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GESTURE SENSOR TECHNOLOGY FOR OS CONTROL

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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. Gesture based input is an emerging technology gaining widespread popularity in interactive entertainment. The use of gestures provides intuitive and natural input mechanics for operating system control, presenting an easy to learn yet richly immersive experience. 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 results can occasional recognition error occurs, it seldom influences the users could easily perform the gesture controlling the counter-action of the error command and continue to access the OS The recognition results achieved with our system were satisfactory as the overall accuracy.

The accuracy of the recognition will depend on time spent on user training, and the number of states in the model. For high accuracy, user specific training is required and background should be white. With this work, we will explore how simple, easy to learn controls can lend themselves to a highly strategic and user driven experience. Our gesture recognition system will perform in real time with high accuracy after an initial training period. After this initial training period, we will be able to update the model.

Key Words: Hand gesture, sensors, Web Camera, electromyogram (EMG), human, computers, natural interaction, human computer interface, OS.

1.INTRODUCTION

Human motion analysis is gaining more and more attention in the field of human machine interaction. On one side, such popularity is caused by the fact that, existing devices become more sophisticated and combined with growing computational power has allowed to solve complicated problems. On the other side recently appeared number of more affordable devices which may be used as a part of relatively inexpensive systems. Human gesture recognition consists of identifying and interpreting automatically human gestures using a set of sensors. The documentation presents an up to-date review of the state-of-the-art in human gesture recognition which includes gesture representations, recognition techniques and applications. Several questions arise when tried to define the word "gesture". The work Web Camera as an image Capture device, which is used to operate with System. Motion sensor interaction between human and the computer.

2. PURPOSE AND WORKING OF THE SYSTEM:

There are numerous methods for implementing a Hand gesture System. Two methods have been considered for the theoretical perception. A) One is to build a three-dimensional model of the human hand. The model is matched to images of the hand by one or more cameras, and parameters corresponding to palm orientation and joint angles are estimated. These parameters are then used to perform gesture classification. B) Second one is to capture the image using a camera then extract some feature and those features are used as input for classification and control. In this project we have used second method for modeling the system. In hand gesture recognition system we have taken database from standard hand gesture database, Segmentation and filtering techniques are applied on images in preprocessing phase then using detection method we will obtain our prime feature and use it to classify a command. We have used linear classifiers. The basic block diagram of the Hand Gesture Recognition System is as follows:

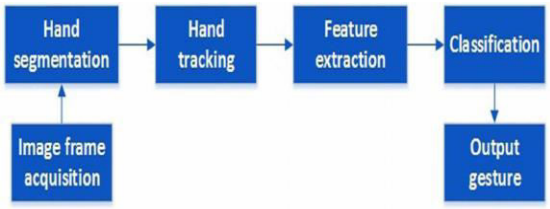
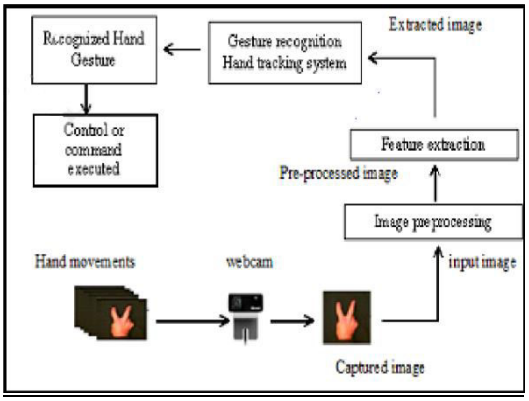


Fig : 1 Block Diagram of hand gesture recognition system

The main components are power supply, web camera and the personal computer or laptop. The power supply connection is given to the PC. The camera is connected to PC through USB cable or inbuild camera of laptops/pc . The camera capture images of hand moments continuously and they are given as input to the PC. These images are taken as gestures to control the mouse pointer. The system first creates a template as reference. The reference template matches with the camera acquired images. According to the number of patterns matched with the reference template, its corresponding

operations are performed in windows screen as per to mouse operation defined by the gesture saved in the data base.



