iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** V **Month of publication:** May 2017

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

A Review on Wearable Hand Gloves Gesture for Disabled People

Kunal Purohit[1], Prof. Kailash Patidar[2]
[1]Research Scholar, [2]Head, Department of Computer Science and Engineering
Sri Satya Sai University of Technology & Medical Science, Sehore (M.P), India

Abstract: ***A gesture is used to classify and recognize a signal that enables communication among the disabled person. It is a technique that can be use to make people feel convenient similar to the behavior of normal people. In this article, the communication toolkit abide of a gesture recognition kit that further subsist of an audio device and hand Gloves with sensors. The sensor captures the gesture passes it to the display panel where the audio device recognizes and speaks up the gesture making proper two way communication between persons. In this paper, we talk about the use of selective panel that depicts what a concern person want to communicate through various set of images stored in it and then speak out using the device. The need of action is depleted due an in built mechanism that would be much more efficient.***

Index terms: Sign Language; Display Panel; Human-Computer Interface (HCI); Kalman filters; Artificial neural network (ANN); Hidden Markov Models (HMM); embedded glass.

I. INTRODUCTION

Body Language takes back their form to the hoary times back at the days when there were no adequate aid of communication known to the society. Nodding the head or making some signs using hands were an amenable means treated at that. Sign language has been a part of life for the individual's disabled persons. As an aid of conversation, Sign language has been utilized for years by the deaf and dumb community of individuals for carrying out interactive communications. It emphasizes on manual and non-manual signals where the manual signs involve fingers, hands, arms and non-manual signs involve face, head, eye and body.

A. Gesture Recognition has Wide Ranging [1] Applications

1) Developing new standards for hearing impaired.
2) To detect the sign language.
3) Communicating through video calls.
4) To allow learning capabilities to be shared from two or more different places through telephonic conversations.
5) Applying various methods for lie detection

Gestures appears in one to many mappings from the concepts to expressions and vice versa. Gestures are completely unpredictable and unclear, that is they are totally unpredictable [2]. Gestures can be either static or dynamic. They carry different types of gesture movements comprising of hand and arm gestures in which the expressions can be made through fingers and wrist including the arm movement..The another type is body gestures that include full body motion for an instance walking style of a person and the way one person interacts with the other, interpret body language.

To make these conversations between certain type of communities as well as some targeted individuals more successful and much more efficient, a different approach is presented in this paper comprising a toolkit with

Detachable parts like wrist wearable tool. The toolkit has two Gloves that the impaired person will wear on wrist when needed. There will be LED light attached to the kit that signifies that it has been properly wore. An audio jack will be connected to the Hand Glove. This will work for those who are blind as well as dumb. The main motive starts with the toolkit which is carried along every time and used whenever the communication is to be carried out between the individuals. Depending upon the location of the environment, the setup provides proper light visibility. After that the connectivity of the kit is established to check the validity of the body language. After confirmation of the image in the database, the gesture will be considered to be recognized. The audio device will play sound regarding that particular gesture having particular connotation, making the communication between the communities successful.

