Counterfeit Bank Note Detecting System

Dr. K. Umapathy, V. Sai Swaroop, P. Viswam, T. Bala Swami Sairaja

Abstract: In our day to day life internet has become a part of our time. People easily can access and accomplish their tasks using the internet. Using the concept of Internet Of Things, we can control and monitor our activities and we can able to take necessary actions if we needed. This paper clearly explains about the counterfeit bank currency detection system which provides the accurate difference between true and fake notes. This system is easily accessible and economical friendly.

Index Terms: Enlightened, Raspberry pi, Small vendor’s application, Smart-programmed, Internet of things

1 INTRODUCTION
Nowadays Banking sector has experienced a major issue on ‘Counterfeit Notes’, which gives loss to the particular economy of the country. With minimum human work Internet of Things become more smart day by day with the help of smart systems and smart programs, digital systems completely boosted up the usage internet for people’s activities through which we can be easily accessed to a scheduled activity. Continuous scanning of the matrix of an image i.e. a note or paper and feeding is pictorial properties is called “Image Detection”. In Image detection, Internet of things collect the data of the scanned note and compares it with a pre-programmed data. If, the matching is above the prescribed percentage the bank note is original. Else, the note is counterfeit. Hence, a counterfeit bank note can be detected

2 LITERATURE SURVEY
This paper [1] signifies the color recognition of a note using matrix properties of an image. This paper [2] briefly explains about image black and white comparison and image pigment comparison also, describes about the resolution of the scanned images. It uses advanced techniques like camera, detection streams etc. and also real-time comparing technology. Observing the real images comparing to saved one explores the changes in pigment, orientation of pixels etc. Here image processing technology we are about to compare the picture in 3 modes including negative mode, sepia mode. Scanning also depends on the pixels of recognizing camera. “Feature point extraction algorithm” from matlab mathworks which helps in maximum resolution detection, i.e. in matlab the matrix formation and processing speed is very high, here the image is reversed and compared in inversion mode. Hardware support package in matlab describes the package installation matlab.

Fig 1. Proposed System

When an image is detected through camera module, the recognition, happens and the image is processed for further checking the system checks with the pre-loaded image, if there’s a matching between the images as per the prescribed matrices of the image and therefore the note is original, when the processing unit observes any difference between the scanned one and saved one, then the note is a fake one, then an alert is made to a buzzer or LCD screen. So an immediate alert is made that the counterfeit currency is detected at the particular instant

Fig 2. Structure of Detecting Application
Raspberry pi is a cheaper debit card sized computer. The Raspberry pi utilizes the architecture of an RISC Machine processor. It is more used in mini computer applications like, detection, controlling and surveillance.

Fig 3. Raspberry Pi

Fig 4. Camera module

<table>
<thead>
<tr>
<th>PIN Model B</th>
<th>PIN Model B+</th>
<th>PIN Model B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Broadcom BCM2837/1/2, Quad-core Cortex-A72 1.2GHz</td>
<td>Broadcom BCM2837/1/2, Quad-core Cortex-A72 1.2GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>1GB UDOO 2GBAM</td>
<td>2GB UDOO 2GBAM</td>
</tr>
<tr>
<td>Connectivity</td>
<td>2.4GHz 802.11 b/g/n wireless, Ethernet 1.0, Bluetooth 4.1, BLE</td>
<td>2.4GHz 802.11 b/g/n wireless, Ethernet 1.0, Bluetooth 4.1, BLE</td>
</tr>
<tr>
<td>Access</td>
<td>Extended 40-pin GPIO header</td>
<td>Extended 40-pin GPIO header</td>
</tr>
<tr>
<td>Video &amp; Sound</td>
<td>1 x Full HDMI, 1 x HMD, 2 x 3.5mm Audio jack, 3.5mm Audio jack, 4 x headphones output and composite video input</td>
<td>1 x Full HDMI, 1 x HMD, 2 x 3.5mm Audio jack, 3.5mm Audio jack, 4 x headphones output and composite video input</td>
</tr>
<tr>
<td>Multimedia</td>
<td>H.264, M4V, 64-bit decode, 1080p, 1920x1080, OpenGFX</td>
<td>H.264, M4V, 64-bit decode, 1080p, 1920x1080, OpenGFX</td>
</tr>
<tr>
<td>SD card support</td>
<td>Micro SD format for loading OS &amp; data storage</td>
<td>Micro SD format for loading OS &amp; data storage</td>
</tr>
<tr>
<td>Input Power</td>
<td>5V/2.5A DC via micro USB connector, 5V/1A DC via micro USB connector</td>
<td>5V/2.5A DC via micro USB connector, 5V/1A DC via micro USB connector</td>
</tr>
<tr>
<td>Camera specifications</td>
<td>Photo diode I/O</td>
<td>2.5 V</td>
</tr>
<tr>
<td>Power supply</td>
<td>A/D converter</td>
<td>1.5 V</td>
</tr>
<tr>
<td>Temperature ranges</td>
<td>Storage</td>
<td>-30 to 85 °C</td>
</tr>
<tr>
<td></td>
<td>Operational</td>
<td>-20 to 60 °C</td>
</tr>
<tr>
<td>Module size</td>
<td>6x6x4.5mm (WxDxH)</td>
<td>0.18 grams</td>
</tr>
</tbody>
</table>

1. Raspberry Pi 4 with Camera Module.
2. The lens which is Capable of recording 4K, 1080P, 720P, 8MP.
3. Active Pixel Count is 3280 (H) x 2464 (V).
4. Power Supply of 2A is Recommended.
5. Inputs must be designated to proper pins.
6. Proper code must be applied for better results.
7. Software installation is precise.
8. Python/matlab must be installed for proper detection.

Fig 5. Raspberry pi versions

Fig 6. Pin diagram of raspberry pi

Fig 7. Camera module datasheet
4 RESULTS AND IMPLEMENTATION
After the detection of note, the Raspberry pi fragments every pixel of the image into binary patterns and many number of matrices, these patterns are more spitted up and divided into pigments, and the image is compared in 3 modes, negative mode, sepia mode, and color detection. The process continues by extracting the image's pixel matrix to LBP result (local binary pattern) and then finally compared with the saved one.

![Fig 10. Attributes for a bank note](image)

Fig.10 gives the Attributes of a specific note and shows small identifications in a bank note. Fig.11 shows the module of the respective bank note and the Fig.12 shows the matlab processing of the bank note.

![Fig 11. Bank Note marks](image)

5 CONCLUSION
Thus, this paper is useful for small vendors and some banks in identification of counterfeit bank notes, It is Economically acceptable for most of International societies around the globe. In future this system may be overtaken, but the basic image processing techniques are same. Image process algorithms are applied to extract the options, for different modes of detection.

6 ACKNOWLEDGMENT
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7 REFERENCES
[6] Assistant Professor, Tadipatri Engineering College, Tadipatri, Anantapur, India