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DESIGN AND IMPLEMENTATION OF ELECTROCHEMICAL ETCHING MACHINE

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ABSTRACT

Voice controlled robotic system is very beneficial in areas where there is high risk for humans to enter. Voice controlled robotic system is controlled through voice commands received via android device. The integration of control unit with Bluetooth device is achieved using a Bluetooth module to capture and read the voice commands. The robotic vehicle operates as per the command received via android device, for this Arduino is integrated in the system. The controlling device may be any smart phone having an Android OS. The transmitter uses an android application required for transmitting the data. The receiver end reads these commands and interprets them into controlling the robotic vehicle. The android device sends commands to move the vehicle in forward, backward, right and left directions. After receiving the commands, Arduino operates the motors in order to move the vehicle in four directions. The communication between android device and receiver is sent as serial communication data. Arduino program is designed to move the motor through a motor driver circuit as per the commands sent by android device. The wireless camera is interfaced with Arduino to record forward movement of the robotic system which also includes wireless night vision camera which will not only allow viewing whatever will be recorded in day time but also during night. A robotic arm is mounted at the front of the system to make changes in the environment along with a led screen to view the received commands.

KEYWORDS:

Power supply, Micro controller, voice receiver, Bluetooth, voice control, Motor driver, LCD, Motor

INTRODUCTION

In the existing system, human hand movements are sensed by the robot through sensors and it follow the same. As the person moves their hand, the accelerometer also moves accordingly sensor displaces and this sensor senses the parameter according to the position of hand. In this system, a gesture driven robotic vehicle is developed, in which the vehicle movements and manipulations i.e., handling and control is depends on the gesture of the user. In this system, gesture is captured by accelerometer and it is processed by software namely, microcontroller software and the parameters are sent to microcontroller and encoder circuit, It is further transmitted (transmitter section) by RF433 MHZ transmitter. In the receiver section, the RF 433 MHZ receiver holds down the received parameters and process with microcontroller and gives those parameters to the robotic vehicle so that it act accordingly to the gesture. By this system, it is possible to achieve processing of long distance. This system is knowingly developed to apply in medical field for nursing assistance to physicians and in surgeries. Now a days, robots became a helping hand for human being

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as robot can perform any task which is very difficult to complete for human being in very less time such as medical surgeries, in industries for mass production as well as to pick and place heavy parts, in agricultural field, in different hazardous conditions, in land mine detection, in vacuum chambers, etc., according to the instruction of human being.

In this paper we suggested such a robotic arm which is helpful to perform above suggested task. This robotic arm is controlled with hand gestures. Human robot interaction is an active area in robotic research. Research in robotics results in the development of two fields: Robotic manipulation and the input feeding system. In the in-situ standoff control, human gestures are given as input. Gesture recognition is mainly achieved using the camera and methodologies such as Grey scale conversion, Inverse algorithm, thresholding model.

The aim is to make the robotic arm to understand the human body language thereby building a bridge between human and the robot. This system consists of a mechanical based robotic arm. Their movements such as forward, backward, left, right, rotate are controlled by using hand gestures. The range for robotic arm and human hands is 100 meters as both are spatially separated. Robots are increasingly being integrated into working tasks to replace humans especially to perform the repetitive task. In general, robotics can be divided into two areas, industrial and service robotics these robots are currently used in many fields of applications including office, military tasks, hospital operations, dangerous environment and agriculture. Besides, it might be difficult or dangerous for humans to do some specific tasks like picking up explosive chemicals, defusing bombs or in worst case scenario to pick and place the bomb somewhere for containment and for repeated pick and place action in industries. Therefore a robot can replace human to do work. There are certain techniques being implemented to control the movement of a robotic arm like Motion sensors & markers, vision systems etc. Use of accelerometer as a gesture recognition device is becoming quite popular due to its small size and low moderate cost.

A robotic arm is a robot manipulator, usually programmable, with similar functions to a human arm. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement. The end effectors can be designed to perform any desired task such as, gripping, spinning etc., depending on the application. The robot arms can be autonomous or controlled manually and can be used to perform a variety of tasks with great accuracy. The robotic arm can be fixed or mobile (i.e. wheeled) and can be designed for industrial or home applications. In some applications controlling robotic arm precisely is of utmost importance.

Fig .1. Representation of the Human Arm

The handheld controller is a 3D rigid body that can be rotated about the three orthogonal axes. Yaw, pitch and roll are referred to as rotation. These rotation takes place as Z-axis is called yaw, the next rotation X-axis is called pitch and last rotation about the Y-axis is called roll. Any orientation can be achieved by the composing those three elemental rotation. In our work, all of the planned hand motions for robot control are simple gestures, each of which

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contains only one of the three elemental rotations. Gestures composed of more than one elemental rotation are too complicated for such kind of application.

RELATED WORK

POWER SUPPLY

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters.

MICRO CONTROLLER

A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

VOICE RECEIVER

A listening device can be a voice activated transmitter or voice transmitter that starts operating once it detects the sound of a person's voice. The voice activated transmitter is a convert room transmitter that starts working when it hears people speaking.

