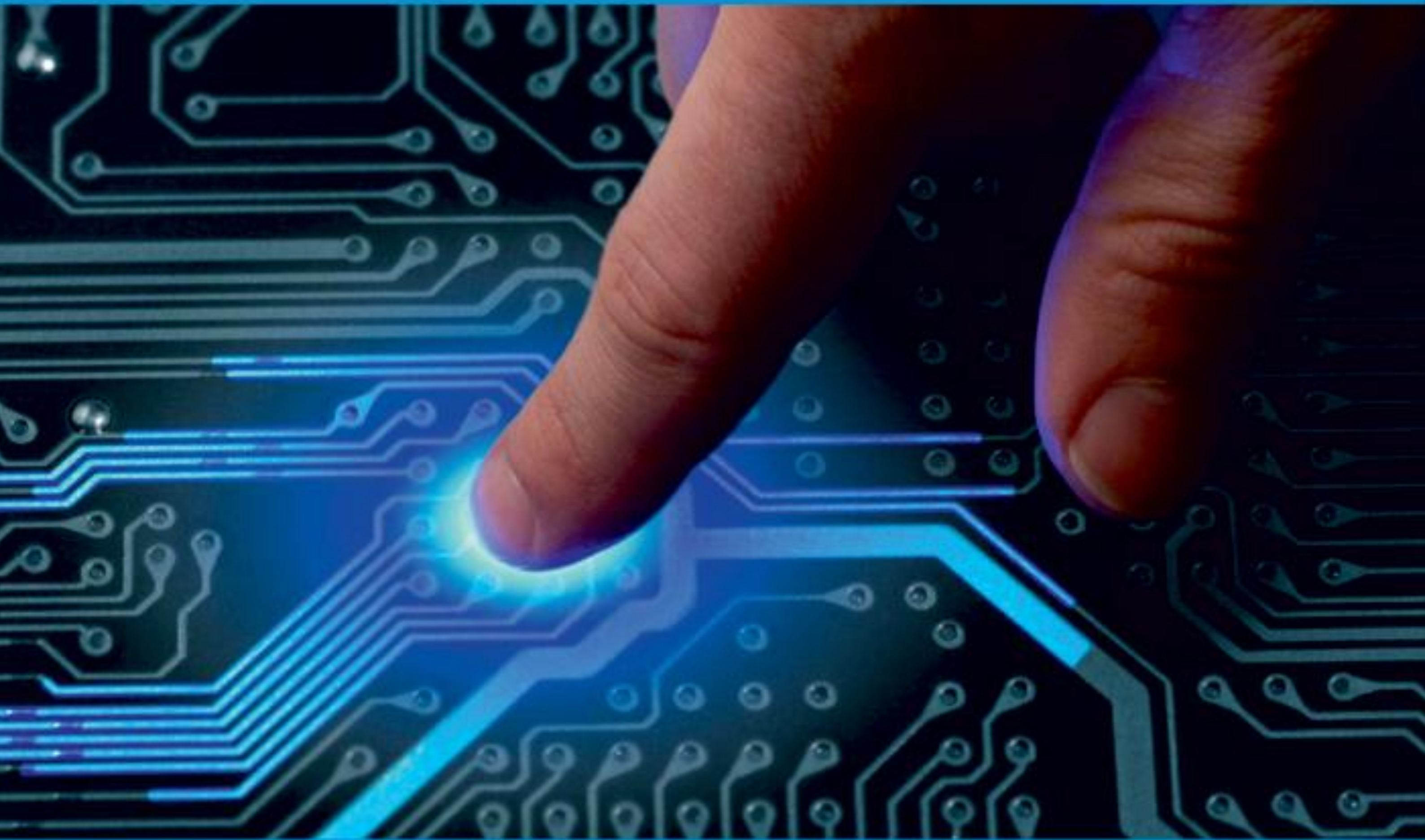
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 2, April 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

Gesture-To-Speech Conversion for Differentially Abled People Using Flex Sensors

Mr. K Pradeep[1] B.E., M.E., Sowbarnikha V N[2], Sinduja K[3], Sruthi S[4], Thenmozhi M[5]

Assistant Professor, Dept of ECE, Velalar College of Engineering and Technology, Erode, Tamil Nadu, India[1]

UG Students, Dept of ECE, Velalar College of Engineering and Technology, Erode, Tamil Nadu, India[2 3 4 5]

