. Threshold voltage is applied to comparator. According to threshold voltage output of the comparator is then given to the microcontroller for further processing. The image processing is also one of the methods for fake note detection.

3)   Image Processing for Fake Note Detection

The colour image captured by camera is in RGB format. It represents an image with three matrices of sizes matching the image format. Each matrix corresponds to one of the colors red, green or blue and gives an instruction of how much of each of these colors a certain pixel should use. The importance of RGB as a color model is that it relates veryclosely to the way we perceive color with the r g b receptors in our retinas. Colour may be specified by the three quantities hue, saturation and intensity. This is the HSI model, and the entire space of colors.

The S-plane is a extracted Saturation plane from the HSI image generated with the help of MATLAB. S-plane indicates saturation levels in the image.The Final part of the code is for detection of the note in MATLAB. It compares the threshold values generated with the help of MATLAB and detect the value of the image. Also, detects the note parameters like Watermark image of Mahatma Gandhi and pattern on note for fake note detection".

4)   Microcontroller Setup

The microcontroller setup contains Microcontroller connected with LCD, Keypad and Motor through Motor Driver. The power is supplied with the help of DC power supply to both microcontroller and motor.

The microcontroller receives the signal from the note detection unit. It checks that signal and perform the coded functions depending on the signal.

- **Procedure of Exchange**

5)   Accepting Note

Accepting the currency note by the MATLAB is first part of this system. Since, MATLAB supports verities of image formats like .jpeg, .jpg, .png, .bmp, .tif, .gif, etc. We have to specify the format of image to be taken before use of the code. As even if every format represents image, but properties stored are different from each other. So, we have to restrict the MATLAB code for some specified formats and then proceed for further algorithm.

6)   Detection of Note

The detection involves detection of value of note, that is selected note is of 10Rs or 20Rs and fake note detection. For both we have to extract specific features of the note. This can be achieved by converting RGB to HIS and processing on S-Plane only. The detailed process will be explained in working section.

7)   Communication with Microcontroller

After identifying the note, we have to send the information to the Microcontroller. This is achieving with the help of RS232 Protocol using DB9 cable. We have achieved this by using MAX232 IC which enables the Microcontroller to Communicate.

8)   Dispense Coins

The Final part is dispensing of coins according to the input received from MATLAB through DB9 and user through push-button keys. When input is received the microcontroller will send a high signal to the normally open (NO) of the relay. This will establish the connection of the supply power with servo motor for dispensing coin. Servo motor is used for controlled motion of the dispense shaft.

IV. CONCLUSION

The above system will be very beneficial in public areas where there is a requirement of change i.e. coins for e.g. in railway stations where change is required for platform tickets, by local tea vendors etc. The system is useful in checking whether the note is real or fake with less hardware.

V. ACKNOWLEDGMENT

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