Volume 5 Issue V, May 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

BLOCK DIAGRAM

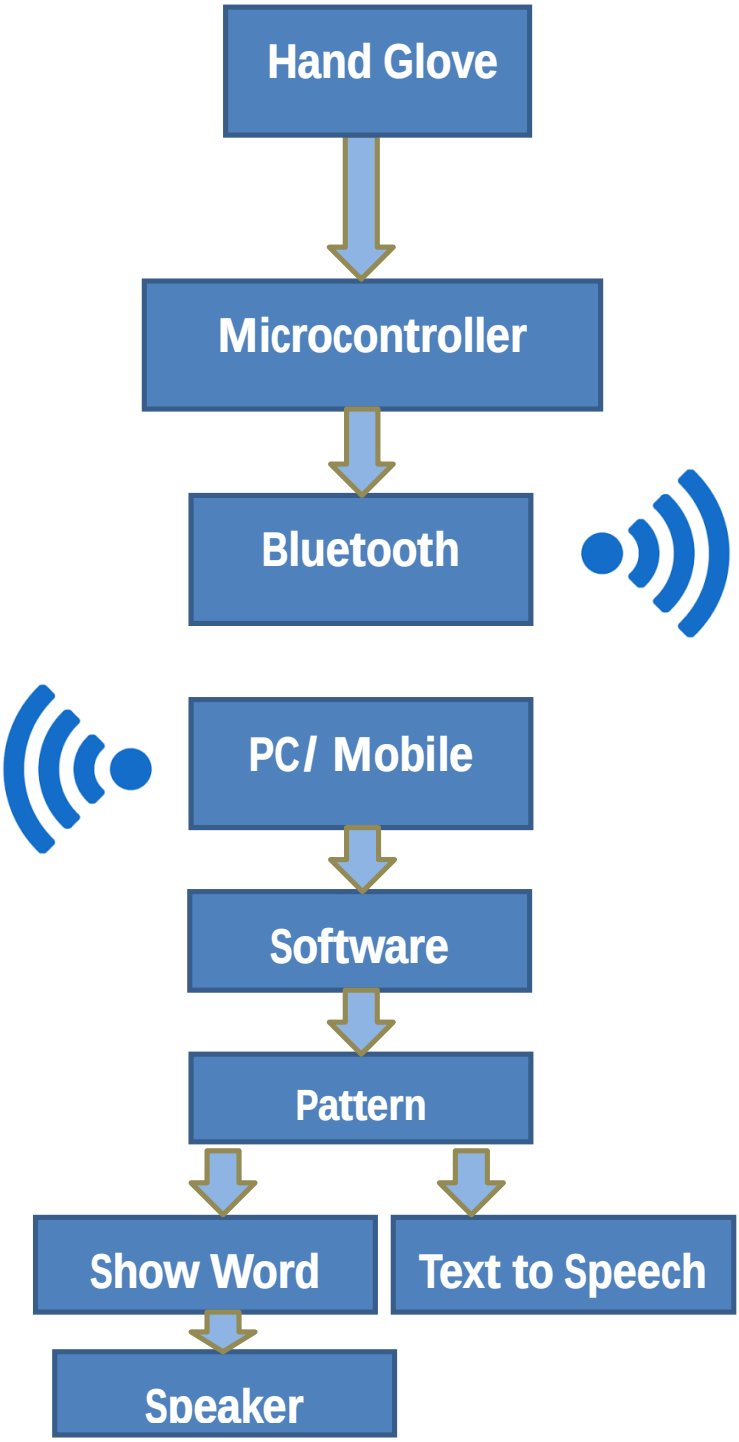


Figure 1: Flow of work

II. METHODOLOGY

A. Flex Sensors

Flex sensors are normally attached to the glove using needle and thread.

Volume 5 Issue V, May 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

They require a 5-volt input to operate and it gives output between 0 and 5 V. As bowing angle of sensor increases defiance of flex sensor also increases. As the sensor varies the output voltage changes accordingly.