ABSTRACT: A new survey conducted in India reveals that millions of people suffer from hearing and speech impairments. According to WHO estimations, there are roughly 63 million individuals in India who have a major impairment in their hearing. People with disabilities find it difficult to express their emotions and to interact with others in their daily lives. Individuals with disabilities typically communicate with one another through sign language, which is challenging for non-disabled individuals to grasp. It is difficult for people with disabilities, as well as normal people, to learn these sign languages. We have designed smart gloves that allow people with disabilities to communicate what they want without anyone's help. Flex sensors are used in its design to translate sign language into text and speech signals. Our main objective of this project is to reduce the difficulty of communicating with differentially abled and elderly people and improve the interaction. The flex sensors sense the bend in the finger based on the movement of the fingers, and they adjust the resistance output accordingly. It can receive a wide range of commands because of its adaptability and resistance. It is interfaced with the help of Arduino UNO. Also, with the help of GSM, the message is transmitted to the caretaker's mobile number.

KEYWORDS: Sign language; Flex sensors; Differentially abled people; Resistance; Arduino UNO

I. INTRODUCTION

With the absence of facilities that a normal person should have, it is exceedingly difficult for deaf and dumb individuals to communicate with regular people in today's environment. Even though technology has advanced quickly in this digital era, sign language remains the primary means of communication for the deaf and silent. While connecting with those who are conversant in sign language can benefit from using it as a communication tool, there are still issues when interacting with the general public. The best tool for enabling deaf and silent persons to communicate effectively through technology in multiple languages is a sign language translator.

It is also difficult for them to socialize and they will not be able to voice out their opinions. This is the same case with paralyzed people. They will not be able to move or communicate. So, the gloves we have designed allows the person with disabilities to communicate what he/she wants without anyone's help.

We have proposed a data glove-based approach because the result obtained is accurate, feasible, and also portable. Based on the movement which is done by the fingers, the flex sensors detect the bend made by the finger and the output is varied in terms of resistance. Due to its flexibility and large range of resistance, many commands can be fed into it. We have used Arduino uno for more storage and faster response.

II. RELATED WORK

H. S. Kala,Sushith Rai developed a device for Gesture to Speech Conversion for the Mute Communit.A framework which will distinguish static hand indications of letters so as in Yankee signing (ASL). The framework devours low power and it's versatile. The device glove define aboard the fabric device helps in decreasing the uncertainty in signals and shows increased exactitude.[1]

Keshav Mehrotra, Amit Saxena, Khushboo Kashyap, Harmeet Kaur, Abhishek Tandon has designed the Augmentative and Alternative Communication using Smart Glove. A wearable framework has been designed supported breathable

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

material and FSS. varied machine learning algorithms were accustomed validate the framework. It eliminates the total idea of direct contact of the skin with the sensors planted on the wristband there by boosting the solace.[2]
Pravin Bhalghare, Vaibhav Chafle, Ameya Bhivgade, Vaibhav Deokar has designed the Multipurpose smart glove for deaf and dumb people. A supple sensible wristband that has strain gage sensors and readout physics embedded thereon are accustomed establish the hand movements. [3]

Geetha M, Rohit Menon created the Gesture articulatio radiocarpea is intended that permits the employment to speak with the wearable computers with the use of Gesture based mostly injection. Hand and forearm movements are known by this band. [4]

Kusurnika Krori Dutta impelemented with the employment of image process and AI, various algorithms and techniques are created. [5]

III. PROPOSED SYSTEM

A. ***Overview***:
The proposed model is designed with the help of Flex sensors, an Arduino UNO, an LCD display, and a speaker. Smart gloves are used by differentially-abled or elderly people to communicate their basic needs. The movement of the finger is converted into a command. Flex sensors generally detect the amount of bending and deflection. As the bending increases, the resistance also increases. Based on the surface linearity, the flex sensor resistance also increases. Arduino UNO will receive the input given by the flex sensor through its analog port (A0).

