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Fake Currency Detection for Differently Abled People

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Abstract: ***For people with visual impairments, identifying various currency denominations and fake currency is difficult. Even though special symbols are engraved on various denominations in India, the process is time-consuming for people with disabilities. The need for a handheld device to distinguish between different denominations and detect counterfeit notes stemmed from the lack of identification and fake detection tools. In this project, the features of the images are compared to all of the currency reference images. If the difference is less than a certain threshold, the numeric portion of the currency is extracted and compared; if it matches, the matched currency denomination is recognized. The 50, 100, 500, 2000, 20, and 10 Indian currency denominations are accepted. Using raspberry pi, the proposed model will automatically identify counterfeit currency and denomination in this project. Basic image processing, template matching, aspect ratio identification, the dominant colour, and feature extraction are all used to distinguish between counterfeit and denomination. Finally, to turn English text into a six-digit braille code, we use solenoid-based valves that are controlled by a Raspberry Pi.***
Keywords: Visually impaired, Image processing techniques, Counterfeit notes, Raspberry Pi, Denomination recognition.

I. INTRODUCTION

The difficulties visually impaired people have in distinguishing cash denominations and counterfeit notes are the focus of our study. A portable device that makes use of image processing techniques and the Raspberry Pi microcontroller is our suggested solution. It contrasts credits of caught pictures and reference photos to decide whether the distinction falls under a limit, recovering the numeric part for distinguishing proof. We also use solenoid-based valves to convert text into Braille, making it more accessible. Fake cash subverts monetary soundness and trust, requiring comprehensive arrangements. Voice commands, large buttons, color-coded indicators, and compatibility with assistive technology are all features of our system. Carrying out a fake identification framework customized for people with incapacities advances financial security and fair admittance to data and innovation. It gives people the ability to protect themselves from financial crimes. Using image processing techniques and Raspberry Pi, our study aims to provide an accessible and comprehensive solution to the challenges that visually impaired people face in recognizing cash denominations and counterfeit notes.

II. LITERATURE SURVEY

First, a variety of project papers were gathered from a variety of sources, analysed, and their outcomes examined. The majority of the authors' contributions to this literature review, as well as some of their shortcomings, are discussed in the paragraphs that follow.[1]" Fake Currency Detection with Machine Learning Algorithm and Image Processing (IEEE) 2021" The only thing this paper has done to help people who are blind or deaf understand is how to find fake coins. They necessitate distinct mechanisms. This study demonstrates that a combination of photo processing, KNN, and machine learning can more accurately identify counterfeit cash.[2]" Review on Detection of Fake Currency using Image Processing Technique (IEEE) 2021" This paper discusses a number of approaches, but not their implementation. Our comprehension of a synopsis of several strategies and algorithms was aided by this study. However, the implementation of hardware is also not addressed in this work. Because we are aware that blind people are unable to fully utilize any modern equipment, the inclusion of hardware is the primary objective of our project.[3]" Detection of Counterfeit Currency using Image Processing techniques – 2019" The researchers in this study demonstrated a variety of approaches for locating a counterfeit letter. Ink fluidity, printing technique, thread quality, artwork, the RBI logo, ID, watermark, and see-through resistors are all ways to identify a fake note.[4]" Indian Currency Recognition for Blind People - 2020" This paper includes both image handling and equipment, and it uses animal power characterization to identify the value of the currency. This paper also includes algorithms for accelerated segment test.

A speech output indicating the note's value is also obtained.[5]" Arduino and Solenoid Valve-Based Text to Braille Converter - 2020" This paper shows how the equipment works and includes text about the Braille converter, which will be very helpful to people who are blind. A visually impaired individual will actually want to become familiar with the genuine worth and text of a note by contacting the six solenoid valves.

III. PROPOSED METHODOLOGY

For people with disabilities, the goal of our project is to create a device that combines fake currency detection with text-to-braille conversion. The Raspberry Pi, which is responsible for processing tasks related to image processing, is the system's most important component. The currency is placed in front of a Raspberry Pi-connected web camera to begin the counterfeit detection process. The web camera that takes pictures of the currency is enabled and controlled by the Raspberry Pi. The Raspberry Pi then processes the captured image using Python-based algorithms and programs that are supported by the Raspberry Pi. The picture handling calculation includes a few stages, for example, pre-handling, picture limitation, highlight extraction, and layout coordinating, using both essential picture handling calculations like Beast Power Matcher and high level methods like Convolutional Brain Organizations. This handling empowers the Raspberry Pi to recognize the category of the money and distinguish fake notes.

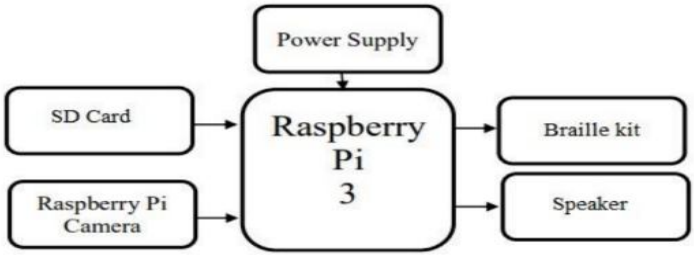

Fig1. Block diagram of a proposed system.

