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Gesture Based HCI and Sign Language Recognition Using Kinect Sensor

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Abstract: ***Communication is essential for human life. But people who are unable to hear, communication is a dispute. To recognize, one has to learn their language. The proposed system aims for tackle this difficulty to some level. The inspiration is that who are unable to hear can cooperate with ordinary persons with help of sign language and this sign language can imprison with the help of sensor and output will be generate in speech so ordinary person can easily recognize sign of person who are unable to hear what exactly they want to say. communication will be done in bidirectional manor it means the normal user can speak in their response and dialogue can be converted into sign language, so persons who are unable to hear can also realize what he want to exactly say. In order to achieve natural human-computer interaction (HCI), a human hand can also be taken as an input device. Starting its early survival, personal computers think that all persons have no abnormality while using their hands, arms, and feet for interact. Yet, person with physical disabilities it is hardly probable to achieve computer because of boundaries of current interfaces, access devices, like mouse and keyboard. Persons who are physically disable badly needs a new edge to manage personal computers in the same way as general persons do. The system, describes a way for user interaction with the computer so that person will able to interact easily with the computer with the use of mouse pointer and with the help of hand movements.***

Keyword: ***kinect sensor, sign language recognition, Motion control, voice recognition.***

I. INTRODUCTION

Sign language is a language which uses manual communication and body language to convey meaning, as opposed to acoustically conveyed sound pattern. This can involve simultaneous communication combining hand shapes, orientation and movements of hands, arms or body, and facial expression to fluidly express a speakers thought. In all around the world about 9.1 billion peoples who are deaf. In their day to day life they have to face lots of problems while communicating. Our system can be used to reduce the communication gap between the normal people and disabled people.

The concept is for peoples who are unable to hear can communicate with normal peoples using sign language and this sign language will be capture by the sensor and output will be generated in speech so normal user can easily understand sign of person who is deaf. This all communication will be perform in both the way it means the normal person's voice response will be

converted into sign language, therefore deaf person can also understand what he wants to say. There is always a communication difficulty existing between a normal person who is unaware of the sign language and wishes to communicate with a deaf person. The concept of the project is to overcome these difficulties.

Sign language is a visual language used by deaf people, which consists of two types of action: signs and finger spellings. There is a communication difficulty existing between a normal person who is unknown of the sign language system and needs to correspond with a deaf person. The aim of the project is to conquer these problems. The intended sign gestured by the user is to be converted into its equivalent alphabet using an edge which will preferably detect the exact demonstration from its records of existing gestures and display it on screen.

II. LITERATURE SURVEY

Most of the research works in sign language recognition is based on ASL (American Sign Language). ASL is popular in the field of research and development. On the other hand ISL (Indian Sign Language) has been standardized recently and its recognition is less explored. The earliest reported works on sign language recognition is mainly based on data glove based methods. In this method ex sensors and Accelerometer sensors was used. The method is based on grouping of alphabets based on gestures they denote. This makes gesture recognition simpler. These methods are not user friendly and are more expensive. Later system uses red markers to recognize the gestures. This increases the accuracy rate of recognition the system is limited to minimal gestures to control PCs. Red markers may inconvenience the user. Next system describes a mechanism of gesture recognition using contours. This eliminates the need of external devices and a marker, simple webcam is sufficient. But the drawback of this system is that System is limited to minimal gestures. The next system which we studied is based on mobile interactive application software for translation of American Sign Language to speech. But the system is having drawback that system does not perform of bidirectional communication. It only performs communication in one direction.

III. EXISTING SYSTEM

In recent years, sign language has been widely studied based on multiple input sensors, such as web camera, vision based system, and so on.

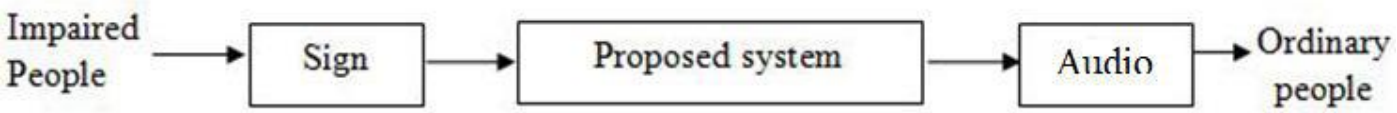
1. **Web camera based SL recognition:** This technique that uses web camera to capture the actions performed by impaired person. The webcam captures the image of the hand gesture and abstracts the features by using SFIT algorithm. It matches the key points of captured image with key points of previously stored images. As the resolution quality of web camera is not good, it becomes difficult to achieve the accuracy.