B. ***Block diagram***:

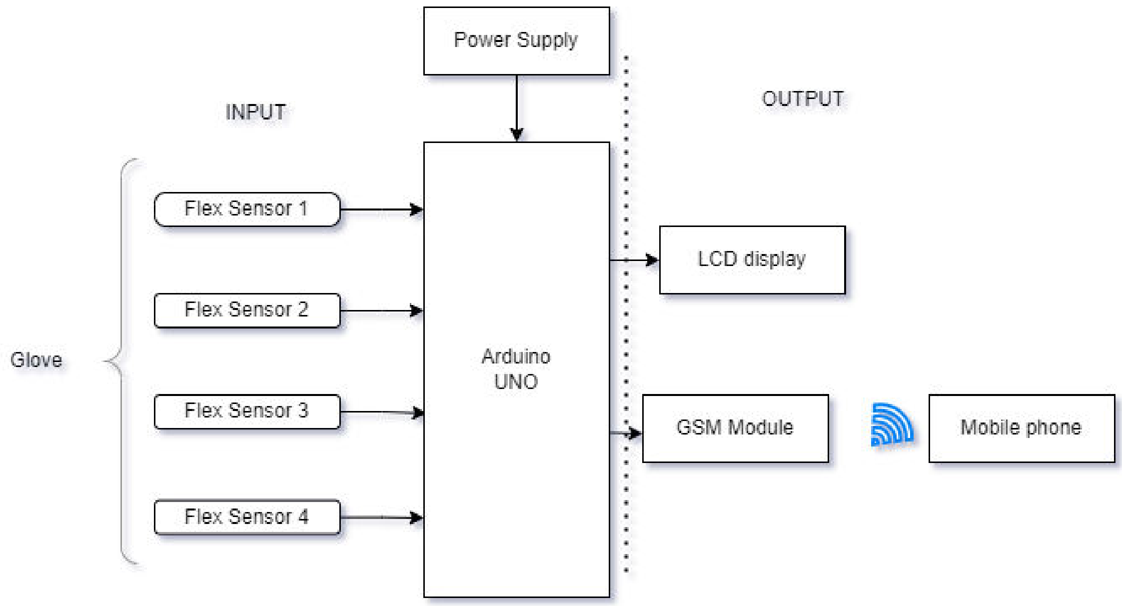


Fig. 1. Block diagram

The following block diagram shows the Flex sensors, an Arduino UNO, a GSM module, and an LCD display. The flex sensors included inside the gloves are connected to the Arduino UNO module. Furthermore, we may receive texts on our phones thanks to the connection between the Arduino UNO and GSM modules.

C. **Working principle:**

Flex sensors typically measure how much a surface bends and deflects. The resistance rises in tandem with the bending. The flex sensor resistance likewise rises in accordance with the surface linearity. A person simply signals to

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

others by waving their hand when they need to communicate. Their gloves have flex sensors, which allow them to measure the deflections in resistance caused by hand movements. To the Arduino UNO, these are sent. The predetermined resistance levels for each and every hand signal are shown here. At this point, the predetermined resistance value and the resistance value of a real-time gesture are compared.

The message is also sent to the registered caretaker's cell phone via the GSM module. We utilized the SIM900A GSM module for this. This GSM module is small, dependable, and capable of low-power long-distance transmission. It can send and receive mobile messages and calls using the frequencies 900 MHz and 1800 MHz.

If the person encounters any emergency situations, then by giving a gesture, the emergency alert will be sent to the caretaker's mobile number through this GSM module.

IV. RESULTS

Fig. 2. Software implementation

The software for this project is written in the C language on the Arduino IDE platform. This is then verified and successfully uploaded to the Arduino UNO.

The software implementation is shown in Fig. 2.

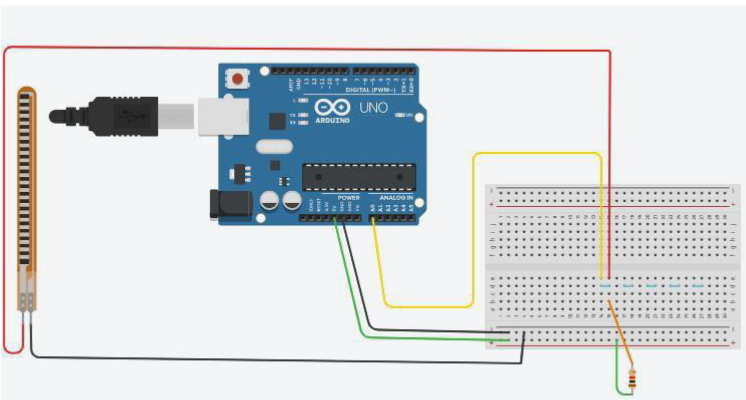


Fig. 3. Connection of Flex Sensor with Arduino UNO

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

Fig. 3. shows the connection of the flex sensor with the Arduino UNO. While connecting the flex sensor with the Arduino, it is necessary to connect a resistor to prevent flex sensor damage. In the same way, all Flex sensors are connected to the Arduino UNO.

