Global Scientific JOURNALS

GSJ: Volume 9, Issue 5, May 2021, Online: ISSN 2320-9186
www.globalscientificjournal.com

SIMULATION OF VISUAL PRODUCT IDENTIFICATION FOR THE BLIND

AKINRINLOLA IBITOYE AKINRINLOLA, ADELANWA SAHEED OLOLADE, AMUSU MARY

1.0 INTRODUCTION

Vision is one of the most important sense organ in the human body. Image plays a vital role in human perception of the surrounding environment. According to Supriya et al. (2018), 285 million people are predicted as visually impaired worldwide. From that 39 million people are blind and 246 million people are having low vision. Reading is one of the main problems faced by blind people. One of the problems faced by blind people is detection of obstacles while walking and finding product details while shopping. To assist the visually impaired people, IT industry has created a variety of computer vision products and services by developing electronic technologies for the blind in order to overcome their difficulties.

Mobile phones with cameras are the most popular combination for code reading, which has increased the commercial values to use camera phones. The ability to identify products such as groceries and other products is very useful for blind and visually impaired persons, for whom such identification information may be inaccessible. There is thus considerable interest among the virtually impaired. Systems based on video camera have evolved considerably, making new tools for visual substitution. One of the greatest difficulties for blind people is the identification of their environment and its components. Product identification with good efficiency is necessary for virtually impaired people. This report proposes the system which will give best results.

The World Health Organization (WHO) estimated that in 2002, 2.6% of the world's total population was visually impaired. Recently, several electronic applications have been developed visually impaired people. Different developing technologies that attempt to help visually impaired people in their daily lives are of more interest. However, it is shown that product identification is still the major difficulty for visually impaired people. Although there are many applications that can be used for this task, there are some limitations that require more improving. For this reason, this report provides an analysis and evaluation for the technologies that used in the object identification task. For the visually impaired the idea of substitution cane used. Converting the detected product information into speech makes it easier and friendly for the visually impaired person.

Today, there are already a few systems that have some promise for portable use, but they cannot handle conversion of scanned product and convert the details inform of sound. For example portable bar code readers designed to help blind people identify different

products in an extensive product database can enable users who are blind to access information about these products through Braille. Some reading-assistive systems such as pen scanners, might be employed in these and similar situations. Such systems integrate optical character recognition (OCR) software to offer the function of scanning and recognition of text and some have integrated voice output. However, these systems are generally designed for and perform best with document images with simple backgrounds, standard fonts, a small range of font sizes, and well-organized characters rather than commercial product boxes with multiple decorative patterns. Most state-of-the-art software cannot directly handle scene images with complex backgrounds.
The document to be read must be nearly flat, placed on a clear, dark surface (i.e., a non-cluttered background), and contain mostly text. Furthermore, Reader Mobile accurately reads black print on a white background, but has problems recognizing colored text or text on a colored background. It cannot read text with complex backgrounds, text printed on cylinders with warped or incomplete images (such as soup cans or medicine bottles). Furthermore, these systems require a blind user to manually localize areas of interest and text regions on the objects in most cases.

Although a number of reading assistants have been designed specifically for the visually impaired, to our knowledge, no existing reading assistant can read text from the kinds of challenging patterns and back- grounds found on many everyday commercial products.

This research intends to make the life of blind people easy. The use of a camera based system to scan the barcode behind product and read the description with the help of Id stored in the barcode. We all have an idea about what kind of contents are most important to every customer while buying a product. The contents are actual prize, manufacture and expiry date of product, which ingredients are inside the packed food or any product. While purchasing medicines it is most important to know expiry date because it is harmful to every living thing. And for the visually impaired people, it is impossible to read this information without any form of aid.

The aim of this research is to design a simulation system that will benefit the life of blind people so that they can independently identify any product to be purchased without depending on others for assistance, this idea will be implemented using interactive software. The objective of the research includes:

a. To assist blind peoples in gaining a complete product understanding using camera embedded hand glove to scan a product and give the details such as manufacturing and expiry date of the product.
b. To retrieve the details of product scanned in form of audio so that visually impaired person can listen and understand what product it is.
c. To implement the above mentioned in a, and b using a software design.

2.0 LITERATURE REVIEW

2.1 REVIEW OF RELATED WORKS

The existing research in this area of study showed that many author has worked in this field. According to Hanen Jabnoun *et. al.* (2015) the author focused on Money Identifier application which is specially developed for visually impaired people to easily identifying currency. Shahed Anzarus *et. al*. (2016) the author focused on the design of application that reads virtually any text aloud to helps blind and visually impaired people while reading, the research converts the text into voice form so they can help to read any book, newspaper easily. Shalini South *et. al*. (2017) focused on a camera based structure, which is converged with Image processing calculations, OCR and TTS synthesis element. The printed content picture is caught by the camera module and it is then exposed to pre-process before being encouraged into the OCR. OCR is utilized with the goal that the visually impaired can tune in to the content.

