THE GESTURE SENSING TECHNOLOGY

Omkar Pingale, Gauri Deore, Vaishali Mali, Dipali Jadhav

Department of Computer Technology Shatabdi Institute College of Engineering (Pune University) Nasik, India

ABSTRACT

This project describes a novel hand gesture recognition system that utilizes both multi-channel surface electromyogram (EMG) sensors and Web Camera to realize user-friendly interaction between human and computers. Human gesture recognition consists of identifying and interpreting automatically human gestures using a set of sensors(webcammer). Therefore, cursor of mouse will move according hand movements across the screen. The accuracy of the recognition will depend on time spent on user training for high accuracy specific user training is required. We used SVM algorithms and open CV library which sense the gesture by image processing and extraction and desired action performed.

I. INTRODUCTION

1.1 Introduction to System

With the advent of computers and computerization the human machine interfaces have reached new levels and with them bought a new range of consumer electronics. In general all these user interfaces interact either with the keyboard, mouse, remote or joystick. A static control panel limits the mobility of the user like; a remote can be misplaced, dropped or broken. Also the physical presence of the user is needed at the site of operation in a physical Human Machine Interface. This project aims to replace this physical Human Machine Interface with a Machine Vision based application. In this paper we have discussed a low cost dynamic Hand Gesture recognition technique to control various soft front panels like HMI systems, Robotic Systems, Telecommunication Systems, Wheelchair applications for handicapped people and demonstrated live example of how to apply the same and control soft front panels. This work aims to describe a Hand Gesture Recognition technique using Virtual Instrumentation LabVIEW and Image Acquisition software. In Section II we describe the various areas in which Hand Gesture Recognition Systems can be imbibed for a better performance. In section III we describe the Literature Survey and define soft front panels. In section IV we describe about the various blocks involved in the project and the basic block diagram. In section V we describe about the architecture and implementation of the project. In section VI we describe results and conclude the paper. This project has been implemented using LabVIEW software.

II. LITERATURE SURVEY

Christopher Lee and Yang Shen Xu developed the cyber glove method of interfacing the robot which performs by recognizing sign language based on hidden Markov models. Nishikawa and Ohnisi have developed a hand recognition system based on the rate of change of human gestures.Starner and Pentland developed a glove-environment system capable of recognizing 40 Sign Languages with a rate of 5 kHz. Research states that by introducing gestures the performance of the system upped by 90% and the error due to various interferences is reduced. In our project we have used hand gestures to control soft front panels. The conventional electronic instruments are hard wired to develop particular configuration which performs specific task only. The front panel is the important part of the electronic instrument as it provides the user interface such that operator can easily interact with the instrument and control it. To control such traditional instruments different knobs, buttons, dials, switches and displays are provided on the front panel. Due to advancement in the overall technology, the electronic instruments nowadays provide improved virtual front panel standard stand-alone instrument connected to a computer. Because of the graphical user interfaces the functionality of the front panel of the traditional instrument increases. These are called soft front panels.

Author	**Invention**	**Application**
Dr. Parameshachari	five skeleton gestures	interact with the computer to play object game using kinect sensor
Chiang Wei Tan	Human computer interaction system	game-based rehabilitation application.
Prof. Yuvraj V. Parkale	Hand gesture recognition with colour bands	Moving cursor and controlling

III. APPLICATIONS OF HAND GESTURE RECOGNITION

A Hand Recognition System recognizes the movements of the hand to implement certain commands or functions. Gestures are the non-verbally exchanged information. A person can perform innumerable gestures at a time. Since human gestures are perceived through vision, it is a subject of great interest for computer vision researchers.

3.1 Telepresence

In situations like failure or emergency hostile conditions or inaccessible remote areas it is often impossible for human operators to be physically present near the machines. Tele presence is that area of technical intelligence which aims to provide physical operation support that maps the operator arm to the robotic arm to carry out the necessary task. The prospects of tele presence includes space, undersea mission, medicine manufacturing and in maintenance of nuclear power reactors.

