Perspectives in Communication, Embedded-Systems and Signal-Processing (PiCES) – An International Journal
ISSN: 2566-932X, Vol. 1, Issue 4, July 2017

Blind Friendly ATM Software System

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Abstract— Blind people face many problems in their lives. One of them would be being dependent on someone else for financial transactions. In the existing ATMs, special type of inscription is installed called Braille on the keypad to facilitate blind, which might not be known to all. So, the paper proposes to design and develop a safer and secure ATM accessing system for the blind to secure their pin codes.

Keywords: ATM Machines Software; Sign Language Recognition; Blind; Image Processing

I. INTRODUCTION

Visual impaired population in the world is about 285 million and about 35 million are blind. There are 3 kinds of blindness-night blindness, complete blindness, and Color blindness. One of the problems they face in their day to day routine is during ATM transactions. Though ATMs are inscribed with Braille it does not completely eliminate the problems faced by blind people.

Various issues faced by them are -What if the blind person using the system does not know Braille and does not know how to use it, the blind person is most of the time accompanied by someone who helps him in his transactions, that person may accidently or purposely see the authentication details of the blind person and may misuse the same for his own use. Since blind person cannot know that he may be watched by a stranger and may rob the blind person. The blind person also cannot be confirmed about the correctness of the money he opted and the amount he received.

Existing solution - Talking ATM is an automated teller machine that provides audio output instructions to a person who cannot read an ATM screen to help him to independently use the machine. All audible information is delivered privately through a standard headphone jack on the machine or a separately attached telephone headset. Information is delivered to the customer either through pre-recorded sound files or via text-to-speech synthesis. A user plugs a standard headset into the jack and can hear instructions such as “continuing further transaction”, “press 2 for deposit”. There is an audible instruction for first time users and audible information describing the location of features such as number keypad, deposit slot and card slot.

II. LITERATURE SURVEY

Magic Glove aims gap the difference between the user and traditional physical hardware devices. Given the high learning curve in understanding how to use foreign technologies, it hopes to break away from conventional control mechanisms and explore a new and smart way to control these devices. Magic Glove provides a tangible interface that relies on hand gestures to wirelessly control any device or software. By removing the distance between the user and traditional hardware devices, the goal of Magic Glove is to make the feel more like an extension of the body as opposed to an external machine.

Simple hand gestures are captured from the Magic Glove and this input is used to wirelessly control a modified RC car. Controlled variables include speed, steering, lights and sounds using a combination of flex, force and gyroscopic sensors. Multiple variables are controlled simultaneously as Magic Glove outputs a constant control signal.

Though Magic Glove has many advantages and scope in many fields it does have many disadvantages too. The sensors used in the Glove should be of high precision else if low precision sensors are used the system may fail to capture the gestures appropriately. Since sensors are a part of the system it is not very cost effective. The Glove is embedded with many sensors and wires which make the whole system very bulky and difficult to carry around. The system along with controllers, cables and sensors is very complex and not very easy to understand by common man.

III. METHODOLOGY

A. Image Processing Flowchart

The gist of the complete work is as shown in Fig 1. As per any Image Processing work, the video is captured from the camera which is connected to the system. Processes like segmentation, noise removal and gesture identification is done here.

B. Hardware and Software Requirements

A webcam with resolution 20mp is used to capture gestures of better quality which is connected to a laptop which has operating system Windows XP and above, processor core i3 and above. Headset/speakers are used to acknowledge the output to the user. Our project is carried out using python 1.2 and editor using Idle.

C. Design and Implementation

a) Setup Design

The design comprises of a thermo coal box inside which a webcam would be fit. There will be a hole through which the person can insert his palm and show the pin through signs. The other end of the box will be connected to a system which consists of required algorithm which in turn is connected to earphones. After entering the pin through gestures, the person will get an output if he is authorized or not, through speakers.

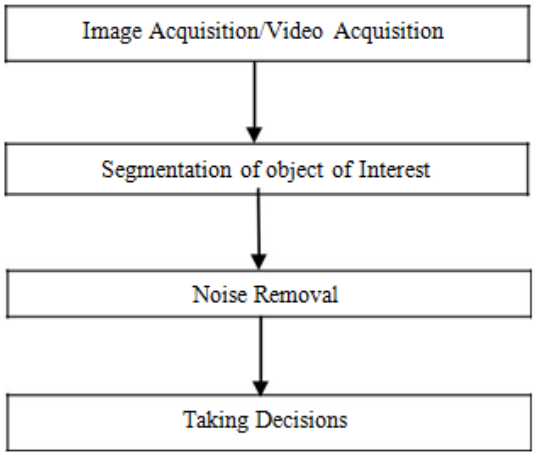

Fig 1. Flowchart

Fig 2. Architecture of the Proposed System

b) Algorithm of ATM accessing for blind

In this section we have explained the process flow and its implementation.

- *Conversion of RGB Image:* The captured RGB image must be converted to YCbCr model and obtain the image of Cb plane because background and foreground can be clearly distinguished as shown in Fig 4. The following formula can be used for conversion.

$$Y = 0.299*R + 0.587*G + 0.114*B$$

$$Cb = -0.168736*R - 0.331264*G + 0.5*B$$

$$Cr = 0.5*R - 0.418688*G - 0.081312*B$$

- Identification of Hand: The hand gesture should be separated from background as our focus is only on hand part of the captured image. This is accomplished by separating out background and hand gesture at different gray levels as shown in Fig 5. This process is called segmentation.