Hanen Jabnoun *et. al* (2015) provided an overview of various visual substitution systems developed in the recent years. This method is based on video analysis , interpretation and feature extraction .They give the results of comparison of SIFT and SURF in which they concluded that SURF is faster than SIFT ,however SIFT is robust when the matches findings, scale variations are considered. They used video to Audio transformation to provide the object information. Ricardo Chincha *et. al*. (2016) proposed an object recognition method to help blind people find missing items using Speeded-Up Robust Features (SURF). The Proposed recognition process begins by matching individual features of the user queried object to a database of features with different personal items which are saved in advance. From the experiments the total number of objects detected were 84 out of 100,this shows that their work needs better performance hence to enhance the object recognition SIFT can be used instead of SURF.

Hanen Jabnoun et. al. (2017) proposed system that restores a central function of the visual system which is the identification of surrounding objects. This method is based on the local features extraction concept. The simulation results using SIFT algorithm and key points matching showed good accuracy for detecting objects. They have worked for the key point detection in fast video using affine transformation in SIFT which is invariant to the changes in luminosity.

Lamya, Hessah *et. al*. (2017) provided a survey for the assistive technologies that can be used to help blind people in identifying objects. They presented advantages and disadvantages of the different technologies and made an evaluation in order to find out the best assistive technology that can be used for designing an efficient identification application. Furthermore, they made a comparison between the mobile applications that use human powered technology to find out which are the limitations that require more improving and research.

Chen Alan L. *et. al*. (2018) proposed time-efficient cascades that can speed up object detection. For Solving the Decision Problem they used Greedy Algorithm. The text detector was tested in two systems to help blind and visually impaired people navigate on streets. One system is called the Smart Telescope‖. The other similar system called

Signfinder is designed for blind people. Instead of having a micro screen for output, the Signfinder system has an extra module to recognize the text in the marked regions, and read it aloud using a speech synthesizer.

Abhinaba, et. al. (2018) presented a conceptual approach of controlling mouse movements, writing texts and sketching colored images by simply making real time gestures in air with colored objects. They have introduced Virtual Teaching by Real-time color detection and tracking.

Figure 2.1: Screenshot of GUI Paint session consisting of all detected

Chucai Yi *et. al.* (2015) proposed a camera-based assistive text reading framework to help blind persons read text labels and product packaging from hand-held objects in their daily lives. They proposed an efficient and effective motion based method to define a region of interest in the video. The performance of the proposed text localization algorithm is quantitatively evaluated. Thereafter, they employed the Microsoft Speech Software Development Kit display the audio output of text information.

Payal Panchal *et. al.* (2015) reviewed Object Detection and Tracking Methods‖ has given the brief idea about various object detection methods. They have also given the comparison of these methods. They concluded that the problem occurs during identification of object if the position of camera is not proper and object in image is not captured properly then it cannot be identified. To solve these problems and get some accuracy they suggested combining multiple methods and making use of it together according to the application.

2.2 COMMON CAUSES OF LOW VISION

According to Holbrook, M.C. & Koenig, A.J. (2000), the common causes of low vision is nearsightedness, farsightedness and astigmatism, and also due to Albinism, Aniridia, Aphakia, Cataracts, Coloboma, Glaucoma, Macular Degeneration, Nystagmus, Optic Atrophy, Optic Nerve Hyperplasia, Retinitis Pigmentosa, Retinopathy of Prematurity, Lazy eye (amblyopia): and due to misalignment of eyes (strabismus). The statistics of Babies Count (Hatton 2013) states that out of 5,931children (0-3 years), 24.9% had cortical (cerebral) visual impairment (CVI) as the main reason for visual disability, and 11.8% had retinopathy of prematurity (ROP) and 11.4% with optic nerve hypoplasia

(ONH). In infants and toddlers with CVI, ROP, and ONH, are the most common causes of visual impairment in USA.

Khan S.A (2000) conducted a study to obtain data on the characteristics of low-vision patients seen at a tertiary eye care hospital in India reveals that, the main causes for low vision were due to retinitis pigmentosa (19%), diabetic retinopathy (13%), macular diseases (17.7%), and degenerative myopia (9%).