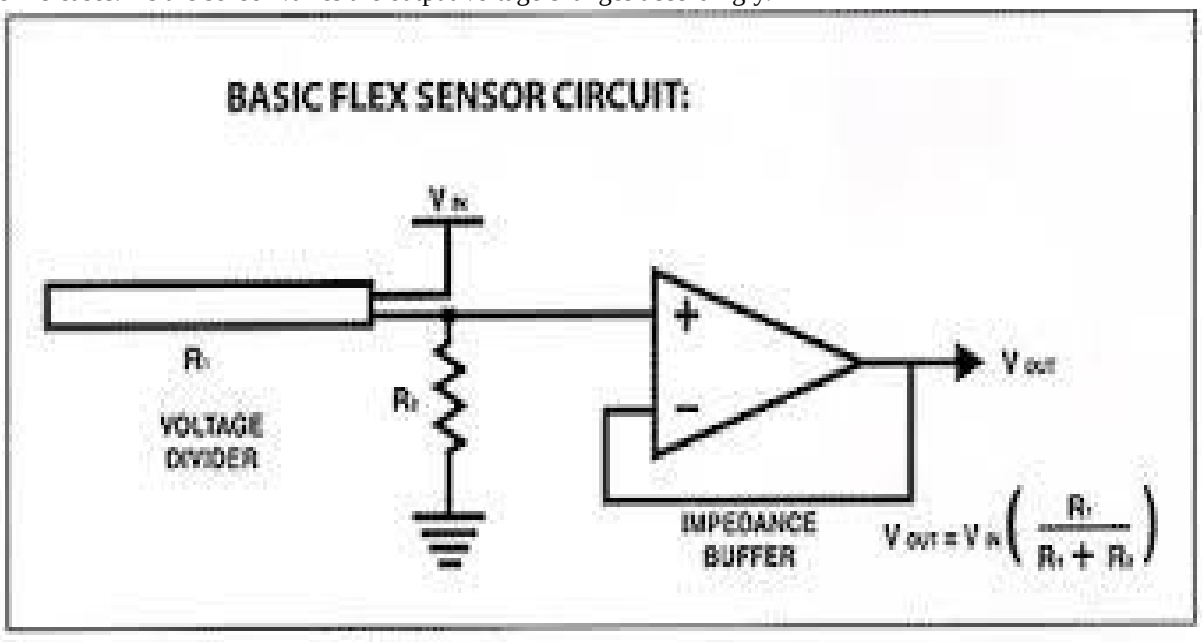


Fig 1.1: Basic Flex sensor Circuit

Flex sensor is simply a resistor which its resistance depending on bend radius.

Here construction of network consists of Flex sensor and 10k resistor. It gets the potential drop across the variable resistor which is the flex sensor and analog value of voltage. This analog voltage is fed to the ADC input pins of the microcontroller. ADC converts the analog value into corresponding digital values and stores in microcontroller's memory. If the voltage value crosses the threshold value, it is recognized as an input.

In this two or three sensors are connected serially and the output from the sensors is inputted to the analog to digital converter in the controller. The outputs from the flex sensors are inputted into LM258/LM358 op-amps and used as a non-inverted style setup to amplify their voltage. Greater the degree of bending, lower the output voltage.

Fig (a) Resistance vs. Angle.

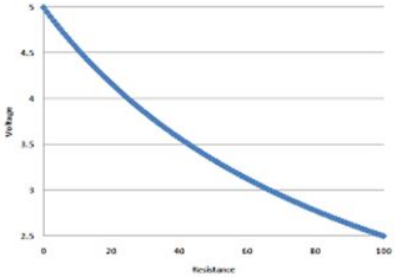
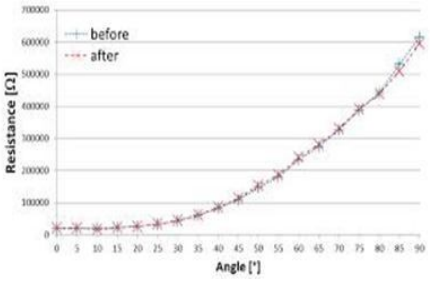


Fig (b) Voltage vs. Resistance.



In this paper, the data glove will be equipped with flex sensors along the length of each finger and the thumb. The flex sensors output a stream of data that varies with degree of bend.

The Analog signal outputs from the sensors will then feed to the PIC (Peripheral Interface Controller) microcontroller. It will process the signals and will perform Analog to Digital signal conversion. The resulting digital signal will be displayed in the system. The gesture will notice and the corresponding text information will be identified.

Text to speech conversion will take place in the voice section and plays out through the speaker. The user will be to know the signs of particular alphabets and he need to stay with the sign for at least two seconds. There are no limitations for signs. It will be tough

to design a standard library of signs. The new sign introduced should be compatible with the software used in the system.
The system can also be built such that it can render words from one language to another. A pair of gloves along with sensors empower speechless people to interact with the public in the prescribed language.
The performance accuracy of this device can be enhanced by expanding the number of sensors in the series. These sensors are attached along with the fingers and thumb. The degree of bowing of fingers and thumb produces the output voltage variation which in turn will convert to analog form. It will generate required voice.

B. Microcontroller (PIC16F877A)

The PIC 16F877A is a low-power, high-performance CMOS 8-bit microcomputer with 8K words of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Microchip's high density nonvolatile memory technology and is compatible with its RISC instruction. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the PIC 16F877A is a powerful microcomputer which provides a highly flexible and cost effective solution for many embedded control applications. The main feature of PIC 16F877A is it that it has in built ADC. This feature is mainly used in our project.

C. Accelerometer

An accelerometer is an electromechanical device that will measure acceleration forces. By measuring the amount of static acceleration due to gravity, you can find out the angle the device is tilted at with respect to the earth. By sensing the amount of dynamic acceleration, you can analyze the way the device is moving. The values of the flex sensors and the motion of the palm detect by the accelerometer and pass it to the micro controller.
Micro controller will pass the values of senses to the application available on the server. Input will be matched with the pattern, saved on the database. Once the arrangement is identified by the interface, it will be displayed. Text to speech converter will convert the text into the speech.

