# A SOLUTION FOR ASSISTING THE BLIND USING AN ANDROID-BASED SOFTWARE PROGRAMME

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**Abstract: The advancement of information and mobile technologies has created chances for visually impaired people to be included online. Due to the advancement of ubiquitous technology, there is an increasing need for assistive solutions to support visually impaired people in their social interactions. An Android-based mobile application for the blind that will make daily tasks easier was developed in this effort. The application was created using the Scale-Invariant Feature Transform (SIFT).**

**Keywords: visually impaired, Scale-Invariant Feature Transform, OCR**.

## I INTRODUCTION

At least 2.2 billion people worldwide suffer from a near- or distance vision impairment. Nearly half of these cases, or at least 1 billion, involved vision damage that either might have been avoided or is still unaddressed.[1].https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment

Routine chores like choosing items for personal use or spotting impediments in their path while going down the road provide several difficulties for these visually impaired and blind folks. For blind persons, it can be difficult to recognize things and movements that normally sighted people take for granted. The blind report having trouble moving around safely and independently outside, which prevents them from leading a typical work and social life [2]. Having the ability to recognize items on one's own will undoubtedly improve independent living and promote economic and social self-sufficiency in those who are blind or have severe visual impairments. Finally, the so-called activities of daily living, or ADLs, are a typical issue for blind people.

The interest in creating technologies to aid visually impaired persons in their daily lives is growing in the modern era. It has been demonstrated that the item identification task continues to be the most challenging for blind persons. Although there are numerous programmes that can be employed for this activity, there are still clear shortcomings that call for greater advancement. There are specific gadgets for navigation and object identification among these technologies. The blind users must carry a variety of tools and equipment, each with a specific function, such as object identifiers, navigators, and mobile phones. The use of gadgets for object identification will be replaced with software that runs on the smartphones of blind users.

Different arrangements accessible at present incorporate the Low-tech marking frameworks wherein names are joined to objects, for example with material signs or instant messages in Braille [3],[4] and the High-tech frameworks that utilize 1-D and 2-D standardized tags, talking marks, or radio-recurrence recognizable proof gadgets (RFID). RFID can be utilized to look for objects at brief distances to which RFID tag was applied utilizing an acoustic sign, however, a major restriction to its utilization is that it is extremely difficult for blind clients to find the place of the scanner tag and to accurately point the standardized tag peruser at the standardized identification. Some perusing assistive frameworks, for example, pen scanners may be utilized in these and comparable circumstances. Such frameworks coordinate optical person acknowledgment (OCR) programming to offer the capability of checking and acknowledgment of text and some have incorporated voice yield [5]. Both the Low-tech

and the High-tech frameworks, nonetheless, require joining extraordinary labels or visual signs to the articles. Thusly, they can be exorbitant, since such frameworks should be routinely kept up with to stay up with the latest.

Before the advent of technologies that aid object identification for the blind, blind people have been living dependently on other people who are not visually impaired for their daily activities. Nowadays, with the rapid development in the field of mobile technology, different IT-based assistive technologies have been developed to provide a better quality of life for these people who have special needs such as visual impairment. These technologies have contributed mainly to helping blind people to interact efficiently with social activities and increasing their ability for having independent lives. This is can be seen through different applications used for path guiding, obstacle detection, searching, and identifying objects [6].

The purpose of this study is to help the blind by developing an Android-based software application that will make it easier for them to complete the challenging process of object recognition. In this study, systems that help the visually impaired recognise objects, such as food packages, medication containers, and other items, are the main focus of the group of daily living chores related to personal care systems. The software is built using an Android-based image processing system. The blind user receives the object recognition indications via pre-recorded vocal messages.

## II. REVIEW OF LITERATURE

Many different assistive technologies and applications for people with special needs have been developed during the past few years. There are also a tonne of fresh and common mobile image recognition applications. There are a number of programs in use, including SnapTell (www.snaptell.com), Google Goggles [7], which recognizes logos and landmarks, as well as applications that identify book and CD covers. Numerous applications for currency recognition have been created over the past few decades as well, however they all have limits and work in particular situations. [8] created an object recognition app for Android mobile devices. The three image processing modules in this tool are colour detection, light detection, and picture recognition.

