Department of Electronic and Telecommunication Engineering
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Conceptual Design Report

Multi-turn Absolute Magnetic Encoder

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This report is submitted as a partial fulfilment of module EN2160

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1 Conceptual Designs and Functional Block Diagrams

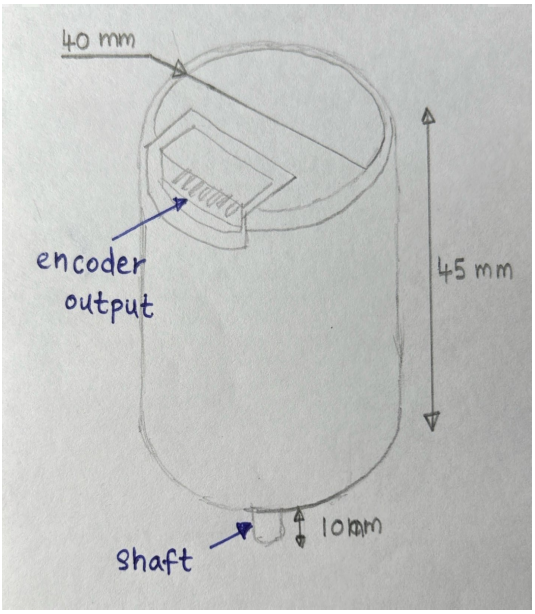

Figure 1: *Conceptual Design 1*

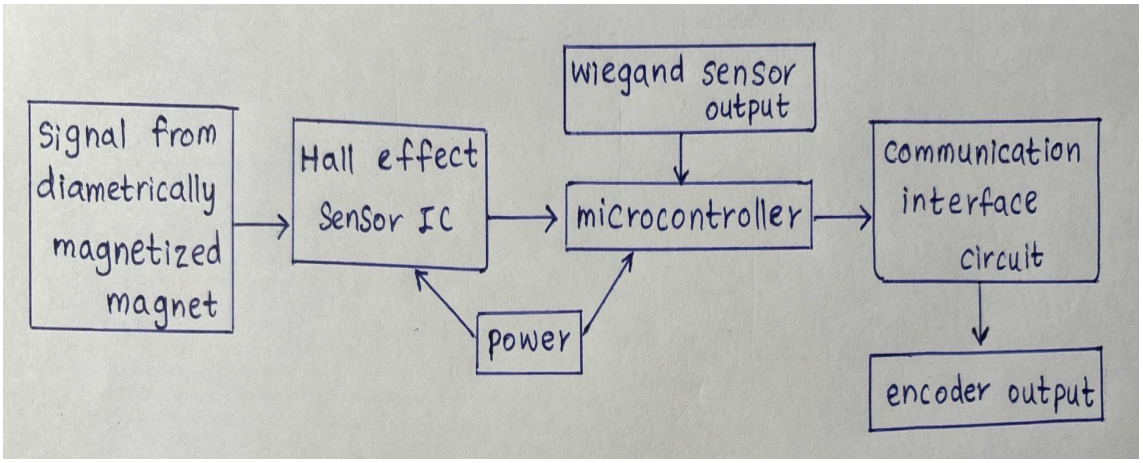

Figure 2: *Functional Block Diagram for Conceptual Design 1*

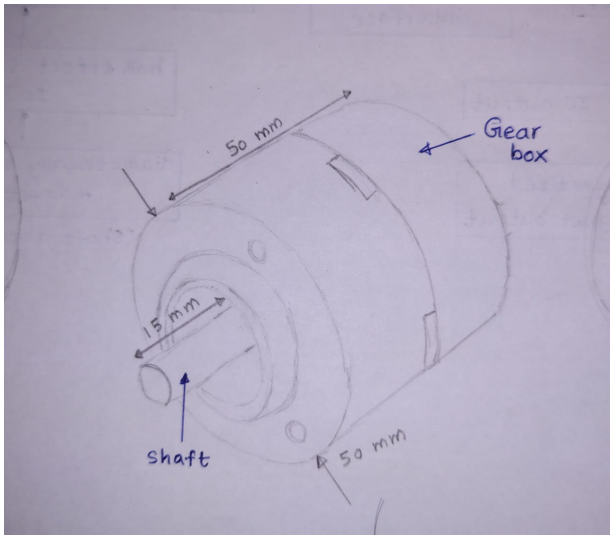

Figure 3: *Conceptual Design 2*

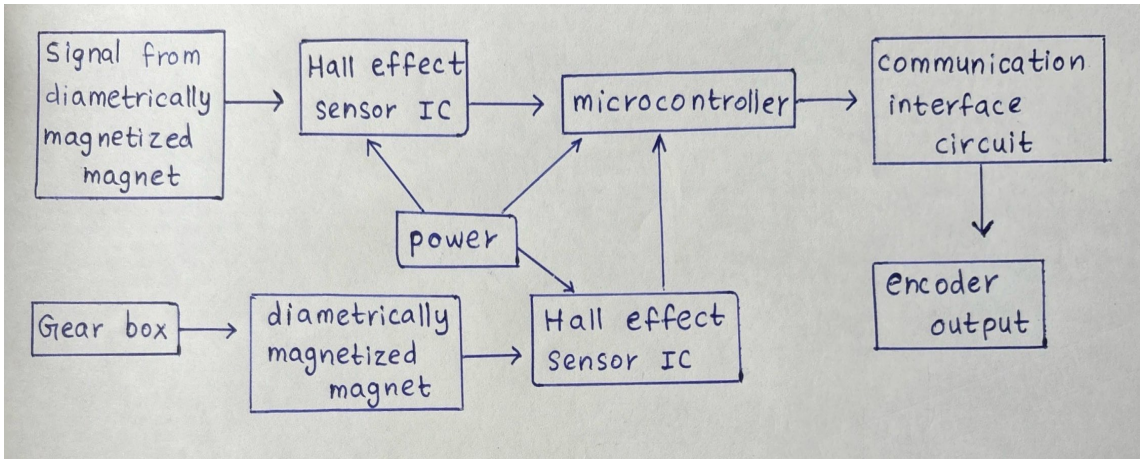

Figure 4: *Functional Block Diagram for Conceptual Design 2*

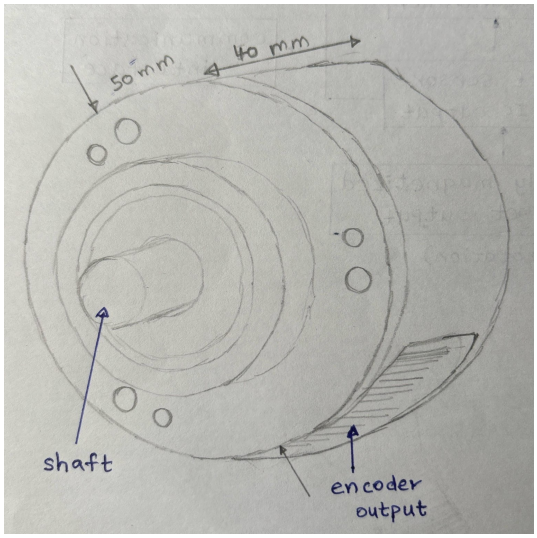

Figure 5: *Conceptual Design 3*

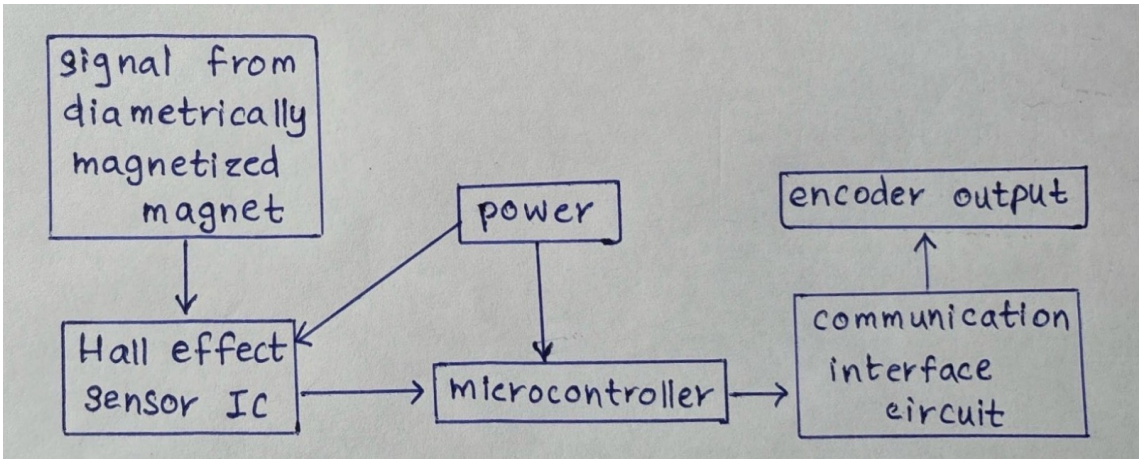

Figure 6: *Functional Block Diagram for Conceptual Design 3*

2 Complete Comparison

	Conceptual design 1	Conceptual design 2	Conceptual design 3
Newly added features	Multi turn capability using wiegand wire which doesn't require power to operate	Multi turn capability using Gear box and two hall effect sensor ICs	Multi turn counting using the microcontroller only
Removed features	Removed the necessity to give internal power for the circuitry to function	removed the wiegand wire	removed extra sensors and circuitry to address the multi turn capability
Enclosure design criteria comparison:			
1. Functionality	9	9	9
2. Size and weight	8	6	9