BLUETOOTH

Bluetooth is a wireless technology standard used for exchanging data between fixed and mobile devices over short distances using short-wavelength UHF radio waves in the industrial, scientific and medical radio bands, from 2.400 to 2.485 GHz, and building personal area networks (PANs). It was originally conceived as a wireless alternative to RS-232 data cables.

VOICECONTROL

With Voice Control, you can navigate and interact with your device using your voice to tap, swipe, type, and more. Before you can use Voice Control, a file download is required. Once the download is complete, you don't need a Wi-Fi connection to use Voice Control. It's recommended that you connect to Wi-Fi before you turn on Voice Control for the first time.

MOTOR DRIVER

In this Arduino Tutorial we will learn how to control DC motors using Arduino. We well take a look at some basic techniques for controlling DC motors and make two example through which we will learn how to control DC motors using the L298N driver and the Arduino board.

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PWM DC MOTOR CONTROL

PWM, or pulse width modulation is a technique which allows us to adjust the average value of the voltage that's going to the electronic device by turning on and off the power at a fast rate. The average voltage depends on the duty cycle, or the amount of time the signal is ON versus the amount of time the signal is OFF in a single period of time.

LCD

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizer's Liquid crystals do not emit light directly, instead using a backlight or reflector to produce in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement.

MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of rotation of a shaft. Electric motors can be powered by direct current (dc) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (ac) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, converting mechanical energy into electrical energy.

EXISTING WORK

In this paper, pick and place robotic arm is designed and implemented. This robotic arm is based on android application controlled for remote operation. In this paper, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc using android application device. Four motors are interfaced to the microcontroller where two motors are used for arm and gripper movement of the robot while the other two motors are used for the body movement. The android application device transmitter acts as a remote control that has the advantage of adequate range, while the receiver end Bluetooth device is fed to the microcontroller to drive DC motors via motor driver IC for necessary work. Remote operation is achieved by any smart-phone/Tablet etc., with Android OS; upon a GUI (Graphical User Interface) based touch screen operation. This system can be enhanced by interfacing it with a wireless camera so that the person controlling it can view operation of the arm and gripper remotely.

PROPOSED WORK

The voice commands to the robotic system are sent through Bluetooth via an Android device. These commands are received on the robotic system via Bluetooth module mounted on it. The surveillance is carried on using a mounted on a servo motor to view 180. A robotic arm is mounted at the front of the system to make changes in the environment along with an LCD screen to view the received commands. The motor driver circuit is used to control the speed of robotic system. An obstacle detector is added to protect the system from obstacles on the way by using an ultrasonic sensor. The whole circuitry is powered using a 12V rechargeable battery mounted on the system.

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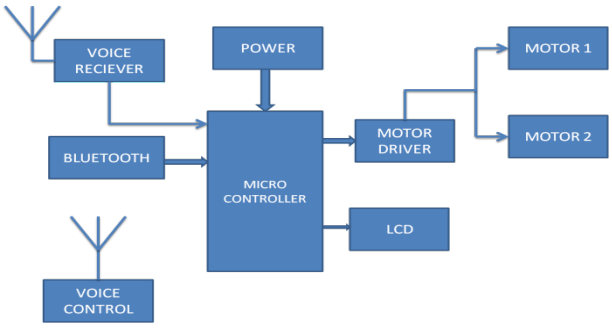

Fig.2. Block diagram

RESULT AND DISCUSSION

The android application device transmitter acts as a remote control that has the advantage of adequate range, while the receiver end Bluetooth device is fed to the microcontroller to drive DC motors via motor driver IC for necessary work. Remote operation is achieved by any smart-phone/Tablet etc., with Android OS; upon a GUI (Graphical User Interface) based touch screen operation. This system can be enhanced by interfacing it with a wireless camera so that the person controlling it can view operation of the arm and gripper remotely.

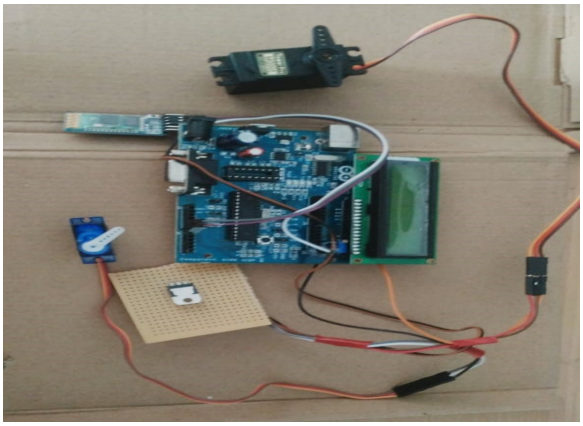

Fig.3.Hardware Result

CONCLUSION

This project also helped us in learning how to manage a project. We have designed the voice command based pick and place robot which can act as calamity rescue robot. This robot can work with the given voice commands. But, only standard commands can be used here to perform the robotic operation. Standard commands mean the trained commands. For performing the robotic operation we will train the robot to perform different operations. Since, difficult portion of the construction was voice recognition of input commands, voice controlled robotic arm for picking and placing an object was successfully designed. The robot control was found to be user friendly.

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