Sign Language Converter and Central Health Monitoring and Controlling For Deaf and Dumb Patients in ICUs: A Survey

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Abstract – Hand gesture recognition system is useful to deaf and dumb people, aged persons for communication with normal people. For this purpose, it is proposed to design and develop the hand gesture recognition system using "E-Hand Glove" to provide integration of monitoring and controlling daily activities of deaf and dumb patient or aged persons. This work describes the development of system by integrating sign language converter and wireless sensor network useful for patients in ICUs. This system will be divided in two parts, first part is to develop "E-Hand Glove" which consists of flex sensor to sense change in hand gestures of patient and send to microcontroller that gathers, processes, and sends data to the LCD which shows the respective resulting letter. Second part is to develop Central Health Monitoring and controlling System for continuous measurement of body temperature, heart beat rate, so the device gives alarms when the heart beat & the body temperature exceed the provided threshold value. It also can be used for controlling the operation of electrical appliances using hand signs such as fan and Light in ICUs rooms using Zig-bee wireless technology. It will also be helpful patients with wrist impairments to perform some daily activity in a joyful and interactive manner. With this view in mind, the detailed relevant literature survey is carried out and presented here.

Keywords— E-Hand Glove, Flex Resistors. Sign to Language Convertor etc.

1. INTRODUCTION

Communication is an essential element of human life, for speech- and hearing- impaired disabilities, non-verbal form of communication is very important; Gestures are used to covey the meaningful information or interact to the surrounding environment through body motion like finger, head, arms, face, and hands. There are many ways to recognize and analyze the Hand movements, by using Hand Glove-based Technique, Vision-based Technique, hybrid Hand Gesture Recognition Techniques. The first Technique is the Hand Glove-based Technique that uses a Glove equipped with different type of sensors like optical, electrical, etc. This sensor based Glove collects the data according to the Hand and wrist movements and then this data is analyzed. Finally, the corresponding predefined action to the data received is taken. The second Technique is the Vision-based Technique that uses a camera to capture the Hand movements and then various image-processing techniques are employed to study the hand gestures and perform the particular tasks for every posture accordingly. The third Technique is the hybrid of the above two techniques. To make the system more reliable and accurate data from both the techniques are collected and analyzed.

The objective of this paper is to review different gesture recognition system. The ideas and solutions introduced in this survey may motivate the recommended system developers to turn research into reality.

The organization of this paper is as follows: Section 2. Introduces the literature survey of various by researchers for recommendation. Section 3 is the summary of the survey and two more sections 4 and 5 is for acknowledgement and references respectively.

2. LITERATURE SURVEY

The main focus of literature survey is to study hand posture and gesture recognition technology. It discusses a number of current glove-based input devices and the advantages and disadvantages of each device over the years a number of attempts have been made to address the problem of communication between speech and hearing impaired people at public places in expressing themselves to normal people. Communicate effectively is necessary to carry out the thoughts and visions of an organization to the people. The importance of words, through a paper or a speech voice in a communication medium, is to convey directions and to provide

synchronization" [1] According to the Word Federation of the Deaf, there are around 72 million deaf, mute, or deaf-mute people in the world today [2] And while many of them can communicate with each other through sign language, there is a communication problem between deaf and mute person with people who can speak and write but do not know signs. Furthermore, most people suffering from hearing impairment prefer sign language; Gestures are used for verbal or non-verbal communication in our day to day life. As per Webster's Dictionary, gesture is "the use of motions of the limbs or body as a means of expression; a movement usually of the body or limbs that expresses or emphasizes an idea, sentiment or attitude [3] For that purpose an assistive device for speech and hearing impaired disabilities has been developed based on the Body Sensor Network (BSN) technology [4].