D. System Architecture

Here use of hand gloves with flex sensor which varies resistance when bent the analog values are processed by the PIC 16F877A. The Gestures can be transformed to voice by using a APR 9600 Voice storage and retrieval chip. Prerecorded voices are stored into APR Memory and when reciprocal gestures are received, the opportune voices are reproduced by the APR via speaker.

Fig 1.2 : Hand gloves with flex sensors

III. RELATED WORK

Péter MÁTÉTELKI, Máté PATAKI, Sándor TURBUCZ, László KOVÁCS, "An assistive interpreter tool using glove-based hand gesture recognition" IEEE Canada International Humanitarian Technology Conference - (IHTC) , May 2014.
The main logic of our automatic sign language interpreter consists of two algorithms: sign descriptor stream segmentation and text auto-correction. The software architecture of this time-sensitive complex application and the semantics of the developed hand gesture descriptor are described.

Hamid A. Jalab, Faculty of Computer Science and Information Technology, University of Malaya, "Human Computer Interface Using Hand Gesture Recognition Based On Neural Network", IEEE March 2015.
Gesture is one of the most eloquent and breathtaking way of communications between human and computer. Hence, there has been a growing interest to create easy-to-use interfaces by directly utilizing the innate conversation and management skills of humans.

This paper presents a hand gesture interface for governing media player using neural network. The proposed algorithm develops an alternative input device to control the media player, and also offers different gesture commands and can be useful in real-time applications.

Rama Chellappa, Xilin Chen, and Qiang , "Automatic Face and Gesture Recognition", 2013 10th IEEE International Conference and Workshops.
The IEEE conference on Automatic Face and Gesture Recognition is the premier international forum for research in image and video- based face, gesture, and body movement recognition. Its broad scope includes advances in fundamental computer vision, pattern recognition, computer graphics, and machine learning techniques relevant to face, gesture, and body action, new algorithms, and analysis of specific applications.

M. M. Gharasuie, H.Seyedarabi, ‖Real-time Dynamic Hand Gesture Recognition using Hidden Markov Models‖ , 8th Iranian Conference on Machine Vision and Image Processing (MVIP), 2013 8th Iranian Conference on Machine Vision and Image Processing (MVIP)
Robust Part-Based Hand Gesture Recognition Using Kinect Sensor[2]: Inexpensive depth camera -A Kinect sensor is used to build a robust part based hand gesture recognition, in this paper. As kinect sensors are of low resolution it is hard to identify the hand, but they can capture large objects easily. To deal with the noisy hand gestures which are captured by kinect sensors, the authors are proposed a novel distance metric known as Finger Earth Movers distance. Only the fingers are matched with FEMD but not the whole hand

Zhou Ren, Junsong Yuan, JingjingMeng, Zhengyou Zhang. ―Robust Part-Based Hand Gesture Recognition Using Kinect Sensor‖. IEEE Transactions on Multimedia, Vol.15, No.5, August 2013.
A Kinect sensor is used to build a sturdy part based hand gesture recognition. To deal with the noisy hand gestures which are captured by kinect sensors, the authors are proposed a novel distance metric known as Finger Earth Movers distance.

Blanca Miriam Lee-Cosioa, Carlos Delgado-Mataa, Jesus Ibanezb. ―ANN for Gesture Recognition using Accelerometer Data‖. Elsevier Publications, Procedia Technology 3 (2012).
The authors introduced an Artificial Neural network application used for the classification and gesture recognition. The gesture recognition is done through the wii remote, this remote will rotate in X,Y,Z directions. To reduce the computational cost and memory consumption the gesture recognition is processed in two levels. In first level User Authentication is done for gesture recognition. Accelerometer Based gesture recognition method is used .In second level without any kind of signal processing for gesture recognition Fuzzy automata algorithm has been proposed. After recognizing the data of the gestures , the data was normalized and filtered by k-means and Fast Fourier transform algorithm. Using this Dynamic Bayesian Network The recognition accuracy has increased up to 95%.