3.2 Bomb disposal

During bomb disposal the presence of humans can be replaced by robots which work on the hand gesture recognition. This reduces the risk of human life and also encourages effective handling of the situation. The robot
recognizes the gestures done by a human from a faraway remote place and implements the corresponding function.

3.3 Wheelchair based applications*:*

People in wheelchair often face problems with the manual techniques used to control the movements of the chair. Hand gestures can be adopted so that each gesture would be assigned to a particular movement. When a particular gesture is given the wheelchair moves in a corresponding direction. There are many applications of hand gesture recognition which are already in use like the gaming industry adapts a lot of hand gesture recognition techniques in which the use of joysticks or keyboards is totally unnecessary nowadays. Robotic surgeries are also conducted where the doctors operate the patients from remote location and the robots perform the tasks.

IV. ARCHITECTURE DESIGN

The Kinect is an upcoming technology which basically looks like a webcam. It detects the 3D image representation of an object. It tracks the skeleton of the person standing in front of Kinect camera within a finite amount of distance. The Kinect which operates in the context of Natural User Interface. Natural interface refers to a concept
whereby the interaction with devices is based on human senses. The input skeleton gesture image is pre-processed in Kinect and the features of the image are extracted from the input. Data base is generated using sensor, gesture is recognized. Segmentation is nothing but partitioning of the pixels from the image, in terms of homogenous and nonhomogeneous. It depends on the algorithm called Levenberg-Marquardt back propagation. Based on the segmentation feature extraction is done here the feature extraction is nothing but it is defined as extracting set of features or characteristics from input, and data base is generated. Based on data base, classification is done after that it will perform the action. The Figure indicates the game architecture. The new

version of Kinect with its SDK (Software Development Kit) containing the skeleton tracking tool. This tool provides us to collect 20 joint
information about the skeleton. The joint information is collected in frames. For each frame, the positions of 20 points are estimated and collected. The 20 joints which are taken as a reference points is as shown in Fig. The first information is the index of the joints. Each joint has a unique index value. The second information is the positions of each joint in x, y, and z coordinates. These three coordinates are expressed in terms of meters. The x, y, and z axes are the body axes of the depth sensor. From the skeleton tracked by the Kinect first it extracts the feature of joint positions. Since, each joint has 3 values and also 3 coordinates and the detected skeleton has of 20 joints. So, the feature vector has 60 dimensions. The system can choose important joints for representing the postures. Other features can be derived based on joint position such as joint angles. Proposed design will analyze the recognition
performance using these joints. Figure 4 shows the important point used as a reference points.

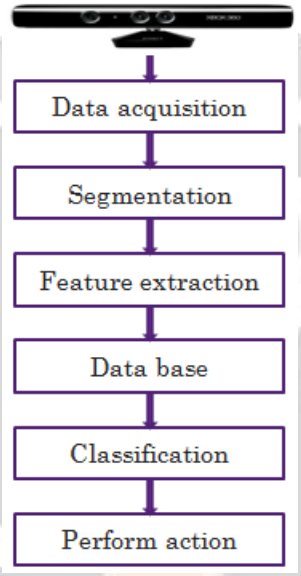

Figure: - Game Gesture.

V. CONCLUSION

As to the computer vision algorithms there is ongoing work to increase the speed and performance of the system, to acquire more position independence for recognition of gestures, to increase the tolerance for varying lighting conditions, and to increase recognition performance with complex backgrounds. The main effort, however, is currently aimed at the design and organization of menus. Area of Hand gesture based computer human interaction
is very vast. This project recognizes hand gesture off-line so work can be done to do it for real time purpose. Hand
recognition system can be useful in many fields like robotics, computer human interaction and so make this offline system for real time will be future work to do. Support Vector Machine can be modified for reduction of complexity. Reduction of complexity leads us to a less computation time. Reduced complexity provides us less computation time so we can make system to work real time. As day-to-day technology, increase the hand gestures system replaced by the voice commands. This voice commands uses only microphones to control the operations.

VI. REFRENCE

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