

DEVELOP VERY LOW COST FLEX SENSOR USING ALUMINUM (AL) FOIL PAPER

Sudhakar P. Sarkate

Ad-hoc Assistant Professor, Degree college of Physical Education, H.V.P.M., Amravati A Multi-faculty Autonomous College, Amravati 444605. (MS)

Abstract

In this paper presents the, develop very low cost flex sensor, with easily available raw materials. The flex sensor works due to movement of flex sensor body that changes the resistance of the according to the bending angle of the sensor body. The flex sensor is used to resistive carbon materials like graphite. In this flex sensor are many applications, human machine interfaces, and robotics, medical, automotive. Flex sensor are produces different resistance values corresponding to the bending angle.

Keyword: Aluminum (Al) foils paper, canvas tape, cleaning pad, pencil, wire.

1.INTRODUCTION

A low cost flex sensor are specifically designed to the various application and advantages, measures the amount of deflection by bending angle of the sensor. New innovation is required to solve the challenged faced by the development and scientists to meet the requirement of customer. The various technology are the join and medical science has create the task like complex surgery by robotic arm simpler, to record the motion of human limbs sensor can be used , among sensors, flex sensor is very attractive for automatic control of different application^[1] (robotic machine ,robotic arm etc). Develop very low cost flex sensor with easily available materials handed-down as, aluminum foil paper, scrub pad, canvas tape, pencil etc. constitute for a very low cost flex sensor. These sensors consist of two conductive layers of thin aluminum foil and abrasive scrub pad with some pencil graphite powder (work as a variable resistor) and a acetate sheet for flexibility. The proposed flex sensor is novel in comparison to because

it uses low cost easily available materials. The proposed flex sensor is also précised and accurate. The proposed flex sensor is simple and it can be easily used for automation controlling of different arduino based robotic machine^[2].

2.LITERATURE REVIEW

1. Novel design of low cost flex sensor for automatic controlling of robotic car (jamini Prasad burman):

This paper mainly focused on the automatic controlling of robotic car and flex sensor. The paper discussed a novel technique to design a flex sensor using daily used materials for controlling of robotic car. Enhance the use of conventional robots by adding human intelligence as decision is taken by operator and working capability of robots^[1-2].

2. Design and development of a cost effective flex sensors for recognition of international sign language through the motion of hand (Dr. Shantanu K. Dixit & Mr. Nitin S. Shingi.):

This paper mainly focused on the Design and development of a cost effective flex sensors for recognition of international sign language through the motion of hand, Robotic hand is a Human like hand which performs the tasks that human performs with his hands^[1-3].

3.DEVELOP SYSTEM

In this develop system, we will, Aluminum (Al) foils paper, canvas tape, cleaning pad, pencil, wire These sensors will be mechanism of the designed flex sensor is shown in Figure1, The flex sensor consists of two conductive layer of Aluminum (Al) foil paper (food wrapping film) soldered with 12cm long wire at either end of each plate and in middle of this abrasive cleaning

pad (3M scotch brite) is used as resistive material. Pencil Graphite powder (collecting from useless pencil) is attached in the middle of the aluminum foil paper and canvas tape is used to attach both the upper & lower Aluminium (Al) plate and it is covered with channel file sheet that can help for flexibility. The structural block diagram of the designed flex sensor is shown in Figure 2^[1-3].



Figure 1. Implement of the Develop flex sensor.

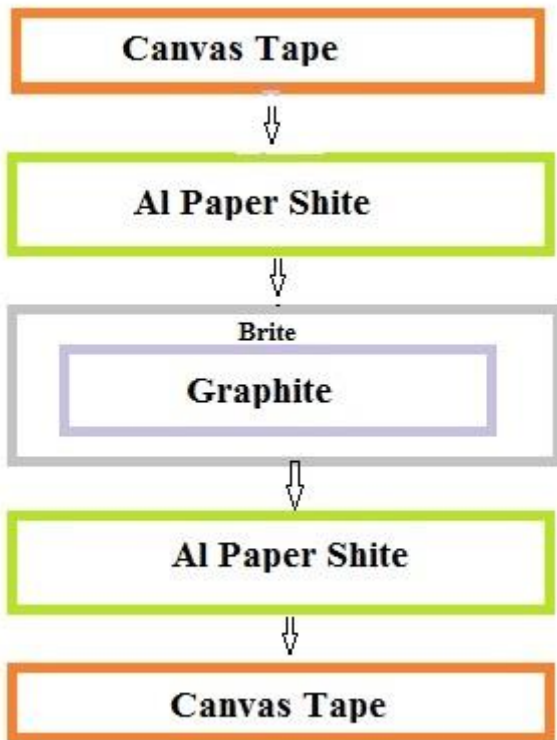


Figure 2. Block Diagram of the Develop flex sensor.

4.WORKING AND PRINCIPLE

The working principle of develop flex sensor depends upon bending phenomenon. When it is in normal condition i.e. 180°, resistance offered by it is maximum. Other the sensor is bent angle to 90°, its resistance decreases. The resistance value decreases with further decrease in bend position. This phenomenon is validated with some numerical values (analogue values). Figure 3 indicates the line plot of bent position versus resistance value^[1-3].

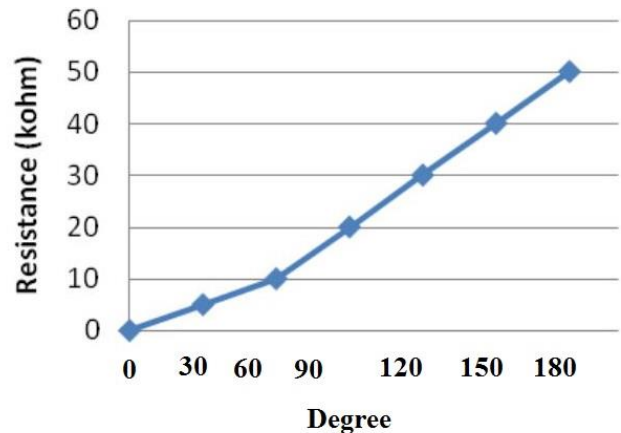


Figure 3. Line draw of bending movement versus resistance Values.

It is clearly seen from Figure 3 that as the bending position decreases the corresponding resistance also decreases hence conductivity increases. Finally, development set up of the flex sensor as shown in figure4^[1-3].

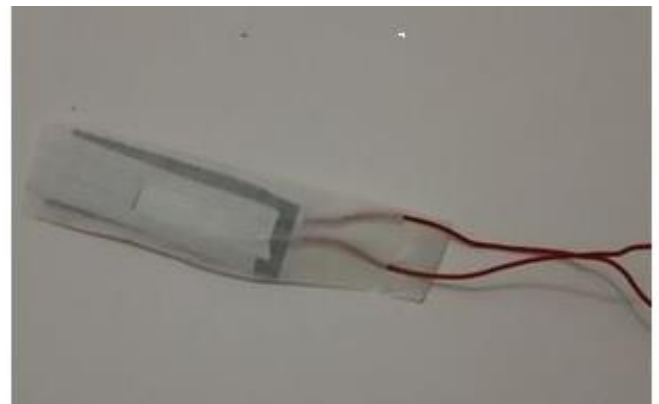


Figure 4 Development set up of the flex sensor.

5. MATHETICAL FORMULA

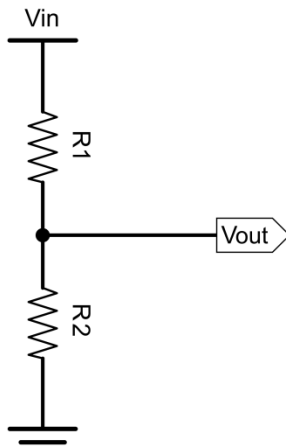


Figure 5. Voltage divider diagram.

$$V_{out} = \frac{V_{in} R_2}{R_1 + R_2}$$

Where,

V (out) = o/p voltage.

V (in) = I/p voltage.

R1= resistance of sensor.

R2=Resistance value.

The very important things required for flex sensor is voltage divider circuit. The above figure 5 helps for supplying voltage according to the^[1-4].

6. RESULTS

The changes of sensor resistance versus voltage are shown in Figure 6. As seen from Figure 6 the changes of sensor resistance and voltage are inversely proportional. That means higher the value of resistance lower is the voltage and vice versa. The maximum resistance of 40k ohm is observing i.e. when the voltage across the voltage divider circuit connected with flex sensor is 0 voltages^[1-5].

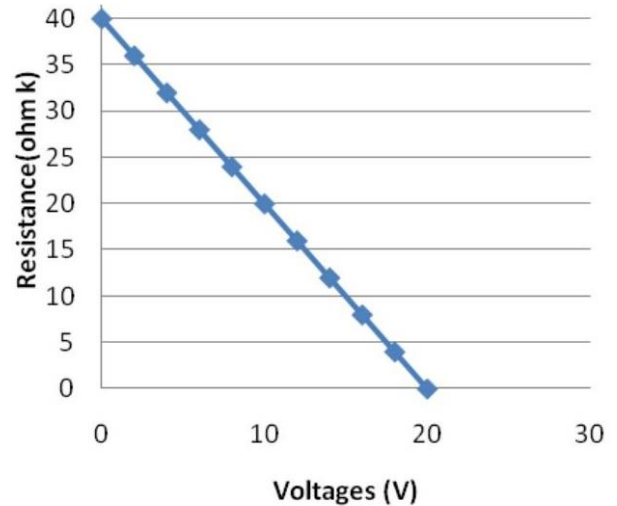


Figure 6. The changes of sensor resistance versus voltage.

7. ADVANTAGES

- It is easy to make.
- It is simple.
- A very Low cost.

8. APPLICATIONS

- It is used in robotics field.
- It is used in medical field.
- It is useful in automobile field.
- It can use in arduino.
- It is used in industrial field.

9. CONCLUSION

Develop very low cost flex sensor using Aluminum (Al) foil paper is accurate sensing analog values. This system will help to reduce cost and time in future. This system can save the lives of many people.

REFERENCES

- [1] Jamini Prasad Burman. 'Novel design of low cost flex sensor for automatic controlling of robotic car', International Journal of Advanced Research in

Electronics and Communication Engineering,411-413.
(2015).

[2]Praveen Kumar,Ajmin Hasan, Amar Dhwas & Amit Prabhakar."Design and development of a cost effective flex sensors for recognition of international sign language through the motion of hand". International Journal of Advances in Electronics and Computer Science, vol-5, 54-58. .(2018).

[3] Dr. Shantanu K. Dixit & Mr. Nitin S. Shingi. "Implementation of Flex sensor and Electronic Compass for Hand Gesture Based Wireless Automation of Material Handling Robot", International Journal of Scientific and Research Publications, vol-2(12),1-3. .(2012).

[4] Abidhusain Syed, Zamrrud Taj H. Agasbal, Thimmannagouday Melligeri & Bheemesh Gudur. "Flex Sensor Based Robotic Arm Controller Using Micro Controller", Journal of Software Engineering and Applications, 364-366. .(2012)

[5] Giovanni Saggio, Antonino Lagati, & Giancarlo Orengo. "Shaping Resistive Bend Sensors to Enhance Readout Linearity", International Scholarly Research Network Electronics, 1-7.(2012).

[6] Alapati Sreejan & Yeole Shivraj Narayan.. "A Review on Applications of Flex Sensors", International Journal of Emerging Technology and Advanced Engineering,Vol-7, 97-100. (2017).