Synopsis on,

Gesture Controlled Robot

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ABSTRACT

Service robots directly interact with people, so finding a more natural and easy user interface is of fundamental importance. While earlier works have focused primarily on issues such as manipulation and navigation in the environment, few robotic systems are used with user friendly interfaces that possess the ability to control the robot by natural means.

To facilitate a feasible solution to this requirement, we have implemented a system through which the user can give commands to a wireless robot using gestures. Through this method, the user can control or navigate the robot by using gestures of his/her palm, thereby interacting with the roboticsystem. The command signals are generated from these gestures using image processing. These signals are then passed to the robot to navigate it in the specified directions.

INTRODUCTION

Gesture Recognition recognizes meaningful expression of motion by a human body, involving the hands, arms, face,
head or body. Gesture Recognition is important in designing efficient human computer interface. It provides a bitter bridge
between machine and human than primitive's tent user interface or

event GUI (graphical user interface).
One of the attractive methods for providing natural human-computer interaction is the use of the hand as an input device rather than the cumbersome devices such as keyboards and mice, which need the user to be located in a specific location to use these devices. Since human hand is an articulated object, it is an open issue to discuss. The most important thing in hand gesture recognition system is the input features, and the selection of good features representation.

Gesture recognition does not require the user to wear any special equipment or attach any devices to the body. The gestures of the body are read by a camera instead of sensors attached to a device.

SOFTWARE & HARDWARE USED

➢ Software

- **Arduino IDE**
- **MATLAB**

➢ Hardware

- **Arduino UNO R3**
- **L239D Motor Driver**
- **ADXL335-Accelerometer**
- **434 MHz Rx-Tx module**
- **Aluminum chassis and 4 DC geared motors**

PROBLEM DEFINITION

The objective of this project is to extract and classify the various patterns of the image acquired through the video as accurately and efficiently as possible and then give the output to the robot to perform the required movement.

GESTURE RECOGNITION

Gestures are expressive, meaningful body motions – i.e., physical movements of the fingers, hands, arms, head, face, or body with the intent to convey information or interact with the environment. There are several aspects of a gesture that may be relevant and therefore may need to be represented explicitly. Hummels and Stappers (1998) describe four aspects of a gesturewhich may be important to its meaning.

Spatial information – where it occurs, locations agesture refers to.
Pathic information – the path that a gesture takes.
Symbolic information – the sign that a gesture makes
Affective information – the emotional quality of a gesture

STEPS for GESTURE RECOGNITION

STEP 1: Captured image is a gray scale image converted into equal binary form or frames. Ostu's algorithm is used to convert gray scale into binary form. In computer vision and image processing, Otsu's method is used to automatically perform histogram
shape-based image thresholding or the reduction of a gray level image to a binary image. The algorithm assumes that the image to be threshold contains two classes of pixels or bi-modal histogram (e.g. foreground and background) then calculates the optimum threshold separating those two classes so that their combined spread (intra-class variance) is minimal.
The result of this step is in the figure show below.
STEP 2: After applying the Otsu algorithm on the original gray scale image, we find that some noise occurs in binary image or frames. These errors create problems in detection of hand gesture. So we need remove these errors. Morphological filtering approach is done to remove these errors. In the morphological filtering, we apply a rule on the binary image. The value of any given pixel in the output image is obtained by allying set of rules on the neighbours in the input image.
STEP 3: After finding the real binary image features extraction is perform. Features extraction is a process of find the edge of detected image. Canny edge detection algorithm is used for find the edge of detected image.
STEP4: The detected edge of image is used to match the appearance of hand gesture and give the result to the output hardware or
media application.

SOLUTION STRATEGY