

Introduction and Acknowledgments

MASTER MODULE 6

CHEMICAL SENSORS AND BIOSENSORS

This book is a joint effort of the Chemical Sensors and Bio-sensors Research Group at the School of Chemical and Environmental Engineering, Dublin City University, Ireland.

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Edited by Gillian McMahon

National Centre for Sensor Research, Dublin City University, Ireland.

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In this section, we give a short overview of basic magnetic fields, which are necessary to understand other magnetic sensors. A stationary or moving conductor in a magnetic field will experience a force.

A second charge will experience a force.

where Q_1 is the charge, \vec{v} is the velocity, \vec{B} is the magnetic field, e is the elementary charge, and c metres is the speed of light.

F = Q₁ × v × B / Newtons

basically, a current carrying conductor in a magnetic field experiences a force.

unipolar to bipolar conversion, and the output voltage is proportional to the current.

analogous to the Hall effect, but the output voltage is proportional to the current.

The magnetic field lies in a circular path around the conductor and perpendicular to the conductor and to the line of r from the conductor.

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Magnetic sensors are used in applications everywhere: from home appliances to cars and industry and scientific instruments. They either sense magnetic field itself, or more often, another physical variable which is transformed into a magnetic response. Magnetic sensors are reliable, they have a large operating temperature range and they are resistant to vibrations, dirt and interference. More detailed information on magnetic sensors can be found in general sensor books [1-3] and in specialised literature [4-6].

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MEMS technology is equipped with various manufacturing techniques such as the Wafer Bonding [2].

MEMS technology is equipped with various bonding techniques such as the Deep Silicon Etching (DSE) [3].

Volume Copy Resolution (PCR) microsystems for DNA amplification and sequencing [4].

Laser lithography [5].

Atomic Force Microscope (AFM) [6].

Scanning Processing Microscopes (SPM) and Scanning Tunneling Microscope (STM) [7].

MEMS devices are extremely small (e.g. electrically driven motors are smaller than the diameter of a human hair), but MEMS technology is not only characterised by the size [8].

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MASTER MODULE 7

LEVEL, POSITION AND DISTANCE

Written by G. Hartung, Berufsförderungswerk, Heidelberg, Germany

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of best most often the key criterion for selection is the frequency response of the sensor defined by the ratio of change of output signal to change of input signal. A potentiometer has a frequency response from DC to several MHz. The resolution of the sensor is determined by the number of segments or the number of bits in the digital output.

7.2 Resistive LPD sensors

Potentiometers are resistive devices with a linear or rotary sliding contact which position is affected by the position (movement) of the measured object. The resistance of the resistive material is proportional to the position of the wiper. The resistance of the resistive material is proportional to the position of the wiper. The

beginning of the winding and the wiper, is proportional to the position of the wiper. The potentiometer can operate as a variable resistor (resistor). The resistive material is proportional to the position of the wiper. The operation in voltage divider (potentiometer) mode in which the voltage between the wiper and one end of the resistive material (output voltage U_2) is measured offers more advantages and prevails in practical applications.

When the resistive windings of the potentiometer are evenly distributed along the core with a low specific ohmic value of about $1 \Omega/\text{cm}$, the current through the resistive material is constant. This method is called the current division method. The measured voltage is proportional to the position of the wiper. This method is suitable for measuring the angle of rotation of a shaft or the position of a linear displacement.

MASTER MODULE 8

TEMPERATURE SENSORS

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MASTER MODULE 9

SOLID-STATE GYROSCOPES AND NAVIGATION

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