HAND GESTURES REFLECTING ROBOTIC ARM

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Abstract

This paper shows the development of gesture controller robotic arm is prepared which is operated and controlled by human hand gesture. The robotic arm is design in such a way that it consist of four moveable fingers with an opposing thumb, that gives the ability to grasp the object of various shapes which is mutually controlled by using hand gloves. The complete robotic arm is assemble in two parts i.e 1. Transmitter section which is applied on gloves section that will transmits data to receiver part and 2. Receiver section which is applied on the robotic arm that receives data from transmitter part. The prototype of this project is to control robotic hand using human gesture.

Keywords– Robotic Arm, Hand Glove, Flex sensor, Servo motor, RF Module(Radio frequency), Microcontroller ATmega 328/16.

I.INTRODUCTION

Thesedays many type of robots are being developed and are put to varied applications and uses. This project is designed in such a way that there is a robotic hand that is basically a mechanical hand having five moveable fingers (like human hand) that gives the ability to grasp object of various shapes which is mutually controlled by another human hand with distance. The main objective of our project is to controller robotic hand using human hand gesture, where the human hand gesture are sensed with help of flex sensor that are applied on device called gloves. Robots are increasingly being integrated into industries to replaces human especially to perform the hazardous tasks. It might be dangerous for human to perform some specific tasks like working with explosive chemicals, defusing bombs, performing an operation. This will be operated and controlled wirelessly with the help of hand gestures with transmit signals to the robot through an auto device fixed on the gloves that are putted on human hand. The transmitterwill send signalbythe gloves with thehelp ofwireless medium to the robotic hand the receiver. Hand gesture recognizing technique can provide user friendly human and machine interface. This project is one of major improvements because of its advanced technology.

II. PROBLEM STATEMENT

It might be dangerous for human to perform some specific tasks like working with chemicals, defusingbombs, performing an operation and other hazardous works. So, a kind of project which might be alternative to human in such situation would be beneficial to human life. Where the Robotic arm can also be helpful in hospitals where control the robotic arm by their hand gestures movement to handle some heavy object.

III. METHODOLOGY

Transmitter Section:-

In this transmitter section the robotic glove which controller the robotic arm consist of Microcontroller ATmega16 which is programmed insuch a way that it transfers the required data with the help of RF module to the receiver section.

Where theflex sensor capturethe moments and different angles of fingers and sends this data to the microcontrollerATmega 16. Then the proceed value are transmitted from module to the robotic arm.
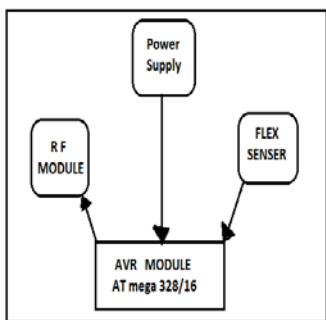
Fig. TRANSMITTER SECTION.

The above block diagram shows the transmitter section of the robotic hand which will be controller by the human gesture.

Receiver Section :-

The robotic glove is the mainpart where implementationsof the program from the robotic glove take place.This robotic arm consist of total five numbers of servo motor attach to each finger are connected in such a way that it provides movementto the robotic arm. The programmed microcontroller Atmega 16 receives the data transmitted from the transmittersectiontoreceiver section with the helpofRF module connected to the receiver section.
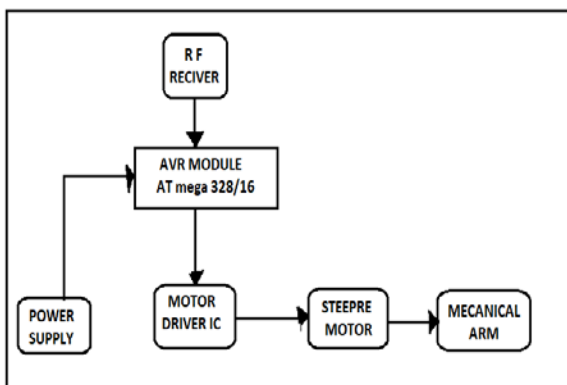

Fig. RECEIVER SECTION.

The aboveblock diagram shows the receiver section of the robotic arm which will be instructed by the robotic glove or by the user.

IV.CONSTRUCTION DETAILS

The Robotic arm constructed consist of following main parts :-
- TRANSMITTER SECTION
  1. Micro-controller ATmega 16
  2. Flex Sensor
  3. RF Module
  4. Robotic Glove

- RECEIVER SECTION
  1. Micro- controller ATmega 16
  2. Servo Motor
  3. RF Module
  4. Robotic Arm

Step 1:- Boards

As per requirement of the project two micro-controller boards are taken
1. **Micro-controller ATmega 16 :-**
   The micro-controller is responsible for controlling theaction of the robotic arm. Which is programmed in such a way that it receives the I/O variations of flex sensors and servo motors through AVR.

Step 2:- Sensors and Motors

Five flex sensors and five servo motors are used as per requirement.
2. FLEX SENOR are the analog register. These resistors work as variable analog voltage divider. When the substrate is bent the sensorproduces resistance output
   relativeto the bend radius.When the substrate isbent, the sensor produces a resistance .

   SERVO MOTOR is a rotary actuator that allows the motor to controlthe angular orlinear position, velocity and acceleration. This Servomotor will help the fingers to makethe movement.

Step 3:-Communication

It is better to transform data wirelessly and this is possible with the help of RF module communication between robotic arm and gloves.

Characteristics of RF module ;
- 100 meter of communication distance.
- Output power is 20 milliwatt.
- Frequency id from 418 MHZ to 455 MHZ.
- 256 bytes of data transfer.

Step 4:- Mechanism :-

The robotic arm is designed on a PCB surface which is controlled with the help of programmed micro-controller. This robotic arm consist of five joints and each joint is connected to servo motor which is used in order to controller the movements of the joints.

V. APPLICATIONS

Robotic hand can be used in place whereactualhuman hand is required.Some of the applications where we can use this technology are as follows.

- In Military it can be used for explosive bomb diffuse robots.
- In Industrial places it can be used tooperate the hazardous and dangerous material which is not safe for humans.
- Robotic hand can also beused inhospitalswhere doctor can performcomplex surgical operation from fardistant places.
- Robotic hand can also be used as apowerful hand that has more power capabilities then our hand.

VI. RESULT

The robotic arm is designed in a simple way without using any complex mechanism. This robotic arm is controlled wirelessly from distance place within 100 meters.

Fig. HAND GESTURE REFLECTING ROBOTIC ARM.

The above figure shows the over all view of the project.

VII. CONCLUSION

This paper presents the Hand Gesture Reflecting Robotic Arm using five flex sensor and five servo motors it has been constructed. This robotic arm is very useful for the socity as well as for the industrial application. The model of the robotic arm was construed and executed successfully.

VII. FUTURE SCOPE

In future the robotic arm can be controlled over the internet by using Ethernet connectivity and a camera for visual feedback.

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