The output text is transcribed into Braille so that it can be read by people who are blind or visually impaired. The binary representation of the text is created by the Raspberry Pi after receiving the ASCII data. A 2x3 array of solenoids is then used to create the ASCII-compatible Braille symbols. A relay mechanism controls these solenoids. Each character is designed in the dab lattice, and the solenoids addressing the spots for that character are raised for a particular period, framing a planned grouping of Braille images. The Raspberry Pi is powered by the USB port, whereas the relay mechanism is powered by external DC sources. Digital I/O pins on the Raspberry Pi are used to send control signals to the relays, which act as NOT gates between the power supply and the solenoids. The converted Braille characters can be displayed on a Braille cell thanks to this arrangement. At the point when message or mathematical info is given, it communicates with the Raspberry Pi, and the relating information is shown on the Braille cell. In conclusion, use of the Raspberry Pi as the central processor for both text-to-braille conversion and the detection of counterfeit currency. We hope to offer a practical solution that enables people with disabilities to identify counterfeit currency and gain access to textual information through tactile feedback by combining image processing algorithms with Braille output.

IV. WORKING

We took on a project to create a method for determining whether Indian paper currency is original. The Raspberry Pi 3 Model B, Raspberry Pi Camera, SD Card, speaker, Step Down Transformer, diodes, resistor-capacitor, and solenoid valves were all part of our hardware setup. We also made use of VNC Viewer for remote access, the Thonny IDE for Python development, and the Raspberry Pi OS.We gathered datasets of Indian currency containing genuine and counterfeit notes to train our detection algorithm. We implemented a Convolutional Neural Network (CNN) algorithm by utilizing Python and deep learning libraries like TensorFlow and PyTorch. Images of the currency were taken by the Raspberry Pi Camera and pre-processed for feature enhancement. The CNN calculation investigated the handled pictures to decide the realness. Vibrators that indicated originality and an audio output speaker provided output feedback. In a nutshell, the hardware setup for our project consisted of a Raspberry Pi 3 Model B, Raspberry Pi Camera, and various components. We used the Raspberry Pi operating system and Thonny IDE for Python improvement, and VNC Watcher for remote access. We confirmed the authenticity of Indian paper currency by employing a CNN algorithm that had been trained on datasets of genuine and counterfeit currency. The framework gave input through vibrators and a speaker, guaranteeing solid discovery and counteraction of fake dissemination.

V. RESULTS AND DISCUSSION

The currency depicted in the preceding illustration was captured by the camera on the Raspberry Pi. The system found that the note was both fake and original after completing all of the image processing steps, and the output shows that the note was both fake and original.

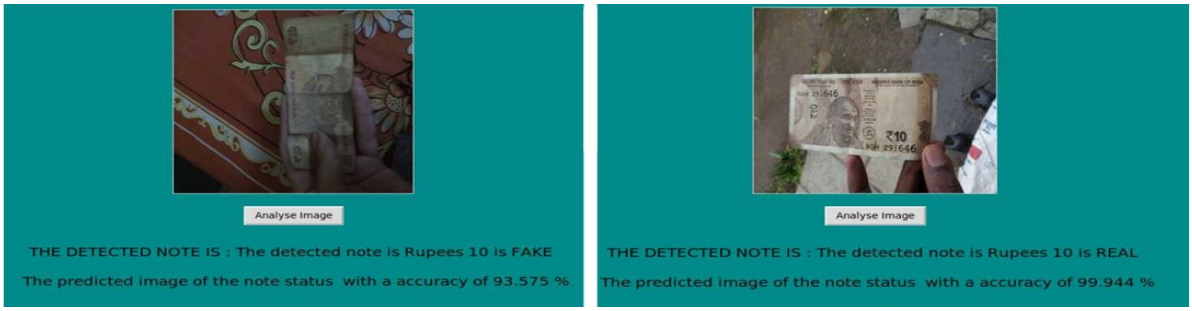

Fig2. Simulation output.

Fig3. Value of the currency detected.

Using the Raspberry Pi Camera, we were able to successfully obtain the output value of Indian currency notes by implementing the YOLOv algorithm. We were able to determine the denomination of the captured notes without having to manually do so because of this. An effective and dependable method for recognizing currency values was made available by integrating YOLOv with the Raspberry Pi.

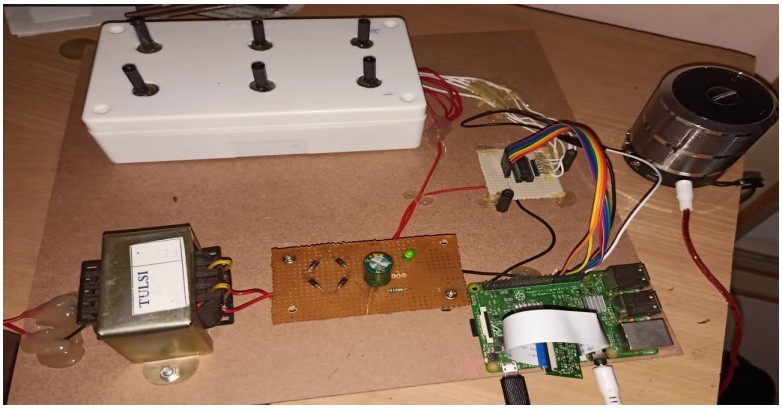

Fig4. Final Product.

