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# NOTE TO COIN EXCHANGER WITH FAKE NOTE DETECTION

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**ABSTRACT**

*Requirement of coins in a day to day transaction at places like bus station, railway station, mall and park is the main motive of designing an efficient and simple machine which will fulfil need of coins for transactions so that people will not face problem of coins. This project will provide coins for note, for this purpose we have developed mechanical coin dispensing model which takes the note inside and checks whether note is fake or real, if note is real camera takes picture of it. After that it will find out its value using image processing technique and then according to the value equivalent number of coins are dispensed. In this way we are trying to design an efficient machine which will be having low production cost as compared to other existing machines. In this project we have developed a MATLAB algorithm for detect the value of note. And we have implemented a fake note detection unit using UV LED and photodiode.*

***Keywords:*** ***ATMEGA-16, DC Motor, MATLAB, MOC, UV LED.***

## I. INTRODUCTION

In our day-to-day life we come across with problem of not getting change in various public places. The importance of coin today is more in fact coins are valued more in places such as bus stations, malls, railway stations, even in rural areas. Now a days also coin telephone systems are used. For this many application coins are widely used, so proposed system can help in solving these problems.

In this system, 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,colour based recognition technique. The most preferable technique along all these is colour based recognition.

For detecting kind of note the MATLAB 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, two rupee coins or five rupee or mixed and hence in the output we get coins as user requirement.

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## II. LITERATURE REVIEW

Euisun Choi, Jongseok Lee and Joonhyun Yoon, have discussed about an approach to feature extraction for bank note classification by exploiting the potential of wavelet transform. In the proposed method, high spatial frequency coefficients taken from the wavelet domain are examined to extract features.[1]

Parminder Singh Reel, GopalKrishan, SmartiKotwal, have discussed about the successful approach for currency recognition depends upon feature extraction of that currency image. Also represents the heuristic analysis of characters and digits of serial number of Indian currency notes to recognition of currency notes. To recognize a character from a given currency image, there is a need to extract feature descriptors of such image. [2]

F. M. Hasanuzzaman, X. Yang, and Y. L. Tian, have developed a novel camera-based computer vision technology to automatically recognize banknotes to assist visually impaired people. To make the system robust to a variety of conditions including occlusion, rotation, scaling, cluttered background, illumination change, viewpoint variation, and worn or wrinkled bills. We propose a component-based framework by using speeded up robust features (SURF). [3]

Amol A. Shirsath, S. D. Bharkad, have discussed about the review of paper currency recognition system. It is applied in various field such as foreign exchange, automatic selling of things and in banks. The image of interest is first pre-processed by reducing dimensionality and extracting the feature by applying image processing toolbox of MATLAB, known as feature extraction. Recognition ability depends on the currency note characteristics of particular country and extraction of features. [4]

Ms.Rumi Ghosh, MrRakeshKhare, have discussed about the expansion of modern banking services, automatic schemes for paper currency recognition are significant in many applications. Automated paper currency recognition system can be a very good utility in banking systems and other field of commerce. Since many years counterfeiting of paper currency challenges the financial system of every country in different sectors, India is also one of them. In this article, various methods for the recognition of paper currency is described [5]

## III.OBJECTIVE

The objectives of proposed work are as follows:

1. To develop an efficient and intelligent note to coin exchanger with fake note detection system.
2. To identify whether the note is fake or real
3. To provide coins for 10 or 20 rupees note.
4. To develop a MATLAB algorithm for detection of note.
5. To design mechanical assembly which will give coin instead of note as per value of inserted note.

### 3.1 Methodology

Presently, as there are lots of techniques to detect the Indian currency note. Scale-invariant feature transform (or SIFT) is an algorithm in computer vision to detect and describe, local features in images. So instead of using above techniques we are going to design a machine to detect if the note is fake or not. Detection is done by using the UV rays .Along with checking the reality of note it gives its coin equivalent. This project will provide coins for note, for this purpose we have developed mechanical coin dispensing model which takes the note

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inside and checks whether note is fake or real, if note is real camera takes picture of it. After that it will find out its value using image processing technique and then according to the value equivalent number of coins are dispensed. In this way we are trying to design an efficient machine which will be having low production cost as compared to other existing machines. In this project we have developed a MATLAB algorithm for detect the value of note. And we have implemented a fake note detection unit using UV LED and photodiode.

## IV.WORKING

### *A. Fake note detection*

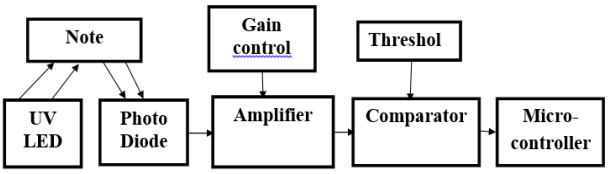


**Figure 1: Block Diagram of fake note detection**

The specialty of Indian currency note is that it absorbs the UV light and a fake note reflects the UV light. Fake note detection unit (Figure.1) 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.

