



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

RADIOLOGY AND EQUIPMENT

III Year : VI Semester

TITLE: STEPPER MOTOR CONTROL SYSTEM



INTRODUCTION



- A stepper motor, also known as step motor or stepping motor, is a brushless DC electric motor that divides a full rotation into a number of equal steps.
- A standard motor will have a step angle of 1.8 degrees with 200 steps per revolution.

V2

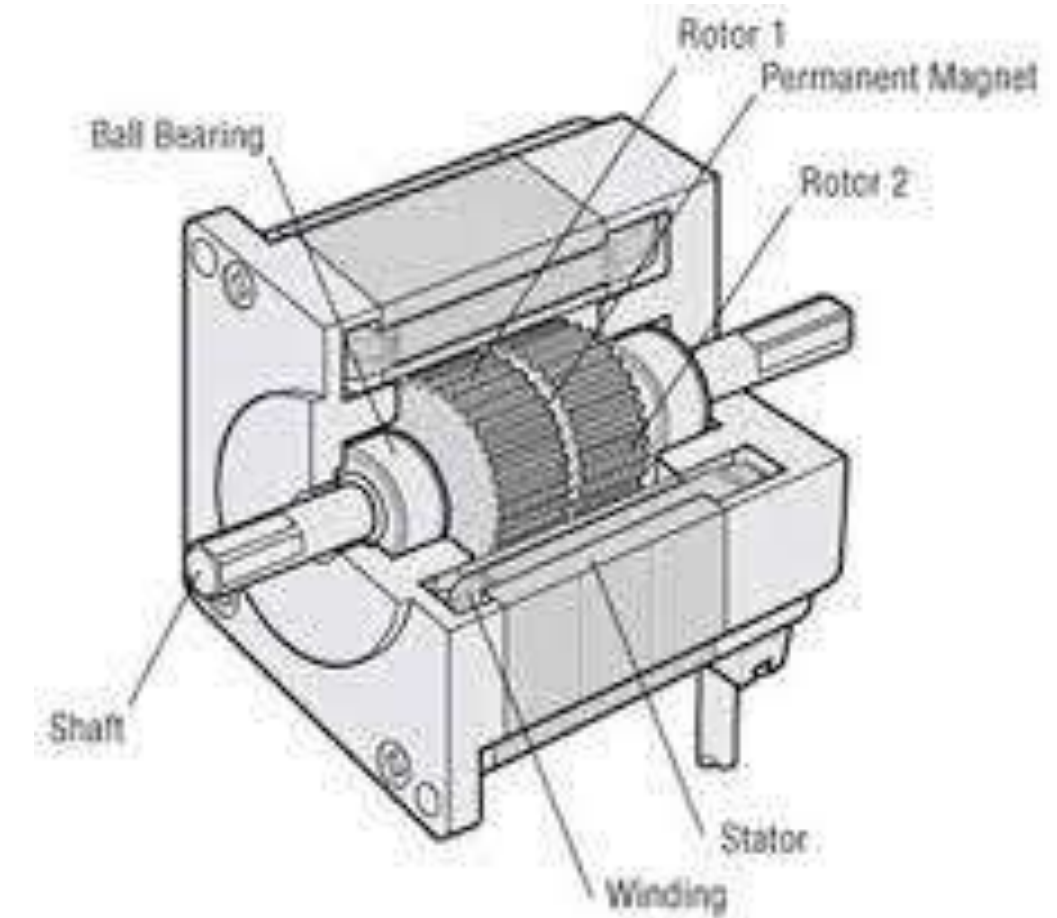




Principle of the Stepper Motor

- The operation of this motor works on the principle that unlike poles attract each other and like poles repel each other. When the stator windings are excited with a DC supply, it produces magnetic flux and establishes the North and South poles.