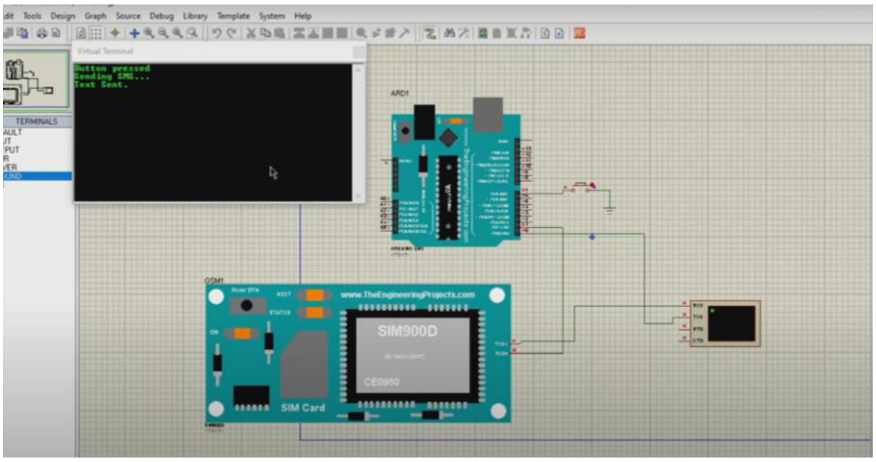


Fig. 4. GSM interfacing with Arduino

Fig. 4. shows the interfacing of the GSM module with the Arduino UNO in proteus software.

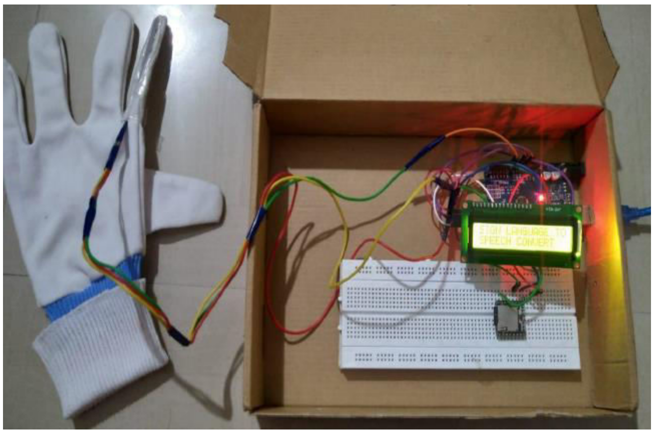


Fig. 5 Hardware implementation

Fig. 5 shows the hardware implementation of the project, which consists of flex sensors that are embedded in the gloves and an Arduino UNO module.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