2. **Vision-based SL recognition:** In vision-based SL recognition, the key factor is the accurate and fast hand tracking and segmentation [3]. It uses image processing algorithms to detect and track hand signs as well as facial expressions of the signer, which is easier to the signer without wearing gloves. However, it is very difficult for the complex backgrounds and also there is accuracy problem related to image processing algorithms.

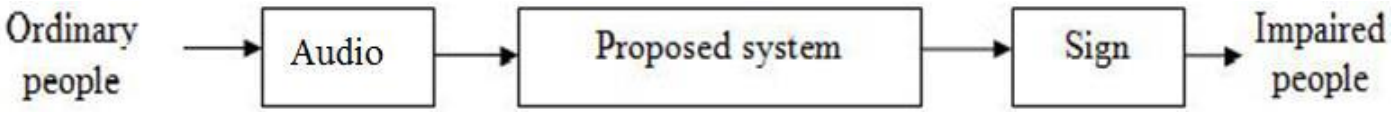
IV. PROPOSED SYSTEM

The system is mainly for deaf people who can interact with normal people using sign language. This sign language can generate by the sensor and output will be capture in speech so normal people can easily recognize sign of person who are unable to hear. This all communication will be performed in both the way it means the normal person will speak and voice will be transformed into sign language, so that deaf person can also recognize what normal person wants to say.

To accomplish natural human-computer interaction (HCI), a human hand will be taken as an input device. From its early survival, personal computers consider that all users have no abnormalities in using their hands, arms, and feet for interaction. Therefore, for users with physical disabilities it is hardly possible to control computer due to the limitations of existing interfaces, access devices, such as mouse and keyboard. Users with physical disabilities badly needs new interface to manage personal computers in the same manner as common users do. Two or more impaired persons can communicate with each other through this language. But it has been observed that they find it very difficult to interact with the society, because not everyone in society is well familiar with the sign language also normal people find it difficult to understand their sign language. So to bridge the gap between normal people and impaired people this system is proposed. In the early days this gap is bridge by the mediator who converts the sign language into natural language and vice versa. It is not necessary that every time the mediator will be available 24X7. So to solve this problem and make ease of the new technology the proposed system is developed. The proposed System act as the mediator between impaired people and normal people. In Mode 1 the system is initiated by the impaired person. When impaired person want to communicate with normal person then he gives the input as sign to System through Kinect camera. These actions are captured by the Kinect camera. System performs Processing on captured sign and produces text and audio as output. That is understood by normal people as shown in below Figure.



In Mode 2 the system is initiated by the normal person. When normal person wants to communicate with impaired person then he gives input as audio. This input is accepted by the microphone which is fitted on the base of Kinect camera. System performs processing on audio and converts it into text. Based on this text pattern matching is done. Once the match is found then the relevant images are displayed. As shown in below Figure. In this way the system converts sign to text and vice versa.



V. SYSTEM ARCHITECTURE

1. **Sign to Audio/Text Conversion:**

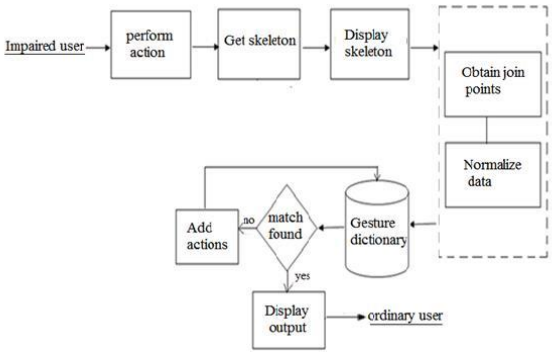


Fig 1: Block Diagram of mode 1

In the mode 1, Sign to Audio conversion takes place as shown in Figure. The input to the system is the action performed by the impaired person. The Kinect camera will capture the actions of human body and displays the skeleton of the human on the screen. In this phase the appropriate joints are obtained from the skeleton in order to calculate the distance. Distance will be calculated with respect to spinal cord, it gives the numeric values when user performs the actions. From this calculation the actual action is obtained by its numeric result. It is matched with the dictionary. If match is found then relevant audio output is generated. If particular action is not stored in dictionary, user can dynamically add that action into the dictionary.

