

Survey on position sensor and its application review paper

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Abstract: The review makes a brief overview of traditional methods of designing of Magnetoresistive sensors and shows in more detail relatively new types of magnetoresistive sensors and its application in various field. The techniques can produce sensors encompass many aspect of physics and electronics. Rotary position sensor are used to measure rotational angles. They do this through different technologies and offer different outputs depending on the requirement of the application. In this review most common technologies used for position sensing are described and compared. These include AMR sensors, optical, resistive and capacitive sensors.

Keywords: AMR sensor, rotational position sensing, angle sensor, pedal sensor.

I. INTRODUCTION

Precise position sensors are required for the automotive and industrial application for sensing angular position and in many other applications. We discuss the principles of these devices with special reference to recent advances. We will concentrate on factors influencing precision and other parameters important for various applications. A rotational position sensors can measure rotational angles from output voltages. The rotation to be measured is linked to the rotation of a magnet to cause changes in resistance, which the AMR sensor converts into changes in output voltage.

There are many sensor are available for rotational position sensing. In the half of this paper, the more popular position sensing technologies will be described and in second half, the major applications of angle sensor are discussed.

Most contactless position sensors are based on magnetic sensors. Magnetic sensing technique exploits a broad range of physics, electronics, and chemistry disciplines. More common position sensors are listed in fig.1, which is comparison between various position sensors. In present review we concentrate on the latest research development in rotary position sensor.

II. LITERATURE SURVEY

In “A new generation of contactless magnetic position sensor” this paper Author proposed by rotating the magnetic field determination of the angular position, measurement of Angle up to 360° and using a permanent magnet at the one end of the shaft which facing towards Hall ASIC. But the sensitivity of this sensor is less and high cost.

New position detector based on AMR sensor”, in this paper author proposed an idea in where AMR sensor implemented for detection of angular range up to 180° . And the Absolute angular position sensor using two AMR sensors saturated by a magnetic field between two ring magnets. The direction of the magnetic field component in the plane of the sensors changes in usoidal with the angular position of the shaft. But the disadvantage of the proposed method is Airgap should be very less and the low temperature range so it is very difficult to use it for Automotive applications.

And another author tried to eliminate the harmonic distortions from the sensor signal by forming sinusoidal shaped Magnetoresistive strips with different resistance for determining the angle, which continuously changes in the direction of the magnetization in the strips, as a result, it avoids the Hysteresis.

III. PROBLEM STATEMENT

Position sensors play a vital role in industrial applications as well as in other applications. Now a days there are various types of position sensors available and it's very complicated to find right one. The earlier position sensor has some issues like they can't long last, sensitivity is not good, can't work in high temperature etc., so in our proposed work we have explained about AMR based position sensor which will eliminate maximum of the disadvantages of other types of sensors. In inductive sensor inductor used to develop magnetic field when current flows through it and by this principle they used to find position of object. Inductive position sensor, capacitive position sensor can't not work in dirty environment while AMR sensor can work in dirty or harsh environment.

IV. BLOCK DIAGRAM

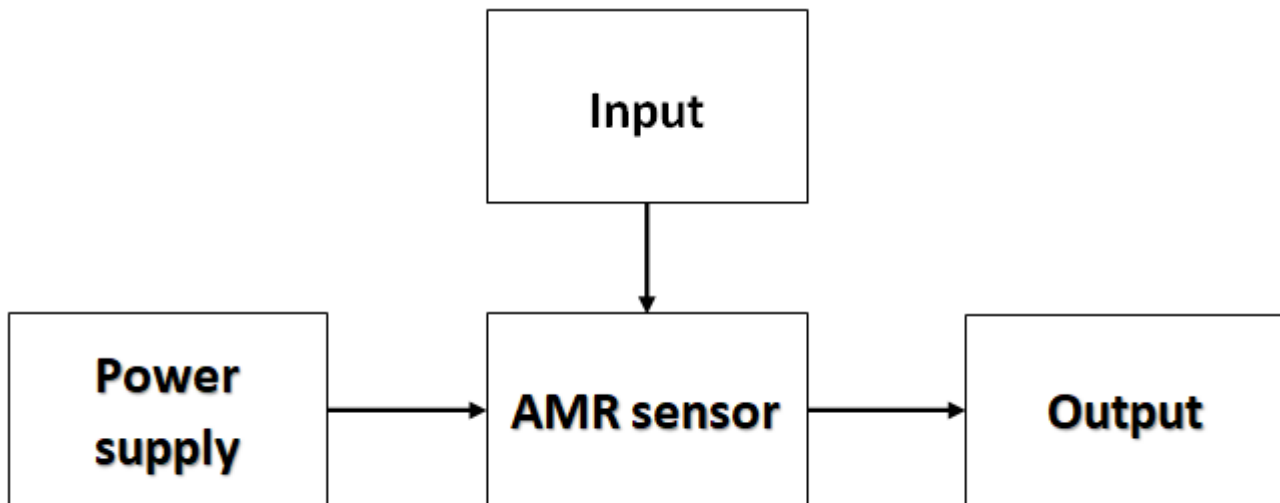


Fig 1. Block diagram

Block description:

Here we are using AMR position sensor. Input which can be mechanical signal is given to the AMR sensor and we can get output as an electrical signal. 6-12 volts power supply is given to sensor. In AMR sensor, sensor circuit is there which are working with respect to rotation of magnet which is placed inside of the sensor and we get output voltage with respect to position. This is contactless sensor, there is an airgap in between sensor and magnet.

An Inductive position sensor is device that provides measurement data based on position of moving object. Magnet-based solutions measure angular position using variations of magnetic field amplitude induced by the displacement or rotation of a moving magnet. But these solutions are expensive and offer limited accuracy for small angular movements. But this sensor can have drawback as explained above they can't work in harsh environment.

Some benefits of inductive position sensor:

- No magnets required; reduces system cost
- Through-shaft capabilities
- Flexible for motor designs
- Supports higher speed
- High accuracy in all applications
- Lower weight, smaller size
- Stray field immunity

Capacitive position sensor:

- Capacitive sensing is a contactless measurement method. this system does not make contact with the part, there will be no witness marks, probe wear, parts distortion Since there is no sensor cycle time, high volume measurements are achievable.
- Capacitive sensors measure quickly. They are ideal for high-bandwidth measurements applications and high-volume sorting applications. But capacitive sensors are not much temperature dependent

This sensor can be used for precision positioning, automotive industries, medical applications, aerospace applications.

Hardware name:

Power supply: 6-12 volts dc power supply can be used here.

AMR sensor: AMR sensor is a product which has inbuilt magnet and sensor circuit.

Display: Display can be gauge display or any other kind of display which can be used to display output voltage.

V. ACKNOWLEDGEMENT

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VI. CONCLUSION

In conclusion, this review work studies some of the important and technologically relevant properties of position sensor. This review work basically based on the literature survey for work which describes the introduction of various position sensor and as well as the comparison between different types of position sensor and discussed the advantages for magnetic position sensor. We turned our focus on the different previous papers related to position sensor and detailed study on what problems they faced. And we conclude, Magneto-resistive based position sensor are very promising. Optical sensors are not competitive with other sensor types: they are expensive, and they would require many turns of the fibre cable to achieve the required sensitivity. Resistive sensor don't have long life: friction can be occurs so error can occurs.

VII. REFERENCE

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