Clare Gilbert & Allen Foster (2001) Childhood blindness in the context of VISION 2020 - describes that the major causes of blindness in children vary widely from region to region, it is largely determined by socioeconomic development, and the availability of primary health care and eye care services. In high-income countries, lesions of the optic nerve and higher visual pathways are predominate cause of blindness, while corneal scarring from measles, vitamin A deficiency, the use of harmful traditional eye remedies, and ophthalmia neonatorum are the major causes in low-income countries. Retinopathy of prematurity is an important cause in middle-income countries. Other significant causes in all countries are cataract, congenital abnormalities, and hereditary retinal dystrophies.

Srijana Adhikari and et.al., (2014) studied the causes of blindness and visual impairment in children in three ecologically diverse regions of Nepal, out of 10,950 children aged between 0-10 years, 5,403 from terai, 3,204 from hills, and 2,343 from mountains, was enrolled in the study, and identified the main cause of blindness was due to amblyopia (42.9%) followed by congenital cataract. Corneal opacity (39%) was the most common cause of unilateral blindness. And, concluded that more than two-third of the causes that lead to blindness and visual impairment was potentially preventable, and further suggested that nutritional and genetic studies are needed to determine the factors associated with ocular morbidity and blindness in the regions.

2.3 IMPORTANCE OF EARLY IDENTIFICATION

Gary Heiting, OD (2015) viewed that eye exams for school going children are extremely important; The American Optometric Association (AOA) says that 25 percent of all school-age children have vision problems. Early identification of a child's vision problem is very important because it is easy to provide treatment when problems are diagnosed early. And it is appropriate and necessary that infants should have their first complete eye examination before they attain the age of six months and they need further eye examination before they enter into the first grade or at the age of 5-6 years.

2.4 ELEMENTS OF VISION

According to Birgitta J. Blok land (2014) there are different eye conditions and each one creates a different form of vision distortion. In order to access the adequate services the elements of vision such as distance, size, contrast, colors, position of the objects and lighting conditions are important parameters in the assessment of functional vision of low vision students and it is essential to determine the extent of sight loss and its impact on daily life. The elements of vision supports in rehabilitation planning and to adapt various environment conditions at home and in school to adjust the situation with various lighting conditions, colours, contrast, size and distance. Also, the elements of vision aids in training to access information and helps to plan to undertake daily activities, leisure time activities, orientation and mobility and etc.

Daniel Kersten (2004) states, that larger object are not always easier to see. The children with reduced visual fields can only see parts of large objects. The shapes and material properties of objects quickly and reliably despite the complexity and objective ambiguities of natural images. Typical images are highly complex because they consist of many objects embedded in background clutter. Moreover, the image features of an object are extremely variable and ambiguous owing to the effects of projection, occlusion, background clutter, and illumination.

2.5 OBJECT DETECTION BASED ON FEATURES EXTRACTION

Object recognition is a classical problem in computer vision: the task of determining if the image data contains a specific object and it is noted that general object recognition approaches exploit features extraction. Features that have received the most attention in the recent years are the local features. The main idea is to focus on the areas containing the most discriminative information.

2.5.1 Features extraction

The main purpose of using features instead of raw pixel values as the input to a learning algorithm is to reduce/increase the in-class/out-of class variability compared to the raw input data, and thus making classification easier. Visual substitution systems generally exploit a single camera to capture image data. Recognition is then performed based on various features extracted from that data. In addition, features extraction is the process by which certain features of interest within an image are detected and represented for further processing. It is a critical step in most computer vision and image processing solutions because it marks the transition from pictorial to non-pictorial (alphanumerical, usually quantitative) data representation. Types of features that can be extracted from image depend on the type of image, the level of granularity desired, and the context of the application.

Once the features have been extracted, theirs representation depends on the technique used.

The features extraction process should be precise, so that the same features are extracted on two images showing the same object. The major algorithm used in recent research forfeitures extraction are the Scale Invariant Features Transform (SIFT) and the Speed up Robust Features (SURF) algorithms.

2.5.2 Features descriptors

Extracted features represent the interesting points found in the image to compare them with other interesting points. Descriptors are used to describe these features. They are generally based around points of interest of the image and often associated with a detector of key points. The descriptors can be global, local or semi-local.

a. Global image descriptor: features overall image are usually based on color indices and the most famous global color descriptor is the color histogram.
b. Local image descriptors: Local features are ones that have received the most attention in recent years. The main idea is to focus on the areas containing the most discriminated information.

c. Semi-local image descriptor: most shape descriptors fall into this category. This descriptor is based on extracting accurate contours of shapes in the image or in the region of interest. In this case, image segmentation is generally useful as a preprocessing step.

2.5.3 SIFT key point extraction

Several methods for features localization and description have been proposed in the literature. In this paper, we aim to use local features extraction algorithm SIFT.