2. **Audio to Animated sign Conversion**

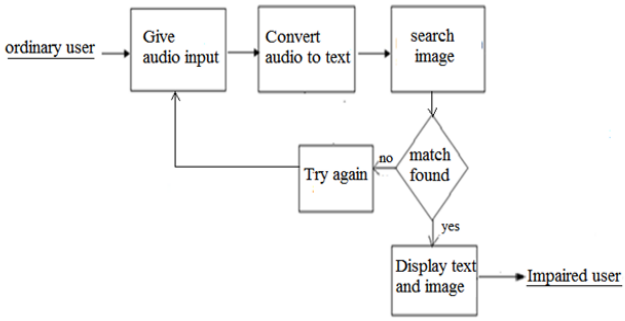


Fig 2: Block Diagram of mode 1

In mode 2, Audio to Text and Animated sign conversion takes place as shown in Figure. The input to the system is the audio input given by the ordinary person. This audio is nothing but the message that ordinary person wants to convey. The Kinect camera will capture the audio through microphone. This audio is then converted into text. The text is nothing but the relevant name given to the audio input. Because of this pattern matching is performed easily. If the relevant image is match according to the text then the sign as well as text is displayed. This helps the impaired to understand what the normal person has conveyed.

3. HCI(Human Computer Interaction)

In mode 3 Using HCI normal user or deaf person can handle the PC. Normal or deaf person can interact with system. The operating environment is a simulated computer desktop containing several object such as window and icons that simplifies the user interface and allows better control over test session. Gesture, both using full arm and only using fingers. User can perform gestures, both using full arm and only using fingers. In this mode, user can select any application which user want perform same action like double click, handle mouse point etc. open application and use it.

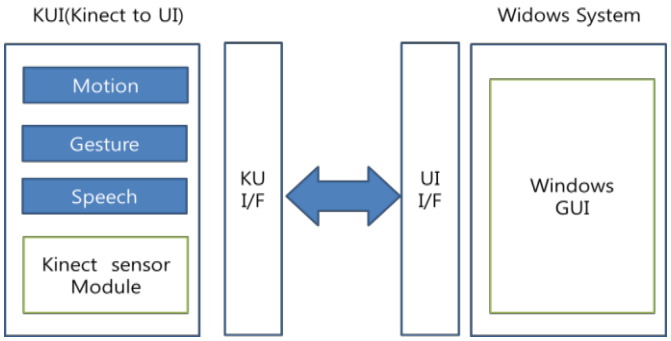


Fig 3: Kinect sensor-based Windows control interface

VI. RESULT

In interactive sign language there are two modes, such as
1. Sign to Audio Conversion
2. Audio to Sign Conversion

Below diagram shows first GUI form of our project. GUI shows the different options for selecting the mode which user want. Normal user gives the input to the Kinect in sign language like finger spelling, sign language etc. and all signs are already stored in gesture file which is nothing but the database. User perform gesture in the front of Kinect camera the Kinect capture that action and match with sign which is already stored in database. If it is match then provide user relevant output or we can say output is given to the normal personal in audible form, same operations perform at normal user side vice versa.

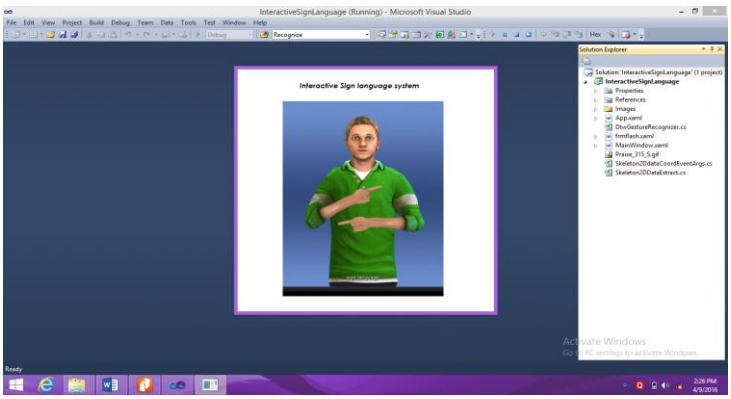


Fig 4: GUI form 1.

