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A PATH FOR HORIZING YOUR INNOVATIVE WORK

WIRELESS ANIMATRONIC HAND USING CONTROL GLOVE

ABHISHEK SARODE[1], MAHADEV TIDKE[1], OMKAR KULKARNI[1], PROF. ADITI CHAUDHURI[2]

1. B.E. ENTC, D. Y. Patil. College of Engineering, Pune
2. Asst. Professor, E&TC Dept., D. Y. Patil College of Engineering, Pune.

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Abstract: Through these project we have tried to bring the word Animatronic into real word. The idea of these project came from Hollywood movies. In real world animatronic hand can be used to carry industrial work and handling of objects more easily. We have used ATmega 328, Bluetooth, Flex sensor, servo motor as hardware part and programming is done in Embedded C using Arduino tool. These paper highlights the use of Bluetooth instead of ZigBee in communication**.**

Keywords: Flex sensor, Bluetooth, ATmega 328, Micro Servo motor.

Corresponding Author: MR. ABHISHEK SARODE

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INTRODUCTION

Animatronics is the use of mechatronics to create machines which seem animate rather than robotic **[9].** In today's world there is an increasing need to create artificial arms for situations where human interaction is difficult or impossible. Robotic arms are used in several fields such as industrial automation, medical applications and military applications, because of its preciseness and accuracy. In critical application controlling robotic arm precisely is very important. The robotic arm used in industries and many other places are preprogrammed and so the interaction of human-machine is less. Even if there is human- machine interaction, it is done by joystick or lift assist devices. Most of the robotic devices used are controlled via wired communication, hence separate communication cables have to be laid for each device which increases the cost and maintenance. In this project we have implemented wireless gesture controlled robotic arm using flex sensor, ATmega 328 and Bluetooth.

Aim of this product is to get involved in many of the industries where human hand is must to complete the required task, but it may be harmful for human health. Here, instead of using actual human hand, we can replace it by this wireless animatronic hand. We may allow this robotic hand to complete the same task to avoid the risk and required task can be achieved.

In industries as the device is preprogrammed, which reduces the ease of interfacing with system. Through these project we have tried to reduce these interfacing gap.

I. DESIGN

A. Block diagram:

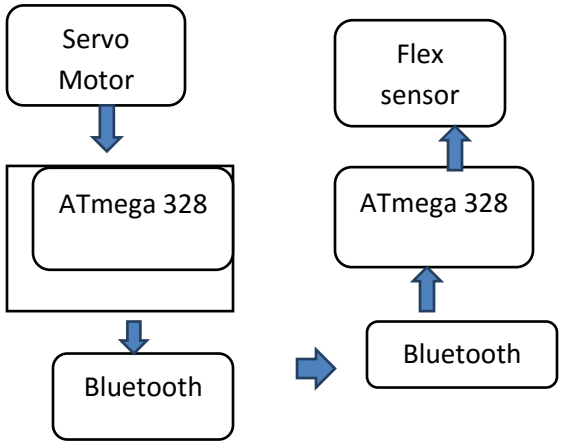

fig.1

B. Working:

I. Transmitter

1. Flex sensor:

A flex sensor is a mechanical device that provides a varying amount of resistance when sensor is bent. By passing a certain amount of voltage through a flex sensor and connecting output to an analog input of ATmega 328 it is possible to measure the amount of resistance produced by a flex sensor.

2. ATmega328:

The ATmega328 reads the voltage change through its analog input pin when the sensors are bend, and triggers the servos to move a proportional amount according to the program.

3. Bluetooth:

The data which is to be send to receiver is send with help of Bluetooth.

II. Receiver

1. Bluetooth:

The data send by transmitter Bluetooth is received by receiver Bluetooth and received data is forward to ATmega 328 at receiver for further process.

2. ATmega328:

The data received by Bluetooth is processed by ATmega328 to trigger the servo motor according to the program.

3. Servomotor:

The servo pull strings that act as tendons, allowing the fingers to move.

II. ALGORITHM:

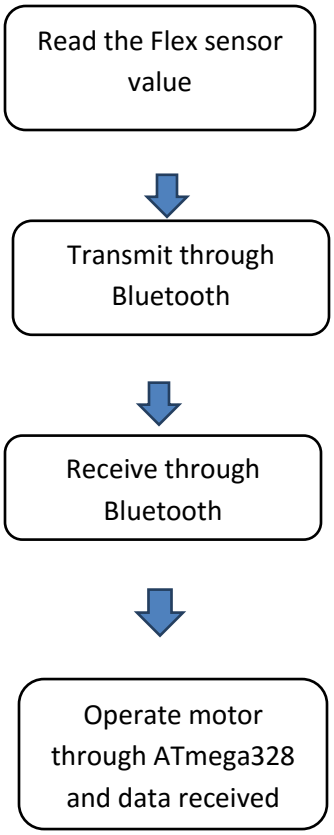

Fig.2

Flex sensor readings are read with the help of ATmega 328 analog pins, the analog data received is converted to digital with the help of inbuilt ADC [7] of microcontroller. The digital data is transmitted to receiving Bluetooth through transmitting Bluetooth.

The data received at receiver is given to receiver ATmega 328 which convert to PWM signal and these signal is necessary to change angle of servo motor.

III. Why Bluetooth?

Specification	ZigBee	Bluetooth
Standard	802.15.4	802.15.1
Bandwidth	20-250kbps	1Mbps
Data rate	250Kbps	1Mbps
Range	1.2Km	10m
Network Type	WPAN,WLAN	WPAN
Security	124, bit	64124 bits
Cost	500	300

Table.1

IV. Basic Devices:

1. Flex Sensor:

Flex sensor provides variable resistance value after bending the sensor. The resistance increases if sensor is bend forward and resistance decreases if bend reverse.

Voltage divider network is used to calculate the voltage across flex sensor, with reference resistor of 100Kohm.

The output voltage value at various position is as shown in table

Input voltage: 5V

Bend	Resistance	Voltage
Flat	22Kohm	3.52V
45^0 bend	39.6Kohm	4.02V
90^0bend	58Kohm	4.12V
Reverse	19Kohm	1.12V

Table.2

1. **ATmega 328:**

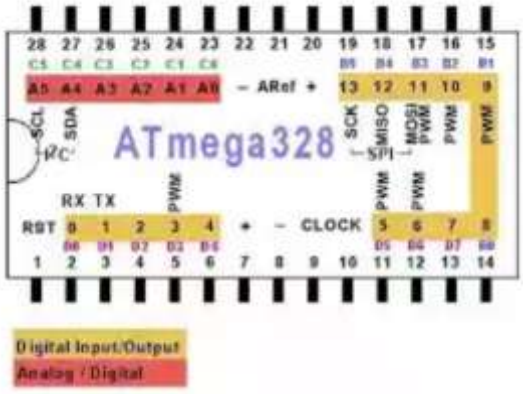

Fig.3

ATmega328 is 28 pin IC with 6 analog pins, 6 PWM output pins.It has inbuilt ADC and PWM converter.

To read the analog input from Flex sensor pin number 23,24,25 and motor is attached to 9,10,11 pins in the project.

RX and TX of ATmega328 are connected to TX and RX of Bluetooth module respectively.

2. **Servo motor:**

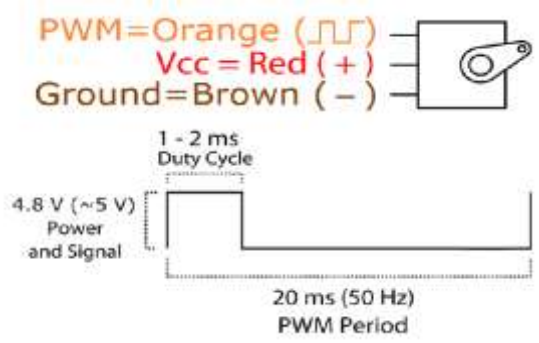

Fig.4

Servo motorrequires PWM pulse to operate. As shown in fig. Orange wire is attached to PWM output pins 9, 10,11 of ATmega 328 and red and brown to Vcc and ground respectively. Motor driving IC is not required as ATmega328 itself provide the PWM output.

Position"0" (1.5 ms pulse) is middle, "90" (2 ms pulse) is all the way to the right and "-90"(~1 ms pulse)is all the way to the left.

3. Bluetooth:

Fig.5

The Bluetooth module is as shown in fig above Pin specification from left side are as follow:

Pin	Specification
1	Vcc
2	Ground
3	TX
4	RX

The TX and RX are connected to RX and TX of ATmega328 respectively.

V. CONCLUSION:

VI. The Price of project is reduced by using Bluetooth. A robotic hand will work smoothly even there are any obstacle in between two Bluetooth modules. It can be widely used where there are restrictions or a hazard to a human hand. The range can be increased by using ZigBee or RF transmitter or receiver, but have to compromised with some or other features.

VII. FUTURE SCOPE:

Further development can be made to operate the hand with help of Arduino application. Different type of sensors like Muscle sensor can be used to increase the application. By increasing the more torque motor the capacity of hand can be increased.

VIII. ACKNOWLEDGE:

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