

A Survey on Sign Language ATM For The Blind

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Abstract: *The blind population often face difficulties in accessing ATM machines to withdraw money, which forces them to visit the bank. This makes them lose their time, thus causing them inconvenience. In order to overcome this issue, most of the ATM keypads offer Braille embossed keys with an intention to guide a blind individual to access the system. Though proven to be useful, the blind people with no knowledge of Braille fail to access these systems independently. Thus, to overcome this issue, other ways to access the ATM machines must be explored. One way out is to utilise Sign Language gestures to interact with the system in an environment that is secure. The survey on different methods proposed to recognise the sign language is conducted in this paper.*

Keywords: *Sign Language; Gestures; ATMs; Blind; Microcontroller; Survey*

I. INTRODUCTION

Blindness is the loss of useful sight. Blindness can be temporary or permanent. Damage to any portion of the eye, the optic nerve, or the area of the brain responsible for vision can lead to blindness. According to [1] – “estimates from the World Health Organization (WHO), about 285 million people are visually impaired worldwide - 39 million are blind and 246 million have low vision (severe or moderate visual impairment), about 90 per cent of the world's visually impaired people live in developing countries, 65 per cent of visually impaired, and 82 per cent of blind people are over 50 years of age, although this age group comprises only 20 per cent of the world population”. According to [2] – “There are innumerable or numerous causes which may lead to blindness. Some of the main causes of blindness are ocular complications of diabetes,

macular degeneration, glaucoma, traumatic injuries, vitamin A deficiency, retinopathy of prematurity, blood vessel diseases involving the retina or optic nerve including stroke, infectious diseases of the cornea or retina, ocular inflammatory disease, retinitis pigmentosa, primary or secondary malignancies of the eye, congenital abnormalities, hereditary diseases of the eye, and chemical poisoning from toxic agents such as methanol”.

There are three main types of blindness:

- *Colour blindness* - the people with colour blindness cannot make differences between shades of green and red colours mainly .colour blindness is not considered to be true blindness.
- *Night blindness* - people with night blindness can see only in more illumination and this is not a state of sightlessness as people cannot see in decreased illumination. This kind of blindness is said to be genetically acquired.
- *Snow blindness* - When there is large exposure to ultraviolet rays it leads to loss of sight. Snow Blindness is temporary and is caused due to swelling of cells corneal surface of eyes. Even in the severe case people are able to see movements and shape.

This paper collates popular methods proposed in the recent years to recognize the sign language gestures. Section 2 summaries the survey conducted, and Section 3 concludes the paper.

II. LITERATURE SURVEY

In this section, papers published from 2012 has been reviewed and summary of the same is presented below. The findings have been tabulated in Table 1.