Comparision Table

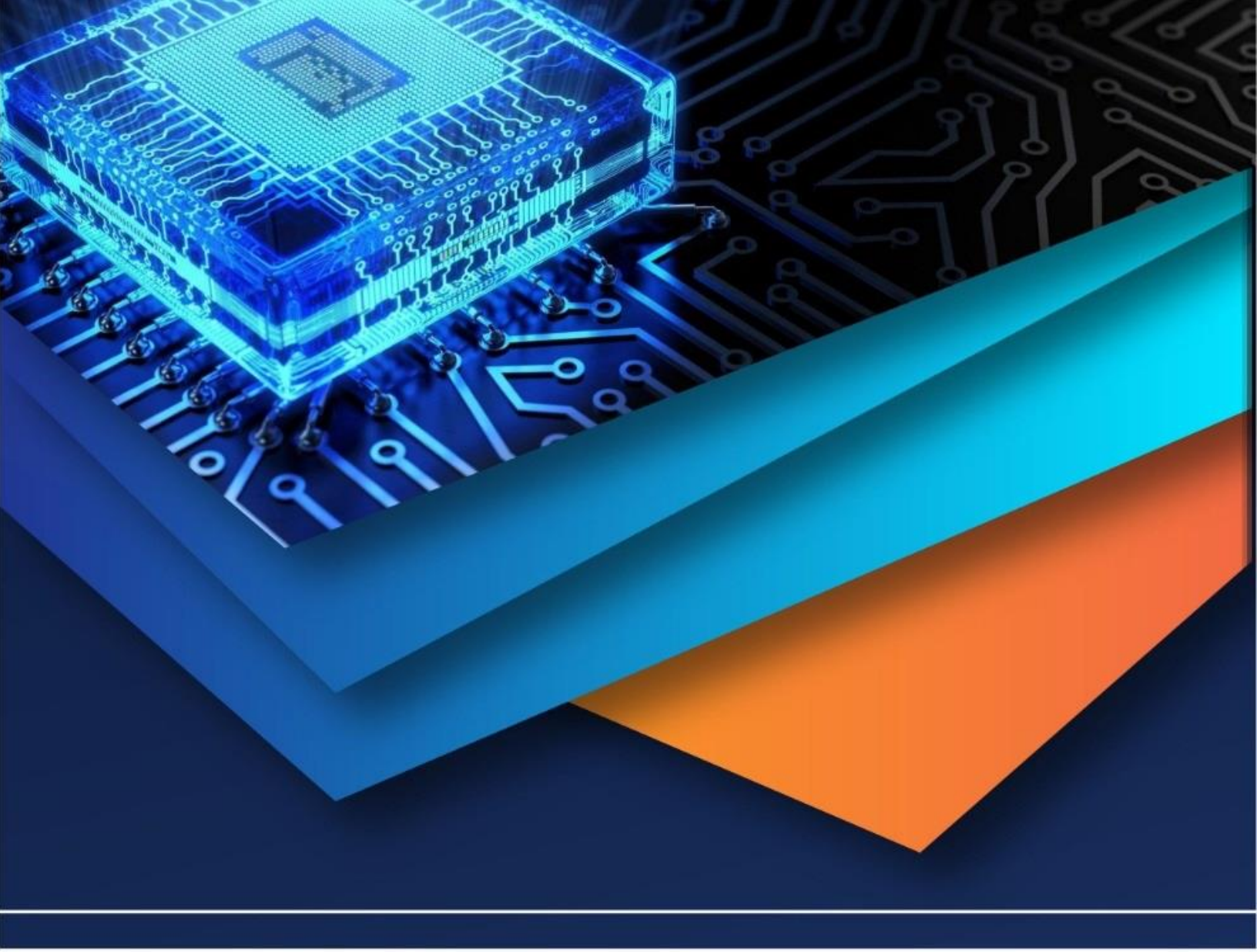
METHOD	ACCURACY	PURPOSE
Hidden Markov Model for data glove.	98.7%	Spatio temporal variability is reduced.
Multiscale Gesture Model.	88%-96%	Segmentation and recognition of the hand.
Accelerometer-Based gesture recognition, k-means and Fast fourier transform algorithm.	Upto 95%	Recognition and normalization and filtering the gestures.
Novel hand gesture recognition scheme, SVM classifier.	95%	3D recognition of hand gestures.
CAMSHIFT algorithm, PCA algorithm.	93.1%	Recognition , Segmentation and normalization of hand gestures.
Discrete Hidden Markov Model.	ranges from 93.84% to 97.34%	Recognition for dynamic hand gesture
Finger Earth Movers distance metric method.	Upto 93.2%	Only fingers of the hand are recognized.