The image recognition module is a composite task that consists of a number of phases, including the identification of key points, the computation of the description, and the comparison of the generated description with other picture descriptions in the database to identify the object. [9]create a system to assist the blind with object identification and space navigation. Typically, blind persons attempt to recognize items through physical contact. However, the described solutions make use of RFID technology to aid blind persons with object identification in addition to navigating. In this system, the RFID electronic tags are attached to particular objects, and a distant computer with a database is set up to store the information about the electronic tags.This RFID tag's id is transferred and processed on a distant computer by obtaining the related information based on the tag's identity code using the RFID reader that is integrated into the user cane to generate radio frequency for data transfer from the tag chip. The computer and RFID reader are both connected to the blind people's wireless headset. The blind individual will therefore receive the information from the computer via vocal representation. Create a method to aid blind persons in locating objects and navigating through unfamiliar places. Typically, blind persons attempt to recognize items through physical contact.

The unique RFID tag's id is sent back by the tag chip via radio frequency, and this tag's id is transferred and processed in the remote computer by taking the relevant data based on the tag's identity code. The RFID reader is embedded in the user's cane and generates radio frequency for data transfer from the tag chip. The wireless headgear used by blind people is linked to a computer and an RFID reader. In order to assist the blind individual, the computer will speak the facts to them. [10] created a shopping assistant for those with vision impairments. The supermarkets made use of PIC microcontrollers and RFID technologies.

The system uses two ZigBee transceiver modules in the Tarang-F4 version, which is the standard for wireless networks and is used to communicate between devices. One Zigbee module is used to communicate with the microcontroller, while the other is connected to a PC so that data may be transferred. Passive RFID tags are used to organize the products on the shelves. These tags emit distinctive radiofrequency waves that are scanned by an RFID reader, who then reads and sends the

unique code to the microcontroller. Probably the most well-known assistive object recognition application is [11].

## III. METHODOLOGY

The purpose of this effort is to create an application that would enable object recognition from photographs captured by a mobile device's camera. The application was created using the Scale-Invariant Feature Transform (SIFT). For identifying and describing local visual characteristics, the SIFT method is regarded as a particularly potent computer vision tool. SIFT enables the computation of feature descriptors that are mostly independent of the constraints for image registration. The Features from Accelerated Segment Test (FAST) technique was used to enhance the application's performance. One of the quickest corner detecting algorithms is this one.

Images of several objects were taken using an android phone camera, and the names of each object were then recorded in voice mode and entered in the android database. A portable camera with a sizable optical sensor and excellent clarity was employed to guarantee that the object could be seen in the camera's field of vision.

When detecting scale-invariant characteristic spots, SIFT employed the cascaded filters method, where the difference of Gaussians (DoG) was computed on progressively rescaled images.SURF employed a blob detector based on the Hessian matrix (equation 1) to locate interesting locations. The determinant of the Hessian matrix was used to measure local change around the locations, and points were selected depending on where this determinant is maximal. SURF chose scale based on the Hessian's determinant.

$H(x, \sigma) = \square Lxx(x, \sigma)\ Lxy(x, \sigma)$

$Lx(x, \sigma)\ Lyy(x, \sigma)\cap\_$ (1)

This was used at a given point p = (x, y) and scale σ.

Where Lxx(p, σ), etc. is the convolution of the second-order derivative of Gaussian with the image at the point x.

### 3.1 System Architecture

The camera's input image is recorded. After that, a segmentation method is used to separate the targeted portion of the image from billboards and text boards. For the majority of image analysis approaches, segmenting the image is a necessary step. Then The image processing technology is used to extract the text from the text board. The use of optical character recognition is suggested for text recognition. The electronic conversion of captured images of typewritten or printed text into computer-readable text is known as optical character recognition (OCR). The collected text is then transformed into a speech that is output, leading to evaluation and testing at the end.

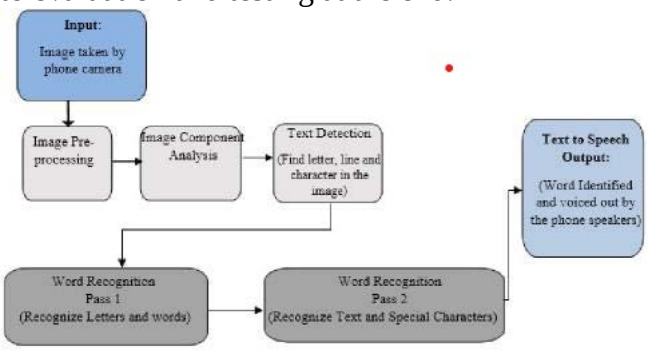


Figure 1: Design Architecture

From the Design Architecture engineering in figure 1, the most common way of identifying and perceiving text is partitioned into text identification stage and acknowledgment stage

### 3.2 Design Phases

The mechanical or electronic translation of images of typed, handwritten, or printed text into machine-encoded text is known as optical character recognition (OCR). It is frequently employed as a method of data entry from printed paper data records, including passports, bills, bank accounts, computerised receipts, business cards, mail, printouts of static data, and any other appropriate paperwork. It is a widespread practise to digitise printed texts so they can be utilised in automated processes like machine translation, text-to-speech, key data, and text mining as well as electronically altered, searched, stored more efficiently, shown online, and more.