3. Ergonomic	9	6	9
4. Heat dissipation	8	6	9
5. Mounting and alignment	8	8	9
6. Simplicity	7	6	8
Functional block design criteria comparison:			
1. Functionality	7	9	6
2. Requirements	7	9	6
3. Power consumption	8	7	9
4. Future proofing	7	8	9
5. Cost	7	6	8
6. Manufacturing feasibility	7	6	8
Total	87	86	90

3 Evaluation Criteria

Enclosure Design Criteria:

1. Functionality: How well does the design support internal functionality?

2. Size and weight: How compact and lightweight is the enclosure for easy integration?

3. Ergonomics: How well does the enclosure design allow for easy handling installation and maintenance?

4. Heat dissipation: How much heat is generated and how well it has been managed?

5. Mounting and alignment: How easy is it to mount and align the encoder with the shaft, and how well does the enclosure maintain its alignment?

6. Simplicity

Functional Block Diagram Criteria:

1. Functionality: How well the circuit design meets functional requirements such as resolution, accuracy, and speed?

2. Requirements: How well does the components (magnet, Hall effect sensors, etc) meet the requirements for accuracy, resolution and bandwidth?

3. Power consumption: How efficiently does the design manage power consumption?

4. Future proofing: To what extent does the design allow for easy replacement or upgrade of individual components?

5. Cost: Overall cost effectiveness for the provided functionality

6. Manufacturing feasibility: Feasibility of manufacturing the design