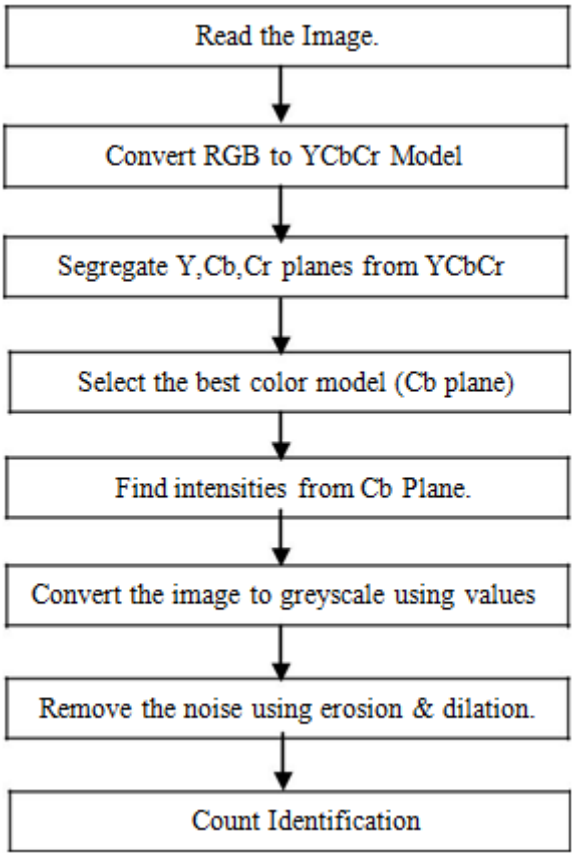

Fig 3. Algorithm flow

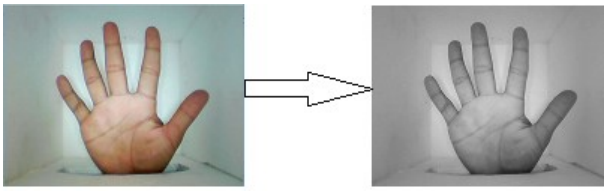

Fig 4. RGB to Cb plane

- Morphological Operations: Morphology is set of image processing operations that process images based on shapes. The morphological operations apply structuring element to an input image creating

an output image of same size. The basic morphological operations are dilation/erosion. They are used to remove noise present in the image. Erosion is used to remove noise present in the background while dilation removes noise present in the hand i.e. exactly opposite of erosion.

- Algorithm for Identification of Gestures: Counting is done to determine how many fingers are opened and which of them are open based upon this test results the actual count is obtained.

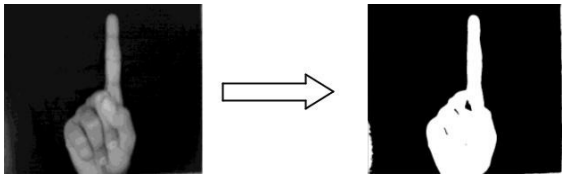

Fig 5. Segmentation

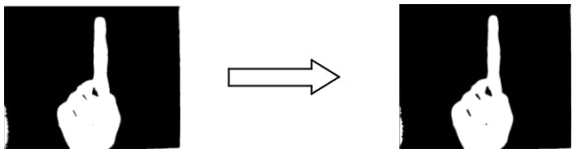

Fig 6. Erosion

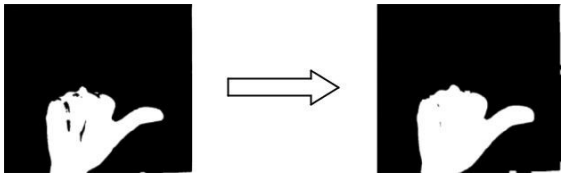

Fig 7. Dilation

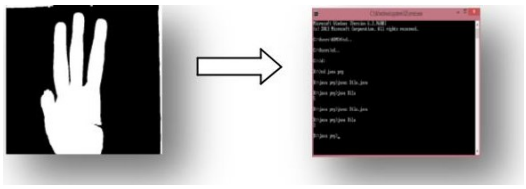

Fig 8. Gesture is identified as number 3

IV. RESULTS

The gestures are captured continuously as a video and are mapped to identify the pin numbers. When the correct 4 digit sequence of numbers comprising the password is obtained the user can carry out further transactions else he would have 3 chances to reshow his password failing which an alarm is triggered.

V. CONCLUSION

The major advantages - firstly Blind people need not depend on anyone for his/her transactions. It provides higher security. Even a person who does not know Braille or an illiterate person can easily do his/her transactions. It is Safe and error-free authentication through enclosed box. And most importantly it's cost effective.

Thus, a model to help blind people to secure their ATM pin, by successfully implementing a model of software system has been developed which can also be made as a real time system. The efficiency of the system is based on how well the system interprets the change in hand gestures. Our proposed system is helpful not only for blind but even illiterate people can use the system and blind need not learn Braille as well. All that they need to know is the Indian sign language of numbers.

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