The SIFT (Scale Invariant Feature Transform) local descriptor proposed by Lowe has been one of the most widely used descriptors.

It operates in four major stages to detect and describe local features, or key points, in an image:

a. Detect the extreme in scale space
b. Sub-unit localization and filtering of key points
c. Assign the orientations to key points
d. Compute the key point descriptors

In fact, SIFT was shown to perform better than all other local descriptors. SIFT descriptor is based on the idea of using the local gradient patch around the key point to build are presentation for the point.

2.6 BARCODE

A barcode is an optically machine-readable illustration of data relating to the object to which it is affixed. Linear or one dimensional barcodes are represented by changing the widths and spacing of parallel lines in barcode. Later by using hexagons, rectangles, dots and other geometric patterns two-dimensional codes (2D codes) were developed. Their code (Quick Response Code) is a two dimensional information storage tool developed byte Japanese company Denso-Wave in 1994, and was approved as an ISO international standard and Chinese National Standard in 2000. Nowadays, their code has been widely used as part of daily life due to its good features such as square shaped and contains smaller squares, large capacity for data encoding, high scanning speed, dirt and damage resistant, high speed reading, small print out size,360 degree reading and structural flexibility of various applications.

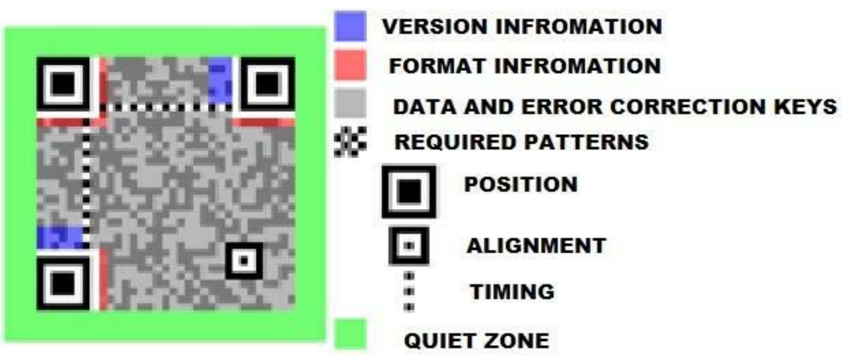


Figure 2.2: Structure of QR barcode.

2.7 FINDER PATTERN

It is a pattern which comprises of large black and white identical squares arranged in the corners of the QR Code, except for the bottom right corner. By arranging this pattern at the three corners of symbol, the position, the size, and the angle of the symbol can be detected. A pattern for detecting the position of the QR Code. The finder pattern can be detected in all directions (360°). The finder patterns enable the decoder software to recognize the QR Code and determine the correct orientation.

2.8 ALIGNMENT PATTERN

It is a pattern for correcting the distortion of the QRCode. It is positioned symmetrically on either side of the diagonal running from the top left corner of the symbol to the bottom right corner. These patterns are spaced as evenly as possible between the Timing Pattern and the opposite side of the symbol. It is a Pattern for correcting the distortion of the QR Code. It is highly effective for correcting nonlinear distortions. The central coordinate of the alignment pattern will be identified to correct the distortion of the symbol. For this purpose, a black isolated cell is placed in the alignment pattern to make it easier to detect the central coordinate of the alignment pattern.

2.9 TIMING PATTERN

It is a pattern that is arranged in both vertical and horizontal directions. Basically, it is used for identifying the central coordinate of each cell in the QR Code with black and white patterns arranged alternately and for correcting the central coordinate of the data cell when the symbol is distorted or when there is an error for the cell pitch.

2.10 QUIET ZONE

It is a margin space necessary for reading the QR Code. In addition to this, quiet zone makes it easier to have the symbol detected from among the image read by the CCD sensor. Four or more cells are necessary for the quiet zone.

2.11 DATA AREA

The data area is used to store QR code data. It is there part as represented in the figure 1. On the basis of encoding rule, QR code data will be encoded into the binary numbers of ‘0’ and ‘1’. The binary numbers of ‘0’ and ‘1’ will be converted into black and white cells and then will be arranged. The data area will have Reed-Solomon codes incorporated for the stored data and the error correction functionality.