The technique that is used to recognize hand gesture is bases on computer vision. The overall system architecture is shown in figure above. The whole system of hand gesture recognition divided into four phases: Image Acquisition, Image Pre-processing, Feature Extraction and Hand Gesture Recognition. Reading the video, Frame extraction and Pre-processing comes under the first stage i.e. video acquisition module. The initiation of the acquisition is done manually. A camera sensor is needed in order to capture the features/web cam. Local changes such as noise and digitized errors should not change the image scenes and information's. In order to satisfy the memory requirements and the environmental scene conditions, pre-processing of the raw video content is highly important. Various factors like illumination, background, camera parameters, and viewpoint of camera add complexity to the system. These conditions adversely affect images dramatically. The first most step of pre-processing block is filtering. It is used to remove the unwanted noise from the image scenes. Currently, the vision-based analysis is used mostly, which deals with the way human beings perceive information about their surroundings. The database for these vision-based systems is created by selecting the gestures with predefined meaning, and multiple samples of each gesture are considered to increase the accuracy of the system. Camera captures a still image and start image **processing** it. Processing involves converting captured image into grey scale, black and white, normal video camera and outlined images. As soon as any object comes under vision of a camera it detects that object shape by converting captured image into below given formats(fig:3). Camera captures the image after some milliseconds of interval, and tracking happens live time.

Fig3: Image converted into 4 different images(Black and white image, Greyscale image, outlined image, camera image)

feature extraction is done after the pre-processing phase in character recognition system. The primary task of gesture recognition is to take an input of gesture and correctly assign it as one of the possible output. This process can be divided into two general stages: Feature selection and Classification. Feature selection is critical to the whole process since the classifier will not be able to recognize from poorly selected features. Feature extraction is the process to retrieve the most important data from the raw data.

Gesture of image after pre-processing is extracted and the remain unwanted noise or image is discarded. The extracted gesture is matched with the database gesture and rating is done. the highest rating obtains to a gestured matched is selected (**gestured recognised**). This selected gesture performed the particular function defined for it.

Focus of GST is kept on the detected gesture until it goes out of viewing angel of camera. After losing focus on current gesture GST software again start detecting whole frame to detect gestures.

3. EXPERIMENT RESULT:

Our prototype was tested in different background by our group member. The more accurate result were obtain when the background remain white. The hand gesture can be changed as per the user choice. More gesture for more command or action can also be added .Right now we are using below mentioned gesture which covered almost all the function of mouse working on windows.

Gesture:			
Command:	Mouse pointer	Right click	Select or click
Type:	dynamic	static	static

4. APPLICATION OF GESTURE SENSOR TECHNOLOGY:

1. Complex data navigation: It navigates the complex data for its proper working. A large number of many to many relationships can occur error and make it unsuccessful implementation so to navigate that complex data is serious need. Complex data navigation controls data manipulation and data decryption with high security package.
2. Trend and correlation identification: It introduces us with new trends and accept it as well. It follows the identification and correlation of the program entities. Use of correlation coefficient you assess statistical dependency between any two variables, not necessarily between week numbers and actuals
3. Reduces rate of hardware: It does not require mouse, keyboard like hardware to use instead of that this technology overcomes this problem by hand gesture technique. If any hardware get defected GST overcomes this problem.
4. Medical Applications – Advanced robotics systems with gesture recognition can be placed in hospitals or homes to recognize and treat life threatening conditions like heart attacks or strokes.

5. Alternative computer interfaces – Gesture recognition, along with voice recognition, facial recognition, lip movement recognition and eye tracking combined can be used to create something called a perceptual user interface (PUI), a completely different way to interact with computer systems which will improve usability and creativity by leaps and bounds.
6. Entertainment applications – Most video games today are played either on game consoles, arcade units or PCs, and all require a combination of input devices. Gesture recognition can be used to truly immerse a players in the game world like never before.
7. Automation systems – In homes, offices, transport vehicles and more, gesture recognition can be incorporated to greatly increase usability and reduce the resources necessary to create primary or secondary input systems like remote controls, car entertainment systems with buttons or similar.
8. An easier life for the disabled – One of the biggest challenges faced today is providing separate and equally non cumbersome services to the differently abled and handicapped. While there are special provisions around the world, there's still huge room for improvement to bring all lives on equal footing. Gesture recognition technology can eliminate a lot of manual labour and make life much easier for those who aren't as fortunate as most of us are.

4.CONCLUSION

This paper has proposed a novel approach to hand gesture recognition which will be utilized in natural interaction between human and computers. We used CV library and svm (support vector machine) concept instead of typical algorithms. Our paper overcome the concept colour band gesture recognition we directly sense the hand movements.

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