A. Pre-processing: To increase the likelihood of a successful recognition, OCR software frequently "pre-processes" images.

Techniques include: De-skew: To make text lines completely horizontal or vertical, the document may need to be tilted a few degrees clockwise or counterclockwise if it was not aligned correctly when it was scanned. Despecklemeans to smooth out edges and remove positive and negative marks. Binarization: The process of changing a colour or grayscale image to black and white. A straightforward method of separating the text from the backdrop is accomplished through the

process of binarization. Cleans up non-glyph boxes and lines using line removalColumns, paragraphs, captions, etc. are identified as separate blocks by layout analysis, also known as "zoning." Particularly significant in tables and multi-column layouts.

B. Character recognition: There are two fundamental categories of core OCR algorithms, each of which has the potential to provide a ranked list of potential characters. Matrix matching, also known as "pattern matching," "pattern recognition," or "image correlation," involves comparing an image to a recorded graphic pixel-by-pixel. This depends on the stored glyph having the same scale and font as the input glyph, as well as being correctly separated from the rest of the image. This method does not perform well when using unfamiliar fonts and is most effective when used with typewritten material. The early physical photocell-based OCR employed this method rather directly. Decomposing glyphs into "features" like lines, closed loops, line direction, and line intersections is the process of feature extraction. A character's abstract vector-like representation, which might be reduced to one or more glyph prototypes, is contrasted with these. This type of OCR, which is frequently used in "intelligent" handwriting recognition and in fact most modern OCR software, is performed using general feature identification algorithms from computer vision. To compare picture attributes with recorded glyph features and determine the closest match, nearest neighbour classifiers are employed, such as the k-nearest neighbour algorithm.

C. Post-processing: If the output is limited by a lexicon—a list of words that are allowed to occur in a document—OCR accuracy can be improved. For instance, this may be the entire English language or a more technical vocabulary for a particular industry. If the text uses proper nouns or other words that are not part of the vocabulary, using this strategy can be challenging. Tesseract influences the character segmentation process using its vocabulary to increase accuracy. Although increasingly advanced OCR systems can preserve the original page layout and produce products like annotated PDFs that have both the original image of the page and a searchable textual representation, the output stream may still be a plain text stream or file of characters.

D. Character detection: To extract the features for each letter, the work used the OpenCV (open source computer vision) package to process the photos. The frames were initially sent to the process after being continually acquired from the camera. The following steps can be used to carry out a subsequent operation after the object of interest has been retrieved from the camera image using a cascade classifier.

Any black present in the original scanned image, if it is flawless, was a character that needed to be identified, whereas any white was a background. Thus, the first step in determining the text that has to be processed is to convert the image to black and white. Also possible with this conversion are some faults.

OCR: Although each OCR programme differs slightly from the others, they all process the image of each page by reading the text line by line, word by word, and character by character.

Finite State Automaton:This work used direct finite state automata to analyse, capture, and group the set of recognized letters or alphabets into a group that represents a legitimate consonant-vowel combination. Using a finite state automaton, this is accomplished. A finite automaton is a finite-state machine that accepts or rejects strings of characters or symbols and only generates a singular computation of the automaton for each input string.

A deterministic finite automaton is mathematically defined as a quintuple (Five-Tuple) containing of mathematically, a deterministic finite automaton is a quintuple (Five-Tuple) consisting of M ($K$, $\Sigma$, $\delta$, $sF$)where, K is a finite set of states, $\Sigma$is an alphabet, s$\epsilon$K is the initial state F $\subseteq$K is the set of final states, and $\delta$, the transition function, is a function from (K x E) to K

Text identification and limitation: Text discovery manages to distinguish the presence of the text in the information picture while text confinement restricts the placement of the text and structures gatherings of text locales by dispensing with the limit of the foundation. Text identification and restriction process are performed utilizing associated part examination or locale-based techniques.

The associated part (cc) investigation strategy shapes a diagram of associated focuses in view of variety or edge highlights from the binarized picture.

During the preprocessing stage, the text picture is separated into little districts involving

windows and quest these areas for the presence of text utilizing surface or morphological activities since text and non-text locales have different printed properties.

After the text identification and confinement stage result might contain non-text districts alongside text locales as bogus up-sides. The order stage checks text areas and dispenses with non-text districts utilizing grouping calculations. This stage can likewise be called check. A directed grouping that knows properties of text like tone, size, surface, and so on before characterization is applied. Solo calculations don't have earlier information about text highlights.