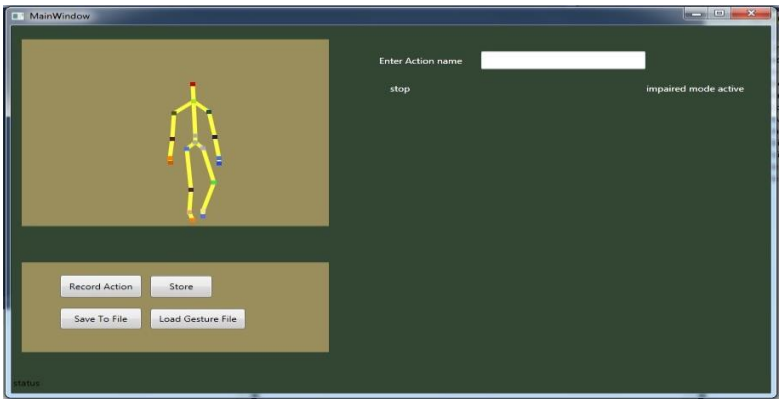


Fig 5: GUI form 2.

Below diagram shows the output of audio to sign conversion. When normal user gives the input in the audible form Then kinect capture that audio and display the output in sign form or we can say in animated images

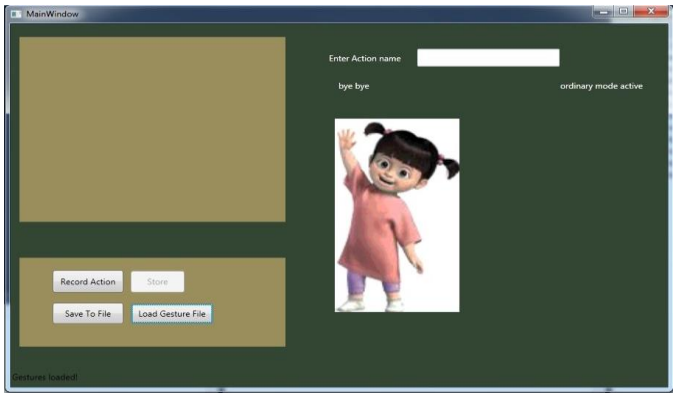


Fig 6: GUI form 3.

Human Computer Interaction (HCI):
When the Kinect sensor capture the gesture then user can select the application which user want.

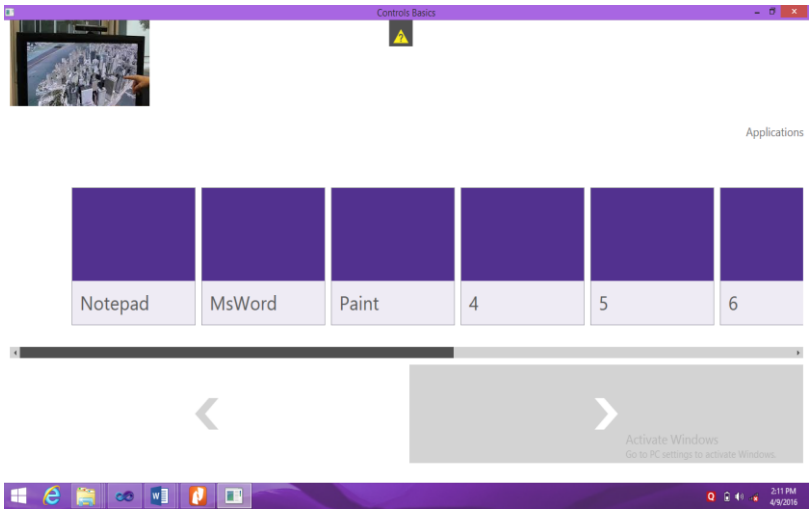


Fig 7:(HCI) GUI form1.

Fig.8: (HCI) GUI form2

Below diagram shows the human computer interaction which shows the interaction between normal as well as deaf user with the system. User can handles the mouse pointer using hand gesture and select any application then open it which user want.