### *B. block diagram*

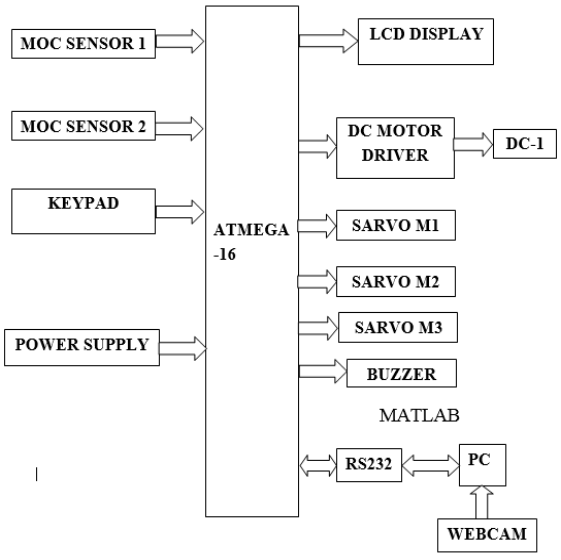


**Figure 2: block diagram**

**Block Diagram Description**:

In figure 2 consists the following point

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The circuit uses microcontroller (AT MEGA16) with mechanical structure which have motors to perform requested tasks.

Note placing unit:

MOC sensors will accept note from the user. It consists mechanical Design of relays to take the respective note from the user. It takes 12v to drive the DC motor of 10RPM. There will be relays and DC motors at the user side to take the note inside the machine. This information is sent to the microcontroller for further processing.

Signal conditioning:

To identify whether the note is fake or real. The specialty of a currency note is that it absorbs the UV light and a fake note reflects the UV light. This work is done by the UV LED transmitter and UV receiver or detector. The UV LED source transmits the UV rays. If the note is real it will absorb the UV rays. If the note is fake then the rays will be reflected towards the receiver or the detector. This output is amplified and then given to the single supply comparator. The output of the comparator is then given to the micro-controller for further processing.

Controller AT MEGA 16**:**

The work of controller is 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 knows that now it has to generate coins in the multiples of 1, 2, and 5 or mix coins.

Coin container**:**

This unit consists of 2 DC MOTOR DRIVER. In case of mix coins, the controller will check for availability of coins in the coin container and then as per the wants of the user from the keypad, the mix coins will be let out to the user. If the coins as per the need of the user are not present in the coin container then a message will be displayed on the LCD "INSUFFICIENT COINS".

Buzzer:

Buzzers are used in a system to indicate or to grab the attention regarding an emergency situation occurred. Buzzer act as a panic horn which indicates the need of instant attention as the condition goes haywire.

Camera:

The Rs232 standard is used to interface the computer with the microcontroller. The computer is connected by the web camera for recognition. The MATLAB software window is used.

DC Motor:

DC motors are used to physically drive the application as per the requirement provided in software. The dc motor works on 12v. To drive a dc motor, we need a dc motor driver called L293D. This dc motor driver is capable of driving 2 dc motors at a time. In order to protect the dc motor from a back EMF generated by the dc motor while changing the direction of rotation, the dc motor driver have an internal protection suit. We can also provide the back EMF protection suit by connecting 4 diode configuration across each dc motor.

Keypad:

Keypad is basically used to provide the input to the microcontroller. The keypad consists of micro switches which are connected to the microcontroller.

Liquid Crystal Display**:**

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LCD is used in a project to visualize the output of the application. We have used 16x2 LCD which indicates 16 columns and 2 rows. So, we can write 16 characters in each line. So, total 32 characters we can display on 16x2 LCD.

LCD can also use in a project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to see the output and to debug the system module wise in case of system failure in order to rectify the problem.

SERVO MOTOR**:**

We use 3 servo motor in this project. Servo can rotate approximately 180 degrees (90 in each direction) and works just like the standard kinds but smaller. This is used for the coin dispatching unit.

MATLAB Processing**:**

Scale-invariant feature transform (SIFT) is an algorithm in computer vision to detect and describe local features in images. Application include object recognition, robotic mapping and navigation, image stitching, modelling. Video tracking, individual identification of wildlife and match moving.

Keypoint Matching

Keypoints between two images are matched by identifying their nearest neighbors. But in some cases, the second closest-match may be very near to the first. It may happen due to noise or some other reasons. In that case, ratio of closest-distance to second-closest distance is taken.

## V.CONCLUSION

We are develop an interactive system that generates currency recognition system using image processing 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 an real time application for all real time places.

## VII.FUTURE SCOPE

1. In future we can extend note and coin capacity up to 100 rupee notes.
2. In future we can develop note to note exchanger e.g. 50, 100, 500, 1000 rupee notes.

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