IV. CONCLUSION AND FUTURE SCOPE

The main motive is to provide an efficient communication between the impaired and normal human being. This covers wide number of audience like there is not always the case that the person interacting with the disabled might not be normal so it takes into account the deaf and dumb community through variety of cases included in the toolkit itself. The wide number of gestures in the database can store a limited number of gestures depending upon the provided memory. This allows a numerous gestures to be stored as well as making the use of audio device alongside their functionality.

REFERENCES

[1] L. Lisetti and D. J. Schiano ," Automatic classification of single facial images," Pragmatics Cogn., vol. 8, pp. 185–235, 2000
[2] Sushmita Mitra and Tinku Acharya ," Gesture Recognition: A Survey,IEEE transactions on systems, man, and cybernetics—part c: applications and reviews, vol. 37, no. 3, may 2007, 311
[3] Stenger, B., Mendonca, P. & Cipolla, R.,"Model-Based 3D Tracking of an ArticulatedHand. In IEEE Conference on Computer Vision and Pattern Recognition", (2001) 310–315
[4] G. R. S. Murthy & R. S. Jadon ," a review of vision based hand gestures recognition, International Journal of Information Technology and Knowledge Management" July-December 2009, Volume 2, No. 2, pp. 405-410
[5] L. R. Rabiner " A tutorial on hidden Markov models and selected applications in speech recognition," Proc. IEEE, vol. 77, no. 2, pp. 257–285, Feb. 1989
[6] S. Mitra and T. Acharya," Data Mining: Multimedia, Soft Computing, and Bioinformatics. New York: Wiley, 2003.
[7] Peter Vamplew ," Recognition of sign language gestures using neural networks", ProcEuro.. Conf. Disability, Virtual Reality and Assoc. Tech., Maidenhead, UK, 1996.
[8] Byung-Woo Min, Ho-Sub Yoon, ungJ Soh, Yun-Mo Yang, ToshiakiEjima," Hand Gesture ecognitionR using Hidden Markov Models", 1997, on IEEE, 199
[9] Meide Zhao, Francis K.H. Quek, Xindong Wu,"RIEVL: RecursivInduction Learning in Hand Gesture Recognition", 1998, IEEE transactions on pattern analysis and machine intelligence, Vol. 20, No. 11, IEEE, 199
[10] Sharon Peperkamp, Jacques Mehler," Signed and Spoken Language: A unique underlying System" 1999
[11] Hyeon-Kyu Lee, Jin H. Kim, "An HMM-Based Threshold Model Approach for Gesture Recognition", IEEE transactions on pattern analysis and machine intelligence, Vol. 21, No. 10, IEEE, 1999
[12] Masumi Ishikawa, Hiroko Matsumura ,"Recognition of hand-gesture based on self organization using a data glove", 1999, on IEEE, 1999
[13] Claudia Nolker, Helge Ritter," Visual recognition of continuous hand postures", IEEE transactions on neural networks, Vol. 13, No. 4, IEEE, 2002
[14] Greg S. Schmidt, Donald H. House ,"Towards model-based gesture recognition", Deptt. Of computer science, Texas A&M University.
[15] Md. RezwanulAhsan, Muhammad IbnIbrahimy, Othman O.alifaKh ,"Electromyograpghy (EMG) signal based hand gesture recognition using Artificial Neural Network (ANN)", 2011, 4th International Conference on Mechatronis (ICOM), IEEE, 2011
[16] Shekhar Singh, Akshat Jain, Deepak kumar ,"Recognizing and interpreting sign language gestures for human robot interaction", 2012, International Journal of Computer Applications, 201
[17] Shoaib Ahmed V. et al. ,"Magic gloves (hand gesture recognition and voice conversion system for differentially able dumb people", 2012, Tech Expo-The Global Summit, 2012
[18] PingalePrernaRambhau et al.," Recognition oftwo hand gestures of word in British Sign Language(BSL)", International Journal of Scientific and Research Publications, Vol. 3, Issue 10, October 2013
[19] ChetanDhule, TruptiNagrare ," Computer vision based human-computer interaction using color detection techniques", 4th International Conference on Communication Systems and Network Technologies, 2014.
[20] Neha S. Chourasia, Sampa Barman," hand gesture spotting using sign language through computer interfacing", International Journal of Engineering Research and Applications, January 2014
[21] ChaowananKhundamet al," First person movement control with palm normal and hand gesture interaction in virtual reality", 12th International Joint Conference on Computer Science and Software Engineering (JCSSE), 2015.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY