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Wireless Robotic Hand Using Arduino

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ABSTRACT

In recent year, with the increase usage of wireless application, the demand for a system that could easily connect devise for transfer of data over a long distance without wires. Our project present development of wireless robotic hand. The development of this robot is based on Arduino platform that will be interfaced with the wireless controller to the robotic hand. The five fingered robotic hand mimics a small degree of dexterity and could be used for patients. This will allow them to get a higher degree of freedom and help in their day to day life.

Keywords: Robotic Arm, Flex sensor,Micro controller,Human Machine Interface

I. INTRODUCTION

Generally in industries human interfacing becomes essential part. In industries,there are hazardous conditions. Therefore,it is harmful for the people who work in those conditions. Industries having a radioactive area which has a radioactive reaction process and some chemical reactions are also there. To 3work in those areas,it is harmful for the humans. And also it is time consuming if humans deal with work in industries. If we want to reduce the time consuming ,we have to increase the number of men which is also not a good solution as far as the industries are concerned.

To deal with these harmful conditions the best solution can be the robots or some parts of robots which can be controlled by humans. The cost of robots is high therefore it is suitable for the industries to make some parts of robots that can be controlled by humans.

The main aim of the project is to reduce manpower in the industries and safety of humans which work in industries. This project can be used in household applications, military camps and hospitals.

Our project mainly focuses on wireless communication between transmitter and receiver, As we know there is so much data loss in wired communication and it is also time consuming for data to be sent and received and connections are also complex due to so many wires.

Our objective is also to increase Human Machine Interface (HMI) by using gesture controlled robotic arm which is used to sense the movement of the operator and work according to it. So to increase HMI, easy wireless communication, less data losses and increase human safety in industries we make this project.

II. METHODS AND MATERIAL

1. Block Diagram

In the figure the system block diagram is given. By studying the system practically it is divided into three parts,

1) Transmitter
2) Receiver
3) Robotic arm

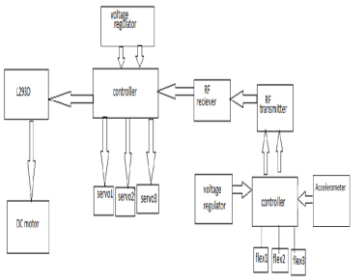

Figure 1: System Block Diagram

The 1st part is for transmitting the data from the transmitter circuit to the receiver by the hand gesture movement. Only after the matching of data of transmitter and receiver the robotic arm will be worked. On the transmitter side, we have connected ATMEGA16 microcontroller, sensors, accelerometer, transmitter IC of RF module.

2nd part is the receiver circuit. The data from the transmitter will be received by the receiver circuit. If the data will be matched the signal is given to the servo motor which is on the robotic arm. On the receiver side, we have ATMEGA16 microcontroller, L293D motor driver is, connections of the servo motors, receiver IC of RF module, LCD, antenna.

3rd part is the robotic arm itself,which works only if the transmitter and receiver data will be matched. The robotic arm consists of 3 servo motors which get a signal from receiver circuit, If those servo motors will get started then the arm is going to be operated.

2. Material

a. Flex sensor

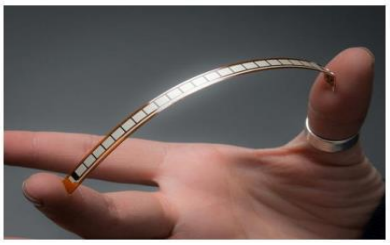

Figure 2: Flex sensor

Bending sensor measures the amount of deflection caused by bending the sensor.

We will use this sensor for sensing the movements made by the operator, As the pressure applied on the sensor it will bend and create the equivalent voltage as the bending. This voltage is given to the microcontroller for the next process.

b. Microcontroller ATMEGA16

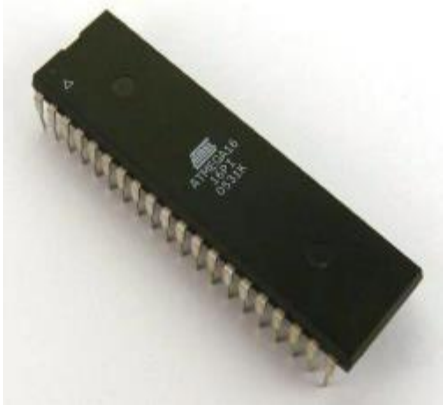

Figure 3: Microcontroller ATMEGA16

The Atmega-16 microcontroller is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption and high speed.

ATmega-16 microcontroller comes with 16KB programmable flash memory, EEPROM of 512 bytes and static RAM of the 1KB.

It has 40 pins. The 32 pins are for input/output lines which are divided into four categories designed as PORT A, PORT B, PORT C and PORT D.

c. Servo motor

Figure 4: servo motor

The Servo motor is just the simple motor that allows for precise control of angular or linear position, acceleration and velocity. It consists of a suitable motor coupled to a sensor feedback system..

There are some special types of application where rotation of the motor is required for just a certain angle not continue for a long period of time.

In our project we also need rotations at certain angles that is why we are using a servo motor.

We are using MG995 servo motors, which are having the voltage ratings between 4.8V to 7.2V.

III. RESULT ANALYSIS

Hardware Implementation:

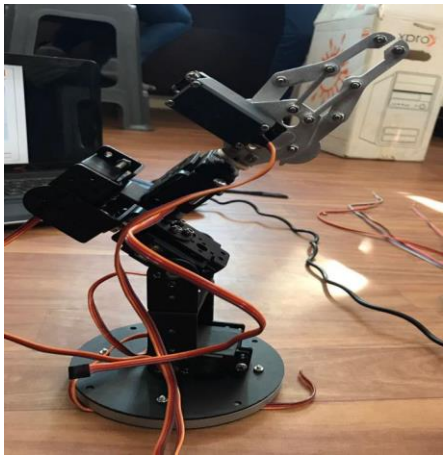

Figure 5: System Model

No single approach is the best for control of robots , each has its strength and weakness. The accuracy and efficiency of surgeries have improved greatly because of the application of robotics in the field. However,there are still some problems that need to be addressed. Research is still being carried out to improve the wireless transmission of signal and reduce the delay and for simultaneous movement of the servos. Thus the control of robotic arm was achieved wirelessly using flex sensor given by the user.

It is more beneficiary because of lots advantages of its like,

- Increase Human Machine Interfacing
- Wireless Communication
- Low Risk Of Life
- Reduce Production Cost
- Reduce Men work

IV. CONCLUSION

Robotic control refers to the way in a in which the sensing and action of the robot is coordinated. There are infinitely many possible robot programs, but they all fall along a well define the spectrum of control. model could be used for small scale surgical and industrial purpose

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