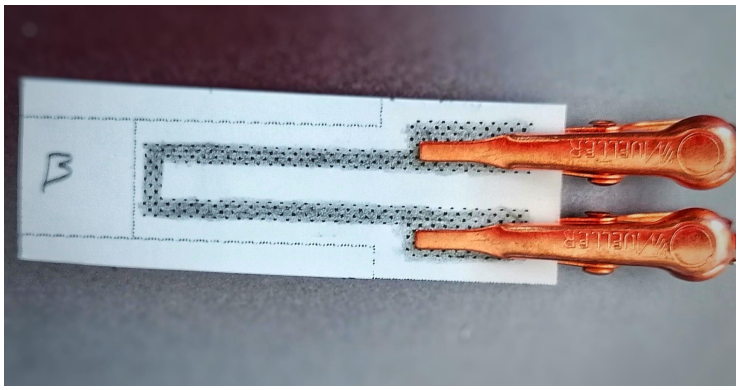
INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

STRAIN GAUGE SENSOR BASED ON GPRAPHITE PENCIL

General features

- Easy to use and fabricate
- Low cost
- Low power consumption
- Measures deflections
- Sensitive
- Portable
- Disposable
- Long lifetime
- Short resoponse time



Description

This pencil-drawn strain gauge on paper is based on the variable resistance of graphite depending on compressive or tensile deflections. In educational situations this sensor fits perfecctly, due to its low cost and simple fabrication process. The sensor consists of paper with a graphite print, which acts as a varying resistance, and two nodes where the sensor can be connected by clasps to the paper. Graphite consists of tightly stacked layers of graphene, making in conductive due to its hexagonal carbon-crystal structure. This contributes to making the sensor stable when exposed to moisture, chemicals and UV irradiation. s its simplicity, reliability, and that it can be made at home in just a few minutes.

The sensor needs to be calibrated before use, due to uncertainties in angle measurements.

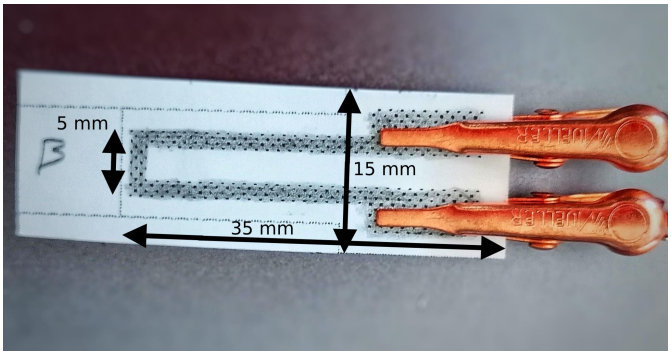
Fabrication

The graphite layer is disposed on the paper with a normal pencil, making it very easy to fabricate, and widely applicable for sensors to be made in minutes with very little special tools. By application with a pencil, the graphite is scraped of due to friction, and adhered to the paper in ultrafine layers. In this technique, graphite works as a ultrafine conductive film with a hight sensitivity. Some of the biggest advantages with this sensor i

Specifications

Type	Graphite strain sensor
Materials	• Graphite (C) • Paper
Sensor type	Active (power supply required)
Nature of measurands	Resistance
Nature of output signal	Analog
Dimensions (total)	Length: 35 mm Width: 15 mm Paper thickness: 0.2 mm
Mounting	Clips **2 connections**: • Power supply • Analog output
Typical application	Measuring deflection angles
Power supply	5 V

Dimentions



Standard test conditions

	Unit	Typical value
Temperature	°C	20±5
Humidity	/	Normal
Air quality	/	Normal

Typical electrical charactersitics

		Value		
	Unit	**Min**	**Typical value**	**Max**
Resistance	Ω			
Voltage	V			

Characteristic graphs of resistances and currents in standard test conditions

The resistance is measured depending to the angle of deflection to give a picture of the relation of these and to help with the calibration of the sensor.

Figure 1: Measurement of resistance in relation to angle of deflection.