2.12 APPLICATIONS OF QR CODES

a. Magazine/Newspaper and Notebooks
b. Business Cards
c. Food Products
d. Concert Venue
e. Clothing Labels
f. History Sites
g. Online Banking
h. Online wallet: PayTM
i. Bus Schedules

2.13 SCOPE OF QUICK RESPONSE (QR) BARCODES

Nowadays, QR barcode has been used frequently. QR barcodes can be seen on the posters for advertisement, business cards, and party invitations. One need to do is to click an image of the QR barcode with the help of phone having camera and the image can be decoded with the help of decoding application of phone. But the case may be that the images taken are under different condition i.e. under uneven illumination, low contrast, and the image may not be a proper square etc so before decoding the image we need to enhance the image first or it may need some geometric corrections. Algorithms had been generated to correct the distorted geometry of the QR barcode. Canny edge detection method is used to find the external contour. At least two advantages of Canny edge detection is estimated, one is filtering quasi-squares, the other is reducing computation in finding contours the inverse perspective transformation method was used to normalize the code shape. In previous work on 2Dcodes, authors have worked on many applications such as (in references) are Feng Liu, Anan Liu, Meng Wang, Zhaoxuan Yang have worked on Radon Transform and Hough Transform on data matrix and shows that localization speed is 67 barcodes/sec for Hough Transform, 78 barcodes/sec for Radon Transform whereas proposed method isomer efficient having 159 barcodes/sec speed for localization. Kinjal H. Pandya1, Hiren J.Galiyawala concludes that there are many possibilities for using QR codes in different areas such as security, better recognition, reducing redundancy in order to save space, possibility of encoding different kind of data like audio, etc. QR codes have structural flexibility so, there is scope to perform experiments to improve data capacity of QR Codes, use of coding techniques other than RS coding and use of encryption to encode data first, and then encode it to QR code for better security solutions.

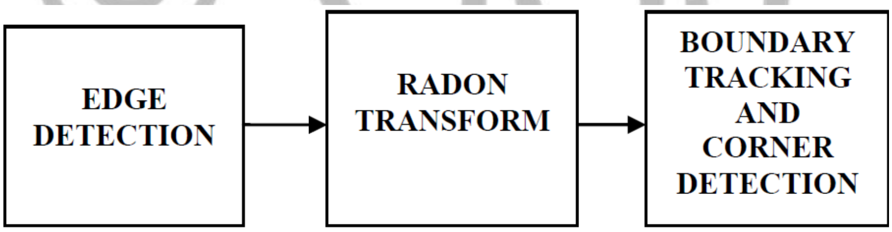


Figure.2.3: Steps to locate barcode

2.14 EXTRACTION OF CODEWORDS FROM THE BARCODE IMAGE

Given the scanned barcode image, we first localize the start or stop pattern, or both by scanning horizontally and vertically. Line equations corresponding to start and/or stop patterns are estimated through line fitting and then four vertices are obtained by scanning in the direction perpendicular to the lines. To ensure the vertices obtained as above are correct, row numbers are checked by decoding the left or r*ight indicator around the vertices. Unless they can be found, their locations are estimated by analyzing the information contained in left or right row indicator. The header information such as the number of rows and columns, error correction level, row number, etc. are extracted from the left or right row indicator, as depicted in Figure 2.3 Because barcode image is usually scanned using a digital camera, it should be warped due to the nonlinearity of lens and the viewing angle of the camera. In this paper, affine transform is adopted to warp the barcode region of the scanned image. Figure 2.4 shows the warped result of the data region inside the barcode region in Figure 2.3 After the barcode region is extracted and warped as mentioned above, codewords should be decoded by detecting the bar-space patterns.

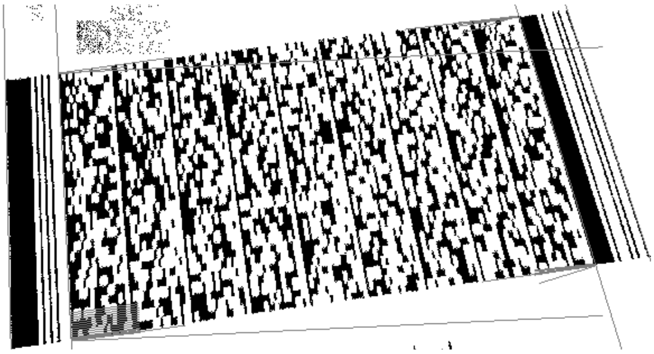


Figure 2.4: Four vertices are estimated and the header information such as the number of rows and columns, error correction level, etc. is decoded from the left or right row indicator.