The division cycle is utilized to isolate text from the foundation and to extricate limited text from the picture. The stepwise strategy utilized here goes through division to acquire exactly extricated characters that are taken care of to the acknowledgment stage.

Character division: Character division is the method involved with changing over text into numerous arrangements of single characters. It is appropriate on account of corrupted text of associated characters. Slope vector stream based technique is utilized which is applied straightforwardly on grayscale pictures. It at first distinguishes up-and-comer cut pixels from the characters and afterward utilizes a two-pass pathfinding process that figures out likely cuts in sending pass and check genuine cuts and eliminates misleading cuts in the retrogressive pass.

Text Recognition: The text acknowledgment stage changes over pictures of text into a series of characters or words. It is critical to change over pictures of text into words as the word is a rudimentary substance involved by human for his visual acknowledgment.

The person acknowledgment approach utilized in this plan is accomplished utilizing the Optical Character Recognition module (OCR) where at first pictures are portioned into k classes followed by paired text picture speculation age which goes through associated parts examination and grayscale consistency requirement module prior to getting taken care of to OCR.

## IV. IMPLEMENTATION

### 4.1 Output Specification and Design

Text acknowledgment is performed by off-the-rack OCR beforethe result of useful words from the confined text locales. A text district names the base rectangular region for the convenience of characters inside it, so the line of the text locale contacts the edge limit of the text character. Nonetheless, our examinations show that OCR creates better execution assuming text districts are first appointed appropriate edge regions and binarized to portion text characters from the foundation. Subsequently each confined text locale is amplified by upgrading the level and width by 10 pixels separately, and afterward Otsu's strategy was utilized to perform binarization of text districts, where edge regions are constantly considered as foundation. We test both open-and shut source arrangements exist that have APIs that permit the last phase of transformation to letter codes (for example OmniPage, Tesseract, ABBYReader).The perceived text codes are kept in script documents. Then the strategy utilized the Google text-to-discourse to stack these documents and show the sound result of text data. Blind clients can change discourse rate, volume, and tone as indicated by their inclinations 4.2 System Implementation

This section catches the execution of the proposed framework. The execution of the proposed framework was achieved utilizing Android SDK and Open CV library. The justification behind picking this is on the grounds that android is an open-source versatile working framework with a huge client base and an improved on portable application improvement process.

During the execution stage, the last framework was tried to guarantee it meets client prerequisites and the examination evenhanded as expressed in part one.

Android is an open-source and Linux-based working frameworktargeted at mobiledevicessuchas PDAs and tablet PCs. Applications are for the most part evolved in Java programming language utilizing the Android programming improvement pack (SDK). Whenever utilized accurately, the SDK, along with Eclipse (the authoritatively upheld IDE) and JDK (Java Development Kit) is proficient to convey present-day programming for Android gadgets. The Android SDK (programming advancement kit) gives the API (Application programming connection point) libraries and engineer devices crucial for construct, test, and troubleshoot applications for Android. This application is made – forobscure. Android Development Tools (ADT) is a fitting

the Eclipse coordinated development climate (IDE) that is intended to give a coordinated

## V EXPERIMENTAL RESULT

In this paper, a model framework that read printed text close by held objects for helping blind people was created. To take care of the normal issue for blind clients, the work proposed amovement-based method to distinguish the object of interest. This strategy can successfully recognize the object of interest from the foundation or different items in the camera vision. Toseparate text areas from complex foundations, an "OCRCalculation" text confinement calculation of the relatinghighlight maps gauge the worldwide primary component of text ateach pixel was proposed. Block designs project the proposedinclude guides of a picture fix into an element vector. Adjoiningcharacter gathering is performed to compute up-and-comers of textpatches ready for text characterization. An Adaboost learningmodel is applied to restrict text in camera-based pictures. Off the rack, OCR is utilized to perform word acknowledgment on therestricted text locales and change it into sound results forblind clients.

## VI. CONCLUSION

A framework for helping the visually impaired through a product application in view of the Android stage has been created. It will assist with facilitating the trouble of playing out the errand of article identification.For pictures without positive edges, the program may not work as expected. Yet, it will turn out impeccably for picture texts which have an unmistakable edge. For the item with an extravagant text style, straightforward text, text that is too little, obscured text, and for the non-planar surface, it won't work as expected. The marking calculation should be gotten to the next level. A superior marking strategy for parts could work on the location of characters. This could obtain improved results for roundabout text, which will in general be excused as the clamor because of the gathering of the letters.To tackle the normal pointing issue for blind clients, a have proposed a camera-based item data perusing structure to assist with blinding people from reading item data from hand-held objects in their day-to-day lives.In this venture, the result is sound.

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