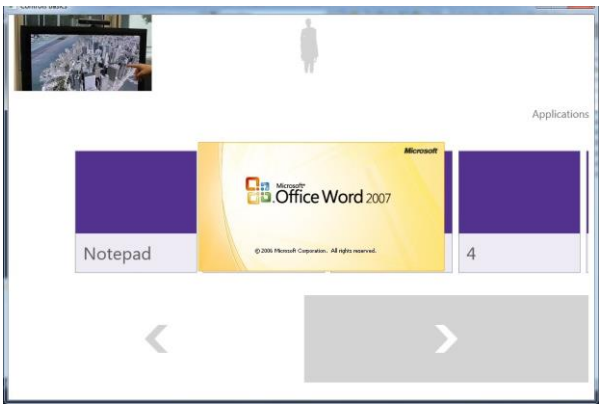


Fig.9: (HCI) GUI form2

VII. FUTURE SCOPE

The Project will introduce new technology using Kinect sensor including the following:

1. Sign language recognition:
Sign Language is the standard language designed particularly for impaired people. Basically this is based on movement of hands, which is taught to them in their school .Two or more impaired persons can communicate with each other through this language.

2. Speech recognition:
A portable appliance converts gesture-based inputs from a signer to audible speech in real time a natural language processor is used to transform the gesture classes into grammatically correct sequences of words. A speech synthesizer converts the word sequences into audible speech.

3. Navigate the power-point slides:
Ability to operate power point slides , which means user can navigate the slides using hand gesture. User can change the slide using hand movements.

CONCLUSION

System will help for easier interaction and communication with impaired people. It acts as mediator between impaired User and Ordinary User. They can easily convey the messages to each other by this System. While communicating, User can also add as many signs into the dictionary along with its corresponding meaning. The experimental results show that the system is working system for native Indian sign language recognition. This proposed system can be enhanced to recognize for continuous sentences.

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REFERENCES

1. D.Martinez, “MSc Thesis - Sign Language Translator using Microsoft Kinect XBOX 360TM”, VIBOT 5. , Department of Electrical Engineering and Computer Science, Computer Vision Lab, University of Tennessee.

2. Neha Poddar, Shrushti Rao, Prof. Sumita Chandak, “Study of Sign Language Translation using Gesture Recognition”,International Journal of Advanced Research in Computer and Communication Engineering, Vol. 4, Issue 2, February 2015.

3. Gowri, Vidhubala, “Sign Language Recognition for Deaf and Dumb People”, IJRET, Vol. 3, Issue: 07, May-2014.

4. Hussana Johar R.B, Priyanka A, Revathi Amrut M S, “Multiple Sign Language Translation into Voice Message”, International Journal of Engineering and Innovative Technology (IJEIT) Volume 3, Issue 10, April 2014.

5. Hee-Deok Yang, “Sign Language Recognition with Kinect sensor”, IJERT, May 2014.

6. Praveen Kumar Sharma, Rohan Sheoran, Dinesh Kumar Kathania, “A Study of Hand Gesture Technique to

7. Communicate with a Robot”, IJERT, Vol. 4 Issue 01, January-2014.

8. Van Bang Le, Anh Tu Nguyen, “Hand Detecting and Positioning Based on Depth Image of Kinect Sensor”, International Journal of Information and Electronics Engineering, Vol. 4, No. 3, May 2014.

9. Lee Sang Hyuk, Oh Seung Hyun, “Kinect Sensor based PC Control Interface for Handicapped Users”, SERSC, Vol. 24, pp. 49 - 52, 2013.

10. Junsong Yuan, “Robust Part-Based Hand Gesture Recognition Using Kinect Sensor”, IEEE Transactions on Multimedia Vol. 15, NO. 5, August 2013.

11. Zhou Ren Jingjing Meng Junsong Yuan, “Robust Hand Gesture Recognition with Kinect Sensor”, IJERT, December 1, 2013.

12. Rung-Huei Liang, Ming Ouhyoung,” A Real-time Continuous Alphabetic Sign Language to Speech Conversion VR System”.

13. Siddharth S. Rautaray, Anupam Agrawal,” Real time hand gesture recognition system for dynamic applications”.

14. Sahib Singh1, Dr. Vijay Kumar Banga,”Gesture control algorithm for personal computers”.