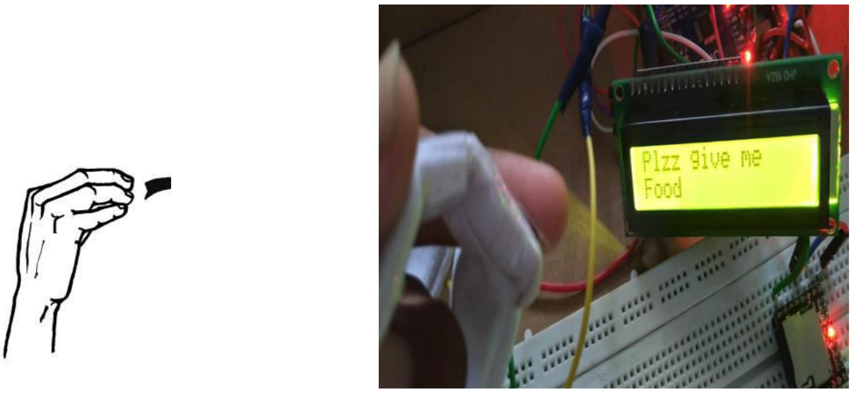


Fig. 6. Output for Gesture to Ask for Food

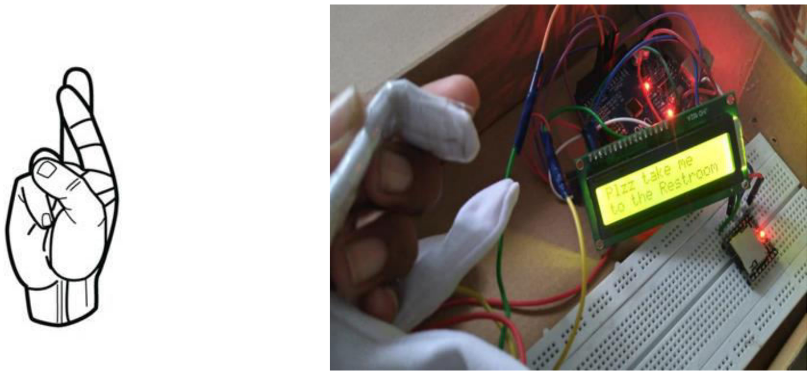


Fig. 7. Output for gesture to asking for restroom

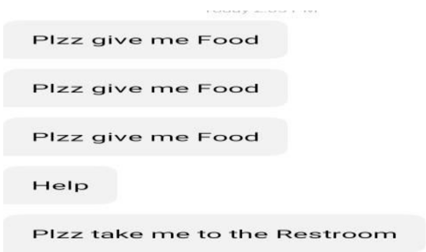


Fig. 8. Output received on mobile phone through GSM module

V. CONCLUSION AND FUTURE WORK

Through continuous advancements in technology and design, we strive to break down barriers and empower individuals with impairments to live more fulfilling and independent lives. Furthermore, the IoT integration can be tailored to each individual's specific needs and preferences, allowing for personalized control and customization of their living space. Moreover, the incorporation of a GPS chip into the gloves allows caregivers or loved ones to track the wearer's location in real-time, providing an added layer of safety and peace of mind. With the help of this creative solution, people may now comfortably explore their homes and surroundings while simultaneously improving accessibility and encouraging autonomy.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

People with disabilities can become more independent and in charge of their living environment by easily combining our smart gloves with IoT house management. People can carry out daily duties more easily and conveniently if they can utilize basic hand gestures to remotely control domestic appliances like fans, lighting, and other gadgets."

REFERENCES

1. Kala,Sushith Rai H.S , "Gesture to Speech Conversion for the Mute Conversion," IEEE Comput. Graph. Appl., vol. 14, no. 1, pp. 30–39, Jan. 1994
2. Keshav Mehortra, Amit Saxena, Khushboo Kashyap, Harmeet Kaur, Abishek Tandon, ''Augumentative and Alternative Communication using Smart Glove''SIGCHI Bull., vol. 23, no. 2, pp. 67–74, Apr. 1991.
3. Pravin Bhalghare, Vaibhov Chafle, Ameya Bhiygade, Vaibhov Deokar, "Multipropose smart glove for deaf and dumb people," in Proc. Conf. Human Factors Comput. Syst., 1991, pp. 237–242.
4. Geetha M. Rohit Menon, "Gesture articulation radiocarpea," in Proc. IEEE Int. Conf. Multimodal Interfaces, 2002, pp. 185– 190.
5. Kusurnika Krori Dutta, "Employment of Image Process and AI various Algorithms," IEEE Trans. Syst., Man, Cybern. B, Cybern., vol. 26, no. 2, pp. 354– 359, Apr. 1996.
6. Sunitha K.A, "Deaf Mute Communication Interpret System," Bachelor's thesis, Univ. New South Wales, Sydney, Australia, 1995.
7. Fels S. and G. E. Hinton, "Developing the tools for pratical VR applications," IEEE Eng. Med. Biol. Mag., vol. 15, no. 2, pp. 23–30, Mar./Apr. 1996.
8. Gao. W and Wang. C, "Augmentative and Alternative Communication using Smart Glove," in Proc. ACM Symp. Virtual Reality Softw. Technol., 1996, pp. 59–66.
9. Liang R. H, "A sign language recognition system using hidden Markov Model and context sensitive search," in Proc. ACM Symp. Virtual Reality Softw. Technol., 1996, pp. 59–66.
10. Wang. C, 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.
11. Zuhyoung M, "A real-time continuous alphabetic sign language to speech conversion VR system," Comput. Graph. Forum, vol. 14, no. 3, pp. 67–76, 1995.

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING