

FLEX SENSOR BASED INDOOR AUTOMATION USING HAND-GLOVE

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Abstract-This project depicts the design of the hand glove in which the flex sensor is mounted on it. The flex sensor interface which helps to control the slider movements, indoor appliances thereby commanding the PC with the hand gesture signals. By using the hand gesture recognition method, the flex sensor sends the commands to microcontroller and then transmitted by transmitter and then received by the receiver. The received commands then again fed to the PIC microcontroller in which it can control the appliances using relays and also it can control the slider movements by interfacing with the personal computer using the MAX 232.

Keywords-Wearable glove, Flex sensor, Microcontroller, Relays, MAX, PIC

I INTRODUCTION

Gestures play a very important role in daily routine communication. According to many sources more than 50% of the communication consists of non-verbal gestures. The gestures are also becoming an increasingly popular form of human computer interaction. The ways in which the physical work and exertion is reduced are being applied to new technologies for ease of access. The gestures are of many types and each and every human body orientation and position can be treated as a gesture. When it comes to interaction, the moving parts of human body play the biggest role. Hand gestures are used in sign language by the people who cannot speak. They are also used in human-computer interaction tools. A lot of work has been done on the recognition, translation and application of hand gestures in the past. In this paper, it is presented how a flex bend sensor based hand gesture recognition system works, what are the limitations of this glove interface and how can we optimize the performance of such a glove interface

The project is designed for automatic detection of door status using flex sensor. This project proposes

a system of automatic detection of door status by sensing any movement at the door. This is achieved with the help of flex sensor. Flex sensor generally sense when it get bend .The sensor is attached with door when position of the door get changed the flex sensor gets bend ,when it bends its output resistance also changes. The output resistance is connected with voltage divider circuit, the output voltage of the circuit changes according to the change in resistance of the sensor. After that it is connected with a PIC controller where code is written to display the output whether the door is open or not. It also commands the other appliances like fan, light etc...

With the help of receiver it receives the commands from the receiver and then fed to the microcontroller where it also helps in controlling the slider movements by using the flex sensor. The received commands can be displayed in the Liquid Crystal Display (LCD).

II LITERATURE SURVEY

In [1] The first Hand Talk glove was designed by Ryan Patterson in the year 2001.He began his mission with his Sign Language. Sign Language Translator consists of two separate components, a leather golf glove that has ten flexible sensors shown into it which monitor the position of the fingers by measuring the electrical resistance created by the fingers as they bend. A small microcontroller on the back of the hand converts the change in the electrical current into digital signals and transmits them wireless to a computer. The computer then reads the numerical values and converts them into the letters which appear on the screen.

In [2] The sensors were placed at their middle length over the finger joints. Their proximal ends were fixed to the glove fabric with medical tape to avoid displacement during finger motion monitoring. Depending on the length of the subject's finger, the distal end of a sensor could overlap the proximal end

of another one. To avoid contact between sensors placed on the index, three different layers of polyamide/Lycra fabric were sewn on the glove fabric, thereby forming separate sleeves into which the sensors were inserted.

III METHODOLOGY

3.1. Proposed work:

The proposed development model as shown below,



Fig :1 Wearable glove interface

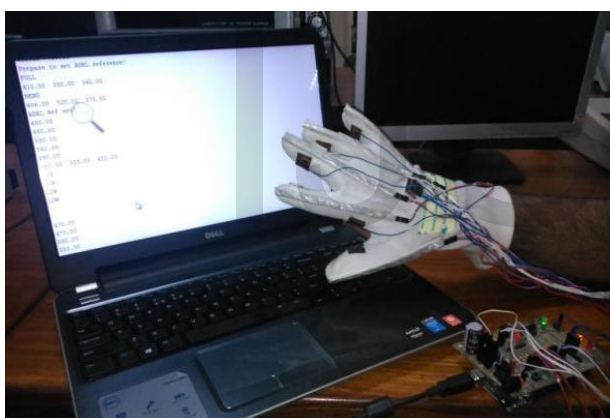


Fig:2 Experimental setup

The components which are used for our design is mentioned below,

3.2 Flex Sensor:

Flex sensors are sensors that changes the resistance depending upon the amount of bending on the sensors which mainly deals with angle displacement measurement. The property of flex sensor is that when we bend a sensor it produces resistive output which is related to bend radius. When the radius is small the output will be high.



Fig: 3 Flex sensor schematic

The higher the variation in deflection or bending of flex sensor results in higher variation of resistance itself. Potentiometer is used to read these resistance changes and it is given to ADC which converts these values into equivalent digital values and fetched it into RF module through which it gets transmitted.

3.3 Block diagram:

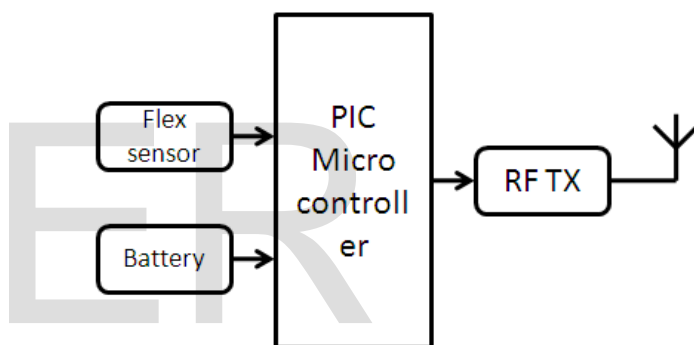


Fig: 4 Transmitter side

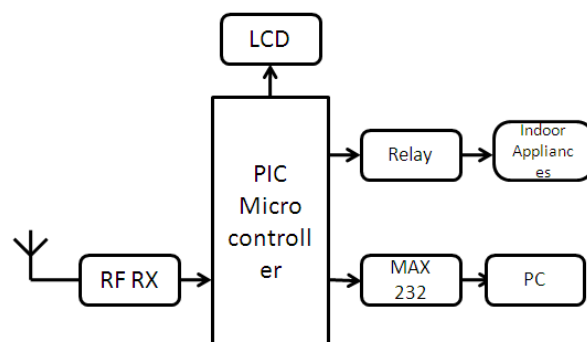


Fig:5 Receiver side

3.4 Components Used:

a) PIC Microcontroller(16F877A)



Fig :6 PIC Microcontroller

PIC 16F877 is one of the most advanced microcontroller from Microship. This controller is widely used for experimental and modern applications because of its low cost, wide range of applications, high quality and ease of availability. It is ideal for any applications. The PIC 16F877 features all the components which modern microcontrollers normally have high performance RISC CPU, Only 35 simple word instructions, power on reset (POR).

b) Personal computer

Personal Computer (PC) is a small, relatively inexpensive computer designed for an individual user.

c) Power supply

The power supply is given to the controller is +5v, it will operate in +5v only.

d) Liquid Crystal Display (LCD)



Fig :7 16x2 LCD Display

Microcontroller can be interfaced with the LCD display with the controller.

The features of the LCD are built-in controller (KS 0066 or Equivalent). It has 1/16 duty cycle and it also has 5x8 dots with cursor.

e) Transmitter



Fig 8: Transmitter

A set of equipment used to generate and transmit electromagnetic waves carrying message or signals especially those of radio and television. Whenever the high output pulse is given to base of the transistor BF 494, the transistor is conducting so tank circuit is oscillated. The tank circuit consists of L2 and C4 generating 433 MHz carrier signal. Then the modulated signal is given LC filter section. After the filtration the RF modulated signal is transmitted through antenna.

f) Receiver



Fig :9 RF Receiver

The RF receiver is used to receive the encoded data which is transmitted by the RF transmitter. Then the received data is given to transistor which acts as amplifier. Then the amplified signal is given to carrier demodulator section in which transistor Q1 is turned on and turned off depending on the signal. Due to this the capacitor C14 is charged and discharged so carrier signal is removed and saw tooth signal appears across the capacitor. Then this saw tooth signal is given to comparator. The comparator circuit is constructed by LM558. The comparator is used to convert the saw tooth signal to exact square pulse. Then the encoded signal is given to decoder in order to get the decoded original signal.

g) Relays

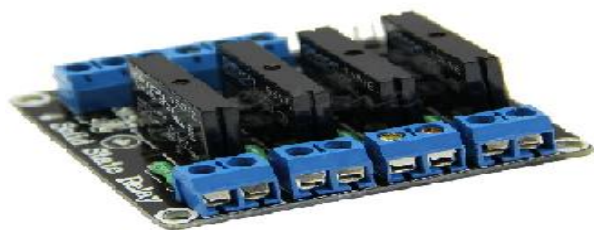


Fig :10 Relays

Relays are simple switches which are operated electrically and mechanically. Relays consist of electromagnet and also the set of contacts. The switching mechanism is carried out with the help of electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays. The main operation of the relay comes in places where only a low power signal can be used to control the circuit. It is also used in places where only signal can be used to control the lot of circuits. The application of relays started during the invention of telephones. They played the important role in switching calls in telephone exchanges. They are also used in long distance telegraphy.

IV PROTOTYPE MODEL

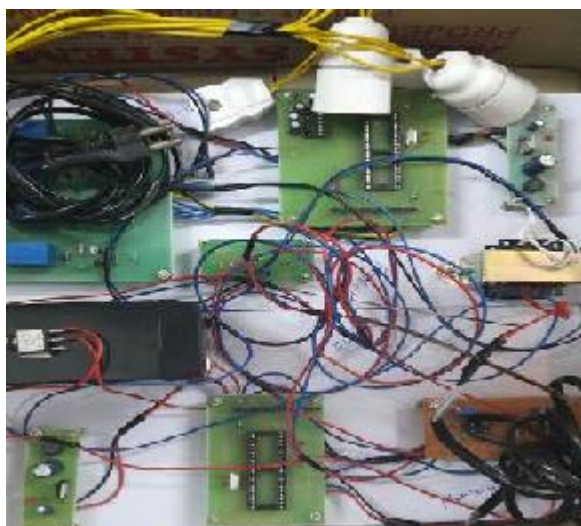


Fig: 11 Working Model

Our developed flex sensor based system as shown in fig.11. It consists of sensor interfacing,glows,relays

and communication circuits which can be more reliable to control all the in-door mechanisms.

V CONCLUSION AND FUTURESCOPE

We have presented our work on Hand Glove controlled indoor environments which is designed with Flex sensor Interfacing. This system provides the enhanced and user friendly mechanism in powerpoint presentation slider movements,appliance control by this, one can manage the overall control within the environment. This is accomplished by using advanced communication protocols which has been monitored and recorded with personal computer. Advantages of this system is a potential of mobility and accuracy thus can be more helpful in physically challenged people also.

The system can be further improved by replacing the CPU with Arduino ATMEGA328 microcontroller to development platforms like raspberry pi, beagle bone, etc. where image processing can further be done separately avoiding any human engagement in monitoring.

VI REFERENCES

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