

# CURRENCY DETECTION AND CONVERSION USING IMAGE PROCESSING

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**Abstract :** Fake Currency has always been an issue which has created a lot of problems in the world. The increasing technological advancements have made the possibility for creating more fake currency which are circulated in the market which reduces the overall economy of the country. This proposed system uses Image Processing to detect whether the currency is genuine or fake. The system is designed completely using MATLAB programming language. This system is consisting of PIC microcontroller 16F877A, IR sensors to detect whether the note reaches at Webcam, DC motors, etc. This system gives an approach to verify the Indian currency notes.

**keywords :** fake currency, PIC microcontroller 16F877A, IR sensors, DC motors, Image processing, Indian currency, MATLAB programming

## I. INTRODUCTION

In most cases, people has no information about currency and their exchange to same or any other currency. This paper presents Currency detection and conversion system using Image Processing. The system work with Real time Currency detection and conversion with the help of MATLAB and Image Processing. Using UV rays, Sensors and previously stored authenticate data, currency is detected and converted. The most used technique among all these is colour based recognition. That is constructed by counting the number of pixels of each colour. For detecting kind of note the MATLAB algorithm runs and the result is given to the controller which will manipulate the note container through relays and motors.

## II. LITERATURE REVIEW

We have studied some research papers to implement our system. This section narrates the highlighted research papers, there outputs and methods they used.

Kalpna Gautam at al.[1] The fake currency detecting is a big problem for the world. The main purpose behind this study is to distinguish Indian paper currency with this hybrid approach which is portable and making an application used on the go. I have used the MATLAB image processing toolbox. Currency recognition has big challenges like watermark detection, currency note declaration, dirty notes etc.

ShilpaSonawane at al.[2] As increase in the technology like scanning, duplicating and colour printing and because of that there is increase in counterfeit problem. This paper develops a technique for fuel automation using currency recognition. This is based on fake currency note detection technique using feature extraction with HSV (Hue, Saturation, and Value) colour space.

Priyanka Dhapare at al.[3] The growth in the number of fake notes in the system has been tremendous nowadays. The counterfeiters have keep developing new ways to get close to the real paper currency as possible. To overcome this issue, various researchers have tried to come up with different techniques to detect fake notes. In this paper, we will try to understand some techniques that are based on image processing and perform a comparative study of that techniques.

Muhammad Sarfraz at al. [4] PCR that is Paper currency recognition, is an important area of pattern recognition. A system for the detection of paper currency is one of intelligent system which is a very important need of the current automation systems in the modern world of today. A method of detection of paper currencies has been introduced. The proposed system is fully automatic and requires no human intervention. The proposed technique produces somewhat satisfactory results in terms of recognition and efficiency.

Shaimaa H. Shaker at al. [5] The currency has a great importance in everyday life. Thus currency recognition has gained a great interest for many researchers. The researchers have suggested various approaches to improve currency recognition. This paper introduces some related works of paper-currency recognition. This paper has explained a various types of different currency recognition systems. Choosing the proper feature would improve overall system performance.

Deepak M. P at al.[6] The identification of the monetary standards and the conversion mechanism is implemented in order to decrease the human power to perceive the measure of the currency's currency value and to convert it to other standards without human supervision. Habitually, bank notes are either blurred or damaged; many have complicated recommendation to increase security. The fundamental requirement for an algorithm that can be considered as practicable are simplicity, less complexity, high speed and efficiency.

Vidhi Roy et al [7] Fake Currency has always been an issue which has created many problems in the market. There are machines present at banks and other commercial areas to check the accuracy of the currencies. But a common man does not have access to such systems and hence a need for a software to detect fake currency arises, which can be used by common people. This system uses Image Processing to detect whether the currency is genuine or counterfeit. The system is designed completely using Python programming language.