Research on hand gesture recognition has been conducted for various languages, real-time recognition of American Sign Language (ASL) finger spelling gestures is performed based on input signals acquired from a wireless sensor gloves. The recognized gestures will then be mapped into corresponding sounds using speech synthesizer [5] In 1977, Thomas Defanti and Daniel Sandin developed the first sensor based hand glove known as 'Sayre Glove' which was equipped with a photocell at one end and a light source at other [6] System illustrates different types of Hand Gloves till date with the name of the sensors they are equipped with. The Glove that the model uses is an Electronic Hand Glove. It is equipped with five Flex sensors, one on each finger that senses the bend in the finger and thumb and one Tilt sensor (Accelerometer) on the wrist which senses the twisting of the hand [7] Glove-Talk is another example of a system that translates the recognized hand gesture into speech by allowing the hand to act as an artificial vocal tract that produces speech in real-time. The system, however, is wired-based, difficult to control and requires a lot of prior training [8]. These gloves were equipped with a limited number of sensors, were hard wired, and cumbersome. They were developed to serve very specific applications, were used briefly, and were never commercialized.

For Central Health Monitoring and controlling System. A blood pressure (BP) reading is a measure of the force exerted by circulating blood on the walls of blood vessels. BP varies between a maximum (systolic) and a minimum (diastolic) pressure during a cardiac cycle. It has been observed that ambulatory BP is more closely related to target organ damage and cardiovascular events than BP readings taken in a clinical environment [16] this fact provides the motivation for the creation of wireless BP sensors. The AMON system has a BP sensor that uses an inflatable cuff around the wrist and obtains systolic and diastolic readings via the oscillometric method [17] though this method can used to obtain ambulatory BP readings, it cannot monitor BP variations continuously and the cuff based measurement may cause user

discomfort. These issues are remedied by Poon et. al. in the creation of a cuff-less BP watch sensor, based on the pulse transit time (PTT) method for measuring BP [18]. The number of electrical devices is increasing day by day so interconnection of device and communication within device is very useful between appliance and communication between them is very likable feature. Li [19] explains how hand tracking is divided into three parts: hand detection, finger identification, and gesture recognition. Zitzelsberger and Shafae [20] proposed common approaches for hand detection without using markers or gloves. One such instance could be building a skin color mask from the input image, for which it has to be converted to HSV color space.

Vision based techniques can be used to overcome this restricted interaction. However, vision based techniques faces the problems of background subtraction, occlusion, lighting changes, rapid motion or other skin colored objects in a scene [21] a similar work has adopted a gesture based appliance system for smart homes. It presents a robust system that can work in complex backgrounds. The method involves the use of TRS moment invariants merged with the Viola-Jones detection framework. They demonstrated this by controlling a pedestal fan [22] thus there were various limitations on the previous researches done so far in the field of Sign language interpretation system. Some of them were usage of the image processing method, as it will be restricted to only individual images.

Therefore in this paper to purpose the system for deaf and dumb Patient at ICUs in Hospitals, to provide hand gesture recognition system using "E-Hand Glove" and Central Health Monitoring and controlling System for continuous measurement of various parameters like body temperature, heart beat rate. And also control the various operations as per patient requirement using Wireless Sensor Network. This system involves "E-Hand Glove" and Wireless Sensor Network, where the "E-Hand Glove" is use for hand gesture recognition which consist of hand wearing the glove, which have flex resistors it's substrate is bent, the sensor produces a resistance output correlated to the bend radius that sense the change in gestures, AVR 16-Bit Microcontroller gathers, processes, and sends data to the LCD, which shows the respective resulting letter. and Wireless Sensor Network is use for monitoring, continuous observation of deaf and dumb Patient at ICUs is essential to measure parameters like body temperature using LM35 Precision Centigrade Temperature Sensors and Heart beat Pulse Sensor it Attach to finger and get Analog out from the sensor based on heart beat pulse, read the analog output with microcontroller ADC and then calculate readings like heart beat per minute. And controlling performs various basic daily activity of Patient as per requirements such as to operate electrical appliances and other facility using ZigBee technology, to

help Patient to ease their work and provide them safe, sound and secure living.

3 CONCLUSIONS

In recent years a lot of research has been conducted in gesture recognition. The aim of this paper was to develop a Gesture recognition system for deaf and dumb persons using sign to letter translator system using an E- hand glove and Central Health Monitoring system for measurement of various parameters like body temperature, heart beat rate etc to perform easy and secure daily activity. So our Design should fulfill the requirements such that system provides accurate data collection and data output and system is portable and easy to use along with easy to install and safe to use. A realizable and efficient system has been designed which would help the deaf and blinds to communicate easily.

4 ACKNOWLEDGEMENTS

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