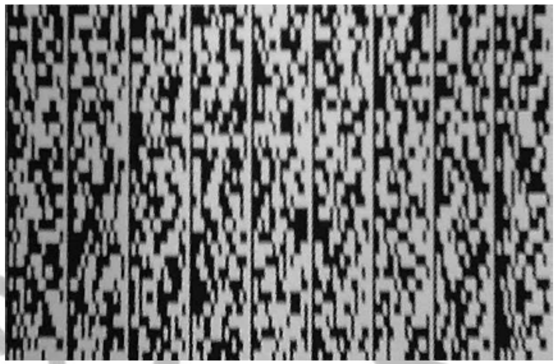
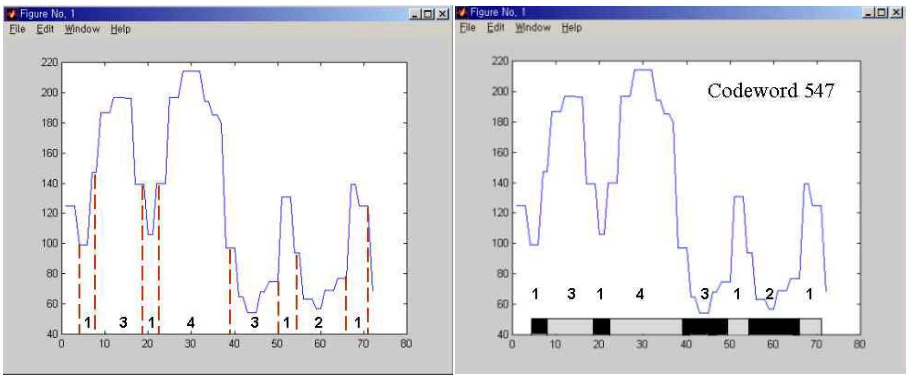


Figure 2.5: Warping the barcode region of Figure 2.4 using Affine transform.

The conversion of gray-level image into a binary image should be preceded, in order to detect the bar-space patterns. Many researchers developed the image thresholding algorithms, most of which reported to date are based on edge information or histogram analysis using information-theoretic approaches. The selection of optimal thresholds has remained a challenge over decades. However, they cannot be applied to decode the barcode images, because the widths of bars or spaces can be 2 pixels or even less in case of high density barcode images and even slight variation of threshold can cause severe errors.

Figure 2.5 shows the intensity profile of the codeword comprised of four bars and four spaces, together with their widths and classification results.



(a) (b)

Figure 2.6: The intensity profiles of the codeword comprised of four bars and four spaces

As shown in the above images, it is impossible to select the single optimal threshold for detecting the widths of four bars and four spaces because the pixel values change dynamically according to the widths of bars or spaces.

The widths and peaks of narrow bars or spaces corresponding to1 or 2 module values get smaller compared to the wide one seven under the same illumination, because of the convolution with the Gaussian shaped point spread function.

3.0 METHODOLOGY

The methodology consists of three functional components which are; Capturing, Data Processing, and Audio output. The capturing component collects data pertaining product of interest in the form of images, the captured image will be high quality and perfect recognition, and this is due to the high resolution camera. Data processing involves the use of deploying object-detection algorithms to selectively extract the image of the object held by the blind user from the cluttered background or other neutral objects in the hand glove camera and the audio output will inform the blind user of recognized product and overhear the details. The proposed system will be designed using Microsoft Visual studio as frontend and Microsoft SQL Server as backend and a Data Manipulating Language (DML).

The Visual Product Identification system is intended to be an accessible shopping system that is designed specially to make the life of the blind people better. The system is made up of an accessible server to accommodate all shopping lists; computer vision software for recognizing products and signs in stores; and a portable device that can execute computer vision algorithms and give the user verbal feedback. Generally, the overall components involve in the system design is listed and discussed below;

Table 3.1 Components of the Simulation System

S/N	COMPONENT	FUNCTION
1.	The cart-box	The cart-box is robotic in nature; it relies on passive RFID tags that are temporarily deployed at various locations in the store. Specifically, the tags were placed at the beginning and end of every shelf and at three different locations within each shelf. These tags allowed the Cart-

		Box to keep track of its position in each shelf.
2	Hand Glove	A typical use of the hand glove is when a shopper wears the glove and points at a particular shelf in the store, the portable unit will indicate the components of that shelf and guide the shopper to the desired item, the hand glove is also used to identify a product when the shopper picked a product from a shelf, the embedded glove camera sensor will automatically scan the product barcode.
3.	Vibrating Motors	The vibrating motor is the device that activates a motion contact between the hand glove and the product. This means that vibrating motor is activated when the hand glove sensor touches the product and automatically gives an audio version of the product specification.
4.	Head Phone	The head phone is a device that is used by the blind to hear the product information in audio.