### III. Block Diagram

#### 1.1 Block diagram of system

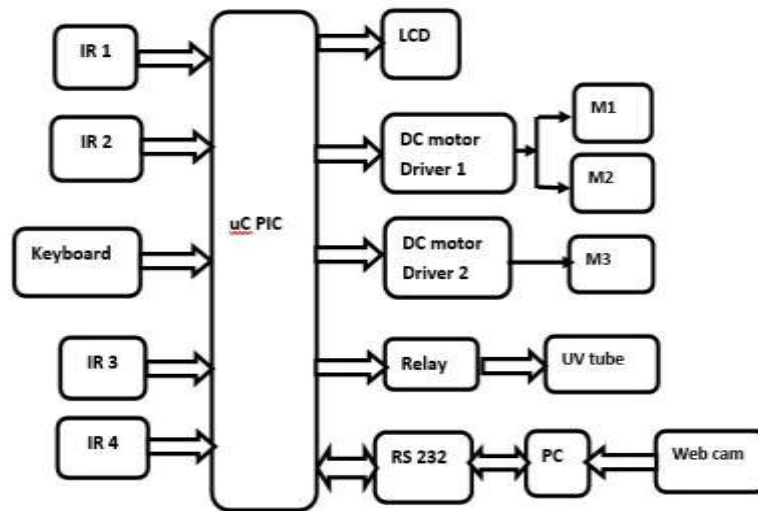


Figure 1.1 Block Diagram of system

#### 1.2 Output Flowchart of Image Processing

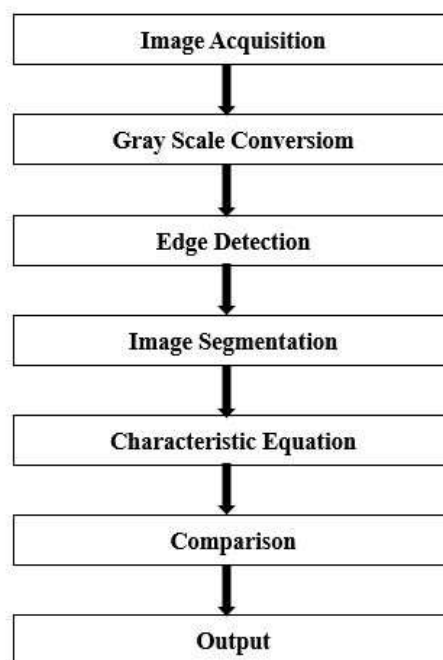


Figure 1.2 Image Processing Operation Flowchart

### IV. Hardware Components

#### 1.1 ULTRAVIOLET TUBE

The Money Detector is just a UV light source. Most of the mission responsive monetary documents are printed with special fluorescent ink which is invisible in normal light but glows or become thick under UV light. In some cases the UV Ink changes colour under UV or Black Light. Normal paper reflects black light and become bright, while cotton based paper absorbs black light.

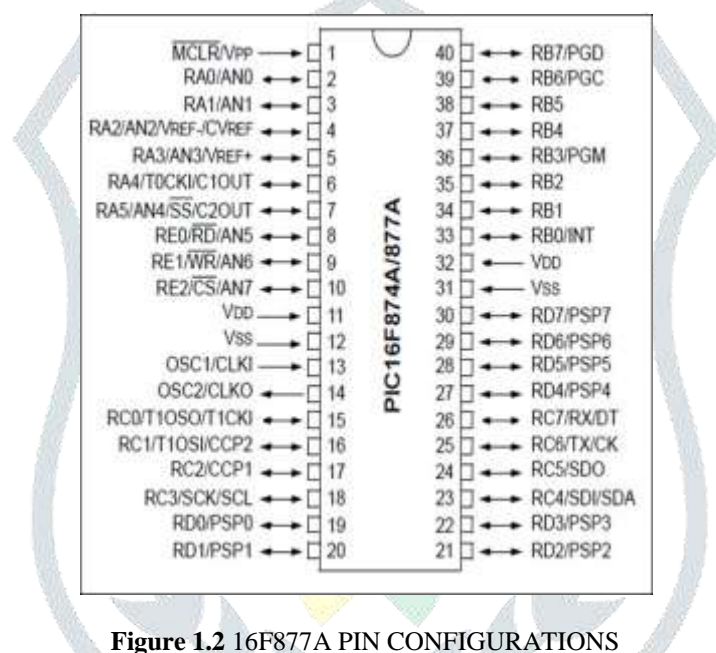
Most of the documents are made with cotton based paper and hence can be easily identified in Black Light. Some of the documents are scanned by technique Magic Tech.



**Figure 1.1** Ultraviolet Tube

## 1.2 PIC MICROCONTROLLER-16F877A

We are using microcontroller-16F877A in our project to run the system. This microcontroller is 8 bit PIC microcontroller having 40 pins and has 5 ports. We need to place crystal oscillator ranging from 4MHz to 40MHz to turn ON this microcontroller. It runs on 5V of input voltage.



**Figure 1.2** 16F877A PIN CONFIGURATIONS

## 1.3 IR SENSOR

To sense the notes we require IR sensor which can sense the incoming notes from user or machine and tell it to microcontroller and computer.



**Figure 1.3**IR Sensor

## V. Proposed Methodology

The Fig. 1.1above shows the block diagram of the system. It consist of PIC Microcontroller, DC motors, IR sensors, Ultra-violate tube, LCD, Web camera, etc.

### 1. Note Placing Unit.

It has accepted note from the user. It consist of mechanical Design of relays to take the respective note from the user. It take 12v to drive the DC motor of 10RPM. There is 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 is cut roller started and take in note and stopped when second sensor is cut. This information send to the microcontroller for further processing. If note is fake motor rotated in opposite direction which give out the note.

## 2. Image Processing Using MATLAB

### a) Currency Note Localization

A UV light source is used to highlight metallic elements in note and webcam is used to take picture of note. The image obtained from the camera can not be directly used it requires to enhancement. It involves applying some procedures like Contrast Enhancement, Normalization and Noise Reduction. Next we need to subtract background from the image then converted it from RGB to gray. After this change of the image, we notice the edges present in the image using some edge detection techniques present in the Image Processing MATLAB. Can any operator is selected in our technique to detect the edges prominent in the note. Currency notes localization is then done by scan line algorithm on the image after edge detection. While the image is scanned from left to right line by line, the number of pixels present in each line is counted. The line set threshold is highlighted (marked) when the line that contained the number of pixels is greater. Likewise is applied from top to bottom.

### b) Fake Note Detection

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

### c) Note Value reorganization Unit

Image processing technique is a huge in this there are many techniques to detect a note, these are pattern based, texture based, checking the micro lettering, checking by the watermarking, color based identification technique. The most used technique along all is color based identification. It is constructed by calculating the number of pixels of each color. Histogram described the global color distribution in an image. In this way we can determine the notes by placing in this system.

#### Advantages:-

1. Simplicity.
2. Provide cheaper and accurate system to the user which can easily accessible and give accurate recognition of currency notes.
3. The system average accuracy is about 90%.
4. At all the Transport systems it may be National Or International Transport like Railway Station, Bus Station.
5. It can be applicable to every economy level.

## V. Conclusion and Future Scope

Paper currencies are used much more in India and hence a system to detect the fake currency is needed. As the new currencies are used in the market, the proposed system seems to be useful to detect the currency to be genuine or not. This system compares more features for feature extraction than other proposed systems. It also provides the exchange of Indian currency into Indian currency.

This system can be further implemented for foreign currencies like Dollars, Euros, Taka, etc. as a future scope. It can also provide an exchange of foreign currency into Indian currency or vice versa.

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