

# Sign Language Based ATM Accessing System for the Visually Impaired

Sajad Ali A

Department of ECE, Islamiah Institute of Technology,  
Bangalore, India, sajad101997@gmail.com

Daniya Afreen

Department of ECE, Islamiah Institute of Technology,  
Bangalore, India, daniyaafreen6@gmail.com

Noor Ayesha

Department of ECE, Islamiah Institute of Technology,  
Bangalore, India, noorayasha576@gmail.com

Revansidha

Department of ECE, Islamiah Institute of Technology,  
Bangalore, India, hiremathrevansiddha@gmail.com

**Abstract:** *Around 285 million individuals all throughout the planet are outwardly hindered and around 35 million are visually impaired. There are 3 sorts of visual impairment night visual impairment, complete visual impairment, and Color visual impairment. One of the issues they face in their routine is during ATM exchanges. Despite the fact that ATMs are recorded with Braille it doesn't totally wipe out the issues looked by dazzle individuals. But the main problem faced by them is performing monitory transaction how difficult for a blind to withdraw money form ATM and the risk in the world. Thus in order to enhance his security while withdrawing money from the ATM we plan to develop a secure environment for them , by designing sign language based ATM accessing system. Concept of real time video processing will be incorporated for the realization of the same. Further it has been noticed that they face difficulty in inserting their ATM card in the designated slot. Thus instead of using magnetic strip based card, we proposed colour coded ATM card, which allows them to access the account upon placing the card in front the camera, the same camera will be utilized to identify the gesture as their pin.*

**Keywords:** *Hand gestures recognition; Real time image processing; ATM for Blind; ATM machines*

## I. INTRODUCTION

Around 285 million individuals all throughout the planet are outwardly hindered and around 35 million are visually impaired. There are 3 sorts of visual impairment night visual impairment, complete visual impairment, and Color visual impairment. One of the issues they face in their routine is during ATM exchanges. Despite the fact that ATMs are recorded with Braille it doesn't totally wipe out the issues looked by dazzle individuals.

The world today has overcome several problems with the help of technology. Right from reducing communication distance to serving humanity, several equipment, devices and solution have been proposed.

Several devices like guiding canes and braille based mobile phones have been developed to assist the blind.

The different explanations behind the disappointment are-What if the visually impaired individual utilizing the framework doesn't know Braille and doesn't have the foggiest idea how to utilize it, the visually impaired individual is more often than not joined by somebody who helps him in his exchanges, that individual may unexpectedly or intentionally see the verification subtleties of the visually impaired individual and may abuse something very similar for his own utilization. Since dazzle individual can't see he might be watched by a burglar and may ransack the visually impaired individual. The visually impaired individual additionally can't be affirmed about the accuracy of the cash he selected and the sum he got.

But the main problem faced by them is performing monitory transaction how difficult for a blind to withdraw money from ATM and the risk in the world. Thus in order to enhance his security while withdrawing money from the ATM we plan to develop a secure environment for them , by designing sign language based ATM accessing system. Concept

of real time video processing will be incorporated for the realization of the same. Further it has been noticed that they face difficulty in inserting their ATM card in the designated slot. Thus instead of using magnetic strip based card, we proposed colour coded ATM card, which allows them to access the account upon placing the card in front the camera, the same camera will be utilized to identify the gesture as their pin.

## II. LITERATURE SURVEY

The design and implementation of sign language interpreter is discussed in this paper. Interpreter is a hand glove along with some sensors and circuitry placed on the arm of the person wearing it for making signs. The main objective of this device is to detect the change in gestures and convert them into human understandable form to fill the communication gap between deaf or mute and normal people. The system can be upgraded easily for more understandable conversation by making use of other

sensors like gyroscopes along with the already used accelerometer. This will help to judge the orientation of signs in a better way [1].

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. Sorcery Glove points out the distinction between the client and customary actual equipment gadgets. Given the high expectation to absorb information in seeing how to utilize unfamiliar innovations, it desires to split away from ordinary control systems and investigate another and savvy approach to control these gadgets.