3.1 SYSTEM DESIGN

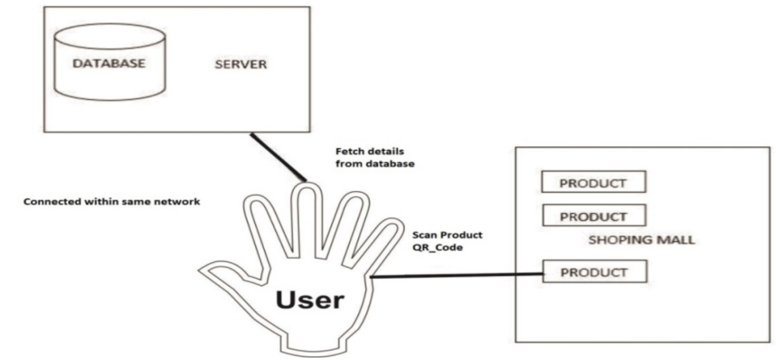


Figure 3.1: Design of the Proposed System

3.2 PAGE FLOW DIAGRAM

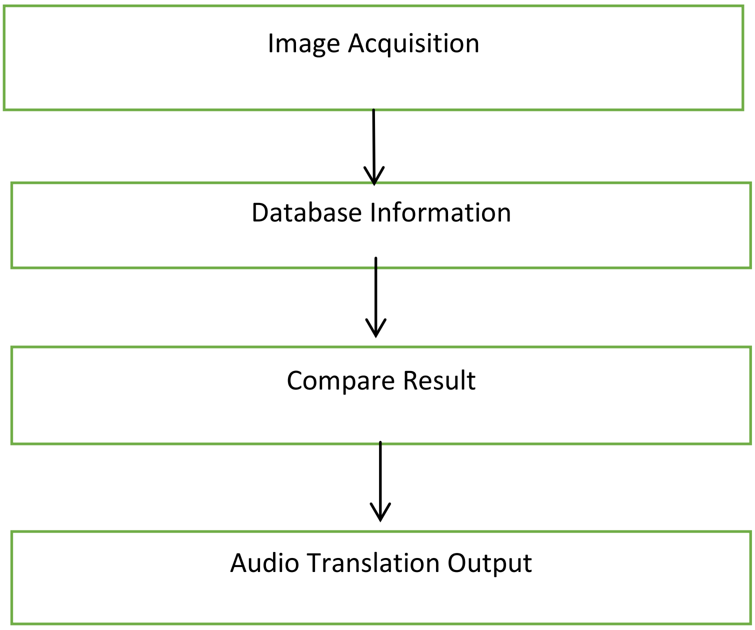


Figure 3.2: Page Flow Diagram

4.0 RESULTS AND DISCUSSION

Implementation result shows the procedure in accessing the simulation software. It consists of screenshots of different operation. Below is the screenshots extracted from the software and the explanation to guide users.

4.1 Splash Screen

This is the first display when user lunched the software from the list of programs listed in the computer program file. The splash screen shows; the name of the software as shown in Figure 4.1

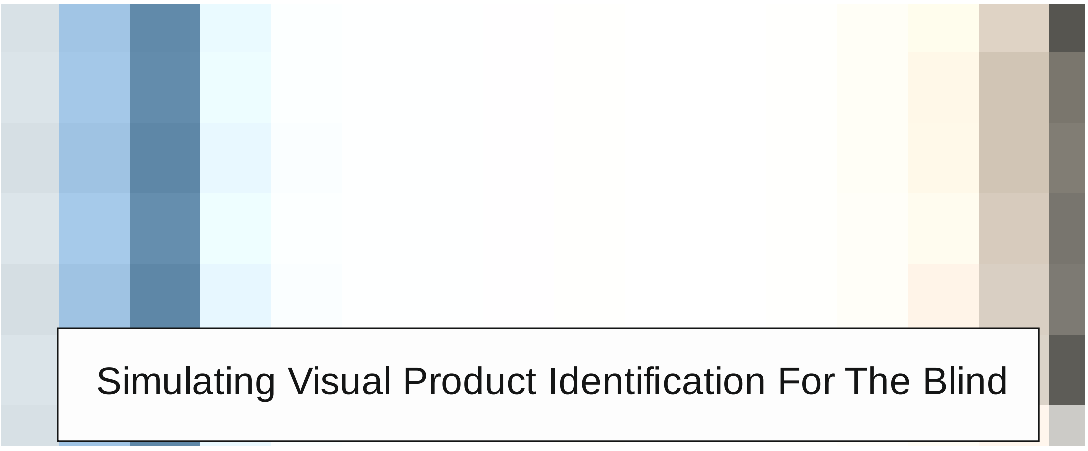


Figure 4.1: Splash Screen Display

4.2 Login/Authentication

The Login or authentication page is the process of recognizing a user's identity. The authentication process always runs at the start of the application, before the permission occurs, and before any other code is allowed to proceed. Different systems may require different types of credentials to ascertain a user's identity. The credential used is in form of a text, i.e. username and password, which is a secret and known only to the user see figure 4.2 below for details.

