



Review Article

A REVIEW ON APPROACHES TO DEVELOP GESTURE AND VOICE RECOGNITION TECHNIQUE FOR ROBOT CONTROL

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Robot navigation control with effective optimization has always been the area of research. Effectiveness of any application proved successful if it is easy to apply. In this paper, literature review of various authors is summarized. The literature specifically deals with the techniques of gesture recognition and speech recognition techniques. The proposed state of work heads towards the development of efficient technique to control robot navigation using combination of gesture and speech recognition techniques. This is an ergonomic approach for an ease of robotic application. Once the technique is developed and implemented, the further work of analysis of robot arm motions will be carried out.

Keywords: Gesture, Human Computer Interaction (HCI), Ergonomics, Skin detection, Pixel, Recognition, Contours

INTRODUCTION

Vision-based automatic hand gesture recognition and voice recognition has been a very active research topic in recent years with motivating applications such as Human Computer Interaction (HCI), robot control, and sign language interpretation. The general problem is quite challenging due a number of issues including the complicated nature of static and dynamic hand gestures, complex backgrounds, and occlusions. Attacking the problem in its generality requires an elaborate

algorithm with requiring intensive computer resources. What motivates us for this work is a robot navigation problem, in which we are interested in controlling a robot by hand pose signs and voice given by a human operator.

REVIEW

Santerabi et al. (2004): This literature gives a fast algorithm for automatically recognizing a limited set of gestures from hand images for a robot control application. They used five steps to carry out gesture recognition from localizing

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hand like region based on red/green values of the colored image. The red green pixels represent the hand like region. By giving the value as one to these red/green pixels and zero to the remaining, the result is black and white image. The hand like region is then segmented from the background by eliminating the small hand like region and considering the continuous white region. The centre of gravity is calculate for the hand region and the circle is drawn of the radius slightly lesser than the distance from the farthest finger. The fingers are calculated by tracking the circle and subtracting one from the remaining portion of wrist. This proves a very simple and fast technique for robot control.

Md. Abdullah et al. (2011): In this paper the controlling of robot navigation with speech is explained. The authors convert the spoken words into to text using C# programming grammar helper activity. If the text matches with any command with the database, it executes the command. This input is classified into uninterrupted recognition and interpreted recognition. Interpreted recognition has transcription, control, mix of both. Uninterrupted recognition is basically just recording of the sound. It does not involve trying to understand what's in the waveform and hence there's no need for further processing. Transcription is the dictation of words into a text editor. While it is normally done by keyboard, it can also be done by speech.

Raju and Nitin (2010): This paper gives a view to recognize gestures with the help of computers. This literature stress on the fact that compared to the various existing interfaces, hand gestures have the advantages of being easy to use, natural and intuitive to control

system. The recognition problem is approached through a matching process in which the segmented hand is compared with large number of the postures in the system's memory using the new hierarchical algorithm, which is based on a dynamic model of hand movements, Hidden Markov Models and Graph matching.

Georgiana et al. (2011): This paper throws as eagle eyed observation on the various vision-based hand gesture techniques. This paper also gives various application of vision based hand recognition technique. According to this paper, the applications ranges from Virtual Reality, Robotics and Tele-presence, Healthcare in hospitals for hygiene purpose, Sign Language interpretation for disable persons.

Pragati et al. (2009): The authors in this paper stress on the direct use of hands as an input device which is an attractive method for providing natural Human Computer Interaction which has evolved from text-based interfaces through 2D graphical-based interfaces and multimedia-supported interfaces to full-fledged multi-participant Virtual Environment (VE) systems. They categorized the existing approaches into 3D model based approaches and appearance based approaches by highlighting their advantages and shortcomings and identifying the open issues for gesture recognition.

Feng-Sheng et al. (2003): In this paper, the author introduced a hand gesture recognition system to recognize continuous gesture before stationary background. The system consists of four modules: a real time hand tracking and extraction, feature extraction, Hidden Markov

Model (HMM) training, and gesture recognition.

Rogalla et al. (2002): The paper describes the set up of a robot named ALBERT. It consists of a mobile platform equipped with a SICK laser scanner for navigation. It gives gesture classification by visual inputs, hand tracking by hue color segmentation. The author proposed a new architecture for handling sensor inputs. This has helped to represent information on user friendly level.

CONCLUSION

From the review of the above literature reviewed by various authors, we concluded that there is a need to develop and implement a technique, which utilizes both of the gesture and voice recognition techniques. This will create an ease of application to control robot navigation just by using fingers of the hand and voice of a respective robot operator. The proposed work will then be supported by the kinematic and dynamic analysis of a single link robotic arm. The work will prove beneficial for industry as well as society where various robotic applications can be controlled easily without any use of teach pendent or complex connections. 🌀

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