By eliminating the distance between the client and customary equipment gadgets, the objective of Magic Glove is to cause the user to feel more like an augmentation of the body instead of an outer machine. Enchantment Glove gives a substantial interface that depends close by motions to remotely control any gadget programming. [2]

This system provides an easy to use human computer interface for differently abled people as well as for others. It allows the input character and symbol from any position without restrictions. Glove based systems and vision based systems are the two approaches generally used for gesture recognition. The main aim of this paper is to provide a way to control electronic appliances using hand gestures. The method used here, there is no need to touch switches to turn on/off an appliance. The main objective is to develop an alternative human interactive system using web camera as input. The clicked real time image is processed using pre-processing tests, Feature extraction, Hand gesture recognition. applications of computers through the use of computer vision. The algorithm includes the following steps- Image Segmentation, Orientation, Detection, Feature extraction, Classification and bits generation. [3]

In this paper, they introduced dB GLOVE, a device which can be worn and makes the deaf and blind independent. This framework is easy to use through its normal interface and it is likewise like previously existing touch and hand motion based dialects, like Malossi and hard of hearing visually impaired manual, to offer a remarkable gadget for associating various networks with a moderate arrangement. In any case, the disadvantage was that they acquired 763 right answers out of 1071 reactions.[6]

### III. METHODOLOGY

#### A. Setup

The design comprises of a box inside which a camera is fitted to one end and a hollow at the bottom of the box where the person is asked to insert his/her hand and flash the card which eliminates the problem of being embezzled. The camera is in turn connected to laptop/pc which uses a real time video processor where the required algorithm being processed to uniquely identify the person. The output end of the laptop/pc is wired to the

display and the headset, where the person is instructed to show the pin number using gestures. The system takes the gestures and it acknowledges the person appropriately. The block diagram is shown in Fig 1.

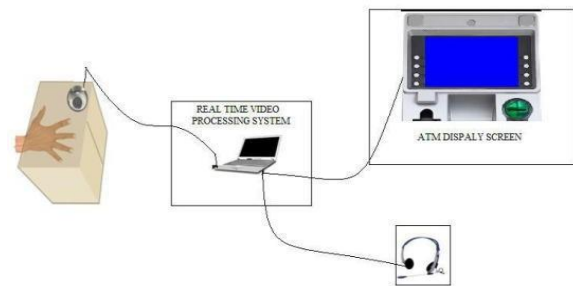


Fig 1. Architecture of the projected System

#### B. Hardware And Software Requirements

1. Arduino uno microcontroller
2. Buzzer
3. MATLAB R2011b
4. Arduino IDE
5. Camera

#### C. System Level Flowchart

The below flow chart shows the operation of projected system. The system starts, then the input block checks hand gesture. The sensor acquires data of the hand gesture, transmits it to the decision block, which decides if the data is true or false. If the hand data is matched with the pre-loaded hand gesture data, then the data is taken. The matched data is sign recognized, then it gives output in the form of voice or audio. If the data is not matched with the pre-loaded hand gesture data, then the operation is terminated and it returns to start.

The operation is successful when the data is matched with the pre-loaded hand gesture. Similarly, the operation is performed for different gestures.

The Figure 3 shows various hand gestures, actions, converting gestures into numeric words by using Leap trainer and Leap motion controller. This technique fills the gap of communication between visually, hearing impaired human and is making human computer interaction easier and more natural.

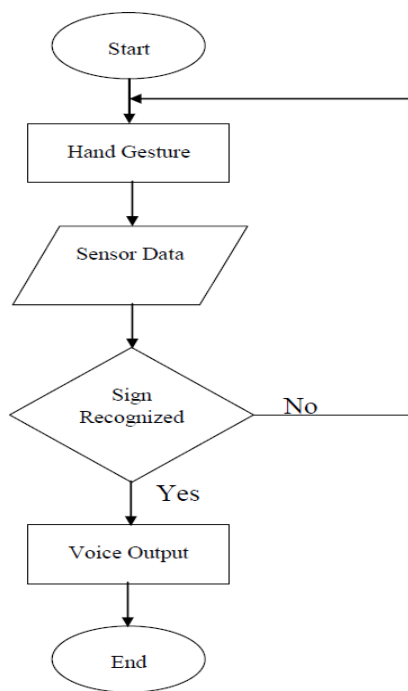


Fig 2. Flow chart of process










Hand Gesture	Number	Hand Gesture	Number
	One		Six
	Two		Seven
	Three		Eight
	Four		Nine
	Five		

Table 1. Table of Hand Gestures

#### IV. CONCLUSION

The projected system based on video processing is developed for the ATM's as it makes a clear possibility by providing a secure transaction by giving input as in form of simple gestures. The system found to be more impregnable, as it is protected from unauthenticated person. Our projected system is helpful for the blind, visual imperfect people as the person need not carry the gloves while travelling out spaces for withdrawal of

money as Indian Sign is easy in learning the projected system can be used by any individuals as he need not worry about learning Braille language.

#### REFERENCES

- [1] J. Wang and T. Zhang, "An ARM- based embedded gesture recognition system using a data glove," presented at the 26th Chinese Control and Decision Conf., Changsa, China, May 31 - June2, 2014.
- [2] Shukor, M. F. Miskon, M. H. Jamal Uddin, F. A. Ibrahim, M. F. Asyraf and M. B. Bahar, "A new data glove approach for Malaysian sign language detection," *Procedia Computer. Sci.*, vol. 76, no. 1, pp. 60-67, Dec. 2015.
- [3] N. Sriram and M. Nithiyandham, "A hand gesture recognition based communication system for silent speakers," presented at the Int. Conf. Human Compute. Interact., Chennai, India, Aug. 23-24, 2013.
- [4] S. V. Matiwade and M. R. Dixit, "Electronic support system for deaf and dumb to interpret sign language of communication," *Int. J. Innov. Research Sci. Eng. Technol.*, vol. 5, no. 5, pp. 8683-8689, May 2016.
- [5] Murakami, K., & Taguchi, H. (1991, April). Gesture recognition using recurrent neural networks. In *Proceedings of the SIGCHI conference on Human factors in computing systems*(pp. 237-242). ACM.
- [6] Gruen, A. (1985). Adaptive least squares correlation: a powerful image matching technique. *South African Journal of Photogrammetry, Remote Sensing and Cartography*, 14(3), 175-187.
- [7] S. Huang, C. Mao, J. Tao and Z. Ye, "A Novel Chinese Sign Language Recognition Method Based on Keyframe-Centered Clips," in *IEEE Signal Processing Letters*, vol. 25, no. 3, pp. 442-446, March 2018.
- [8] Caporusso N., Biasi L., Cinquepalmi G., Trotta G.F., Brunetti A., Bevilacqua V. (2018) A Wearable Device Supporting Multiple Touch- and Gesture-Based Languages for the Deaf-Blind. In: Ahran T., Falcão C. (eds) *Advances in Human Factors in Wearable Technologies and Game Design. AHFE 2017. Advances in Intelligent Systems and Computing*, vol 608.
- [9] B. G. Lee and S. M. Lee, "Smart Wearable Hand Device for Sign Language Interpretation System With Sensors Fusion," in *IEEE Sensors Journal*, vol. 18, no. 3, pp. 1224-1232, 1 Feb.1, 2018.
- [10] B. Lee and W. Chung, "Wearable Glove-Type Driver Stress Detection Using a Motion Sensor," in *IEEE Transactions on Intelligent Transportation Systems*, vol. 18, no. 7, pp. 1835-1844, July 2017.
- [11] T. Starner and A. Pentland, "Visual recognition of American sign language using hidden Markov model," in *Proc. IEEE Int. Conf. Autom. Face Gesture Recognit.*, 1995, pp. 1-52.
- [12] C. Wang, W. Gao, and S. Shan, "An Approach based on phonemes to large vocabulary Chinese sign language recognition," in *Proc. IEEE Int. Conf. Autom. Face Gesture Recognit.*, 2002, pp. 393-398.
- [13] P. Jangyodsuk, C. Conly, and V. Athitsos, "Sign language recognition using dynamic time warping and hand shape distance based on histogram of oriented gradient features," in *Proc. ACM Int. Conf. Pervasive Technologies Related Assistive Environments*, 2014, pp. 1-6.
- [14] G. Marin, F. Dominio, and P. Zanuttigh, "Hand gesture recognition with leap motion and Kinect devices," in *Proc. IEEE Int. Conf. Image Process.*, 2014, pp. 1565-1569.
- [15] J. Zhang, W. Zhou, X. Chao, J. Pu, and H. Li, "Chinese sign language recognition with adaptive HMM," in *Proc. IEEE Int. Conf. Multimedia Expo.*, 2016, pp. 1-6