Paper	Description	Drawback
Real-Time Translation of Indian Sign Language using LSTM (2019) [2]	A sensor-based gloves can be used to convert the sign language gestures using the fingering moments of the person.	Low accuracy
Atm Machine for Blind People (2016) [3]	Voice chips are used to produce sound through speaker. Main component of this project is the flex sensor that change the resistance depending on the amount of bend on the sensor	Mainly concentrates on deaf people thus difficulty in communicating with people who does not know sign language.
Two Dimensional (2d) Convolutional Neural Network for Nepali Sign Language Recognition (2018) [4]	The static hand gestures are captured, and the pictures are translated into their respective meanings, using a 2D convolutional neural network. This procedure is mainly used to help the visually impaired people.	The accuracy obtained by using this technique is slightly as the number of signs increases from 5 to 9
Data-Glove for Japanese Sign Language Training System with Gyro-Sensor (2018) [5]	A data glove system that employs a gyro sensor and heuristic algorithm to detect words with palm-turning actions in Japanese sign language.	Need to implement an enrolling function to determine appropriate threshold values for different individuals.
Performance Enhancement by Combining Visuals Clues to Identify Sign Language Motion (2017) [6]	Gloves with colored regions and optical camera are the key elements used in the sign language recognition method. The moment of the colored region are used to identify the motions of hand and fingers.	Low accuracy
Android Mobile App for Real Time Bilateral Arabic Sign Language Translation Using Leap Motion Controller (2017) [7]	For the translation of real time Arabic sign language e, an android mobile application is introduced. The mobile application is designed such that it makes the bi lateral communication for the deaf community easier.	Currently by using this system only 15 sign language words can be obtained. Meanwhile, the recognition of continuous sign language sentences are much complex.
Talking Hands-An Indian Sign Language to Speech Translating Gloves (2017) [8]	For the recognition of sign language, we will be using different sensors which will be integrated onto a glove for detection of gestures and for converting them into speech with the help of a Bluetooth module and android smart phone.	With the use of variety of sensors like flex sensors, gyroscope and accelerometer, the position and orientation of hand gestures can be successfully obtained.
Sensor Based Hand Gesture Recognition System for English Alphabets used is Sign Language of Deaf-Mute People (2018) [9]	A sensor-based device is used to decipher the sign language of a hand gesture for a English alphabet. A hand glove, when put on by a mute person accurately recognizes the hand gestures as 26 letters.	This system uses a simple algorithm to recognise the English alphabet of ASL and real time.
Intelligent glove for sign language communication (2019) [10]	The flex sensor has measured the bent of fingers and movement of a hand transform alphabet and text then show output in form of voice by passing a mini speaker which trapped to a glove for better understanding between disable and normal people.	It has only 7 alphabets and 4 basic words which accuracy less than 100%.
Electronic Device Control Using Hand Gesture Recognition System for Differently Abled (2018) [11]	A real time hand gestures recognition system is used to detect the hand gesture in mid-air and also to control the appliances related to the input gestures. It is hence the combination of hand gesture recognition with real time hand detection by using HOG (Histogram of oriented radiance).	Low quality camera or the physical constraint of training data set.
Design of ATM Accessing System for Blind using Real-Time Video Processing through Gestures (2015) [12]	The possibility of simple hand gesture based input which provides secure transactions.	Gestures should be shown properly, and Indian sign language should be known.
Skill Specific Spoken Dialogues Based Personalized ATM Design to Maximize	To assimilate into conventional ATMs and enable the effective interaction of visually impaired users with the machine.	Fast cash menu option's amounts unpredictable for user to choose from main menu.

Effective Interaction for Visually Impaired Person (2014) [13]		
Hand Gesture based Interface for Aiding Visually Impaired (2012) [14]	K-means Clustering algorithm- will recognize and classify 36 different hand gesture patterns On the basis of generated bit sequences we can assign different tasks to support human computer interaction or sign language.	Threshold values are experimentally defined, Maximum parameters are based on assumption.
Sign Language Recognition Based on Intelligent Glove Using Machine Learning Techniques (2018) [15]	Machine learning algorithm (DROP3) to store each alphabet with sign language with less data sets to train the algorithm	Only classifies for alphabets.
Smart glove-based gestures recognition system for Arabic sign language (2020) [16]	Low Cost smart glove system to recognize hand gestures in Arabic Language.	Cannot be adapted for more than one user at same time, Requires modifying system for board pod
Human Computer Interaction based on Gestural Recognition/ Sign Language to Text Conversion (2018) [17]	Development of an HCI system that will convert sign language to text for hearing impaired people.	Only employed for static gesture.
Sign Language Communication and Authentication using sensor Fusion of Hand Glove and Photometric Signal (2017) [18]	Sign Language Interpretation system by a combination of data glove and photoplethysmography sensor measurements collecting concurrently from data glove and PPG devices.	Sensors recommended was based on only six subjects involved and only four experiments were conducted.

Table 1. Survey

Similar attempts have been made to develop such systems in [19-22]. Furthermore, survey on existing techniques in provided in [23].

III. CONCLUSION

In the previous section, several methods proposed have been summarized and their drawbacks have been pinpointed. To make the accessing system easy to use, we propose to design and develop a safer and secure ATM accessing system for the blind. The idea would be to use a camera to identify the gestures shown in front of the camera. The gestures must be decoded into pin and help the blind navigate through different options concerned with his account. In future this can be implemented in all the places where touch screen is there and also where the blind needs other person assistance in accessing the systems.

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