Department of Electronic and Telecommunication Engineering
University of Moratuwa

Project Proposal

Multi-turn Absolute Magnetic Encoder

Epa Y.L.A.   210156U
Epa Y.R.A.   210157A

This report is submitted as a partial fulfilment of module EN2160

Feb 2024

1   Introduction

The aim of this project is to design and develop a multi-turn absolute magnetic encoder system. The encoder will provide accurate position feedback over multiple revolutions, making it suitable for applications requiring precise rotational positioning such as robotics, motor control, and industrial automation.
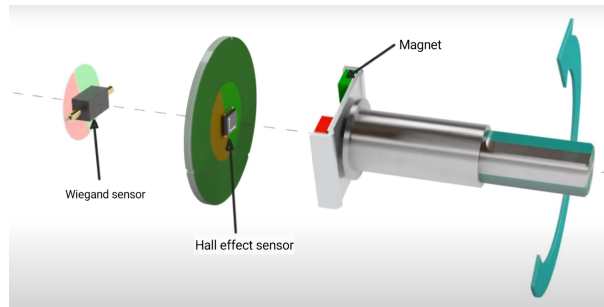
2   Methodology

Figure 1: *Basic diagram: Reference [2]*

Our methodology involves the following approach.

- Fixing a diametrically magnetized magnet onto the shaft (through the enclosure), enabling rotation

- Measuring the angle using the hall effect sensor, by considering the change in the magnetic polarity

- Tracking the number of revolutions completed by the magnet using the measured angle or a wiegand sensor

In order to achieve our goals, we plan on:

a) Selecting appropriate hardware including hall effect sensor ICs, microcontroller and diametrically magnetized magnets considering the cost and accuracy

b) Developing algorithms for absolute position calculation and multi-turn tracking

c) Testing the hardware and software to evaluate it's accuracy, precision and reliability

3   Conclusion

Developing a multi-turn absolute magnetic encoder will provide a valuable solution for applications requiring precise rotational position sensing and control.

4   Reference

[1] "Magnetic Rotary Encoder Technology" [Online]. https://files.pepperl-fuchs.com/webcat/navi/productInfo/doct/tdoct3063_eng.pdf?v=20231211180839

[2] "New Magnetic Rotary Encoder Technology" https://youtu.be/soImUGrWuhI

[3] "AS20-Series Miniature Encoder : Magnetic Absolute Kit Encoder with Energy Harvesting Multi-Turn." [Online]. https://docs.broadcom.com/doc/AS20-M42M-Series-DS