Figure 4.2: Login/Authentication Display

i) After a successful authentication user will be redirected to main menu. The menu consists of three button; Enter store, View Cart and Logout
ii) User will click on enter store button to proceed transaction and system will migrate to next stage where it will ask for transaction mode.

iii) After the selection of transaction mode, three devices is expected to be mounted on the user for a successful transaction to take place,

iv) Immediately after user has mount the three devices, user account balance will be displayed to know how much is available before transaction begins.

4.3 BENEFITS OF THE PROPOSED SYSTEM

Visual product identification for the blind enables blind people to identify the description of packaged products. Blind people find it very difficult to identify packaged goods. The following are some of the benefits of visual product identification:

i. It ensures that the blind people get to know of the packaged goods through the description available.
ii. It easy to use since the user interface modules compact in nature.
iii. The reliability of this application is more as it will benefit blind people.

5.0 CONCLUSION

This research paper describes a prototype system to read printed text on products for assisting blind persons so that they can independently identify a product without depending on others for assistance. In order to solve the common aiming problem for blind users, we have proposed a motion-based method to detect the object of interest while the blind user simply holds the product. In this research, three methods were adopted which are; Capturing, Data Processing, and Audio output. The capturing component collects data pertaining product of interest in the form of images, the captured image will be high quality and perfect recognition, and this is due to the high resolution camera. Data processing involves the use of deploying object-detection algorithms to selectively extract the image of the object held by the blind user from the cluttered background or other neutral objects in the hand glove camera and the audio output will inform the blind user of recognized product and overhear the details. The method adopted can effectively distinguish the object of interest from background or other objects in the camera view. To extract text regions from complex backgrounds, a novel text localization algorithm based on models of stroke orientation and edge distributions is used. The corresponding feature maps estimate the global structural feature of text at every pixel. Hence, this project represents a visual substitution system for blind people based on product identification. This system uses computer vision software for recognizing products and signs in stores; and a portable device that can execute computer vision algorithms and give the user verbal feedback.

REFERENCES

Abhinaba, et. al. (2018), Text string detection from natural scenes by structure based partition and grouping, IEEE Trans. Image Process., vol. 20, no. 9, pp. 2594.

Chen Alan L. *et. al*. (2018), Assistive text reading from complex background for blind persons,‖ in Proc. Int. Workshop Camera –Based Document Anal. Recognit., 2011, vol. LNCS-7139, pp. 15–28.

Chucai Yi *et. al.* (2015), Detecting and reading text in natural scenes, In CVPR, Vol. 2, pp.

Ciochetta Ilaria and *et.al*. (2015). Visual Perception Substitution by the Auditory Sense. In Beniamino Murgante, Osvaldo Gervasi, Andrs Iglesias, David Taniar, and Bernady O. Apduhan, editors, ICCSA (2), volume 6783 of Lecture Notes in Computer Science, pp. 522–533. Springer.

Clare Gilbert & Allen Foster (2001), Detecting text in natural scenes with stroke width transform, In CVPR, pp. 2963-2970, 2010.

Daniel Kersten (2004). Computer Solutions on Sensory Substitution for Sensory Disabled People. In Proceedings of the 8th WSEAS International Conference on Computational Intelligence, Manmachine Systems and Cybernetics, pp. 134–138.

Gary Heiting, OD (2015), Blind navigation and the role of technology, in The engineering handbook of smart technology for aging, disability.

Hanen abnoun*et. al.* (2015) ICDAR 2011 robust reading competition:ICDAR Robust Reading Competition Challenge 2: Reading text in scene images,‖ in Proc. Int. Conf. Document Anal. Recognition.

Hanen Jabnoun et. al. (2017) Advance Data Reports from the National Health Interview Survey.[Online]. http://www.cdc.gov/nchs/nhis/nhis_ad.htm.

Hanen Jabnoun, *et. al*. (2015), Text string detection from natural scenes by structure based partition and grouping,‖ IEEE Trans. Image Process., vol. 20, no. 9, pp. 2594–2605.

Holbrook, M.C. & Koenig, A.J. (2000), Wearable obstacle avoidance electronic travel aids for blind: a survey, In IEEE Transactions on systems, man, and cybernetics, Vol. 40, No. 1, pp. 25-35, 2010. II-366 II-373, 2004.

Shalini Sonth*et. al*. (2017), Assistive text reading from complex background for blind persons,‖ in Proc. Int. Workshop Camera-Based Document Anal. Recognit., 2011, vol. LNCS-7139, pp. 15–28.