Raspberry Pi B 3 as the essential picture handling unit. To take photos of the money notes, we utilized a pi camera that works with Raspberry Pi. The speaker system is where audio is sent out.

VI. CONCLUSIONS

All things considered, the endeavour on " Counterfeit Cash Identification for Distinctively Abled Individuals" signifies to encourage a complete and simple to utilize system that assists individuals with handicaps in perceiving counterfeit cash. By incorporating non-visual cues and accessible features like texture, weight, sound, voice commands, tactile inputs, or braille displays, the project aims to empower people with disabilities and provide them with equal access to financial transactions. Through extensive research, development, testing, and user feedback, the project aims to develop a reliable and practical solution that improves financial security and encourages independence for people with disabilities. By raising awareness of assistive technology and contributing to the field, the project hopes to improve the lives of people with disabilities and make a positive social impact. In general, the task has tremendous potential to advance financial inclusion and ensure that people with disabilities can confidently explore the field of cash transactions.

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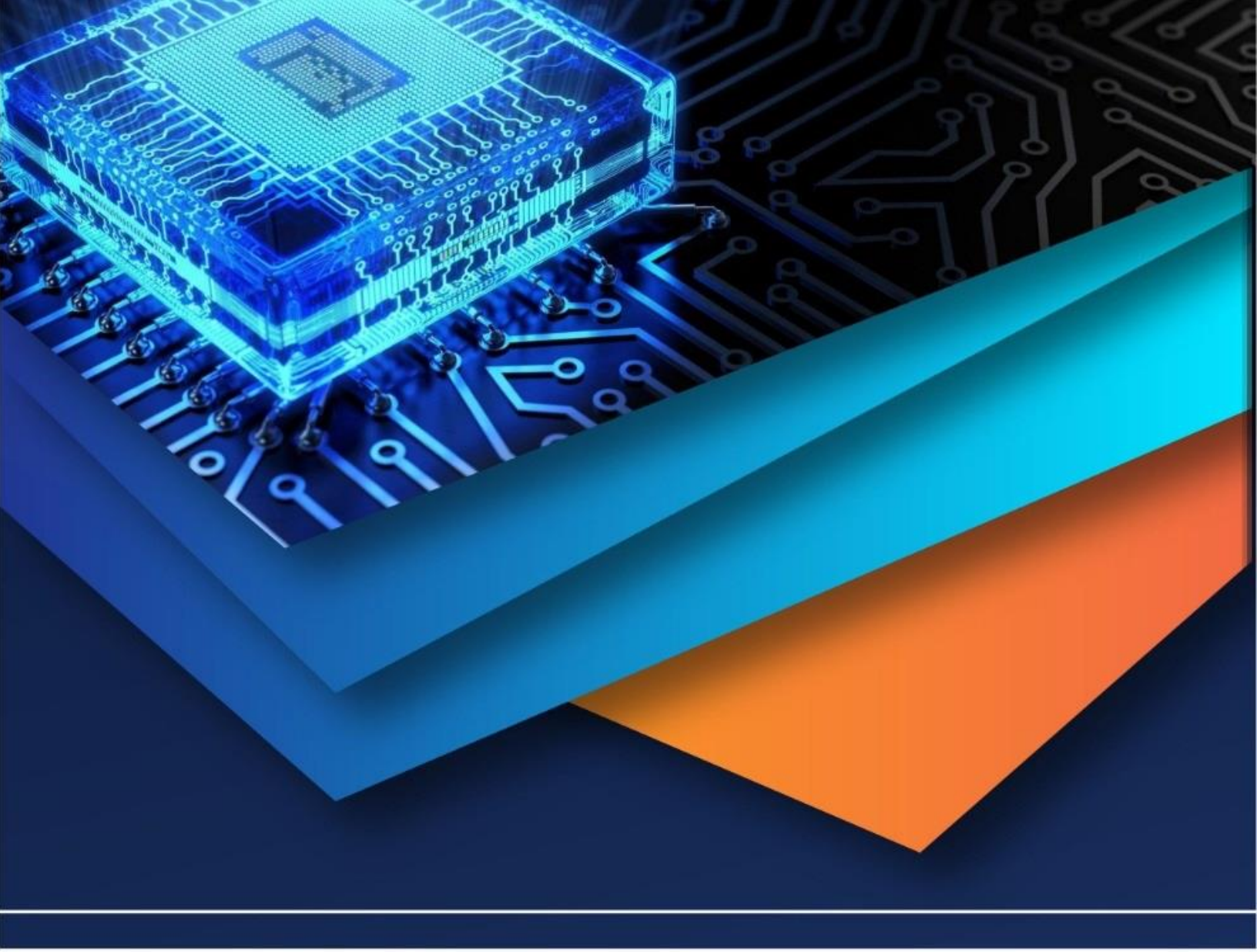

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