V2



Motor Structural Diagram: Cross-Section Parallel to Shaft

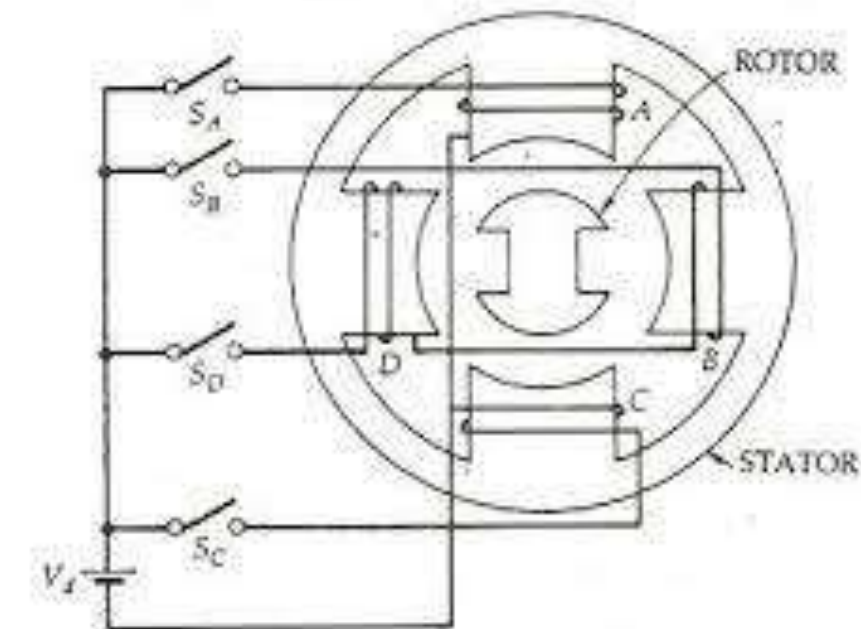
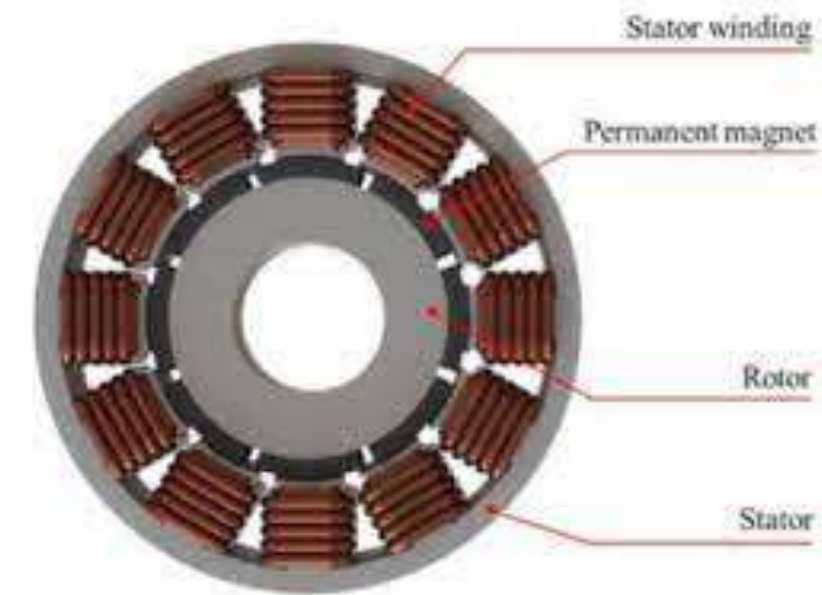


Types Motors

- **Permanent magnet motors:** It uses a permanent magnet (PM) in the rotor and operate on the attraction or repulsion between the rotor PM and the stator electromagnets

Variable reluctance (VR) motors: It have a plain iron rotor and operate based on the principle that minimum reluctance occurs with minimum gap, hence the rotor points are attracted toward the stator magnet poles

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System of the Stepper motor



- A stepper motor system consists of three basic elements, often combined with some type of user interface (host computer, PLC)
- Indexers
- Drivers
- Stepper motors

Vision Title 3



Indexers



- The indexer (or controller) is a microprocessor capable of generating step pulses and direction signals for the driver. In addition, the indexer is typically required to perform many other sophisticated command functions.

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DRIVERS

- The driver (or amplifier) converts the indexer command signals into the power necessary to energize the motor windings. Not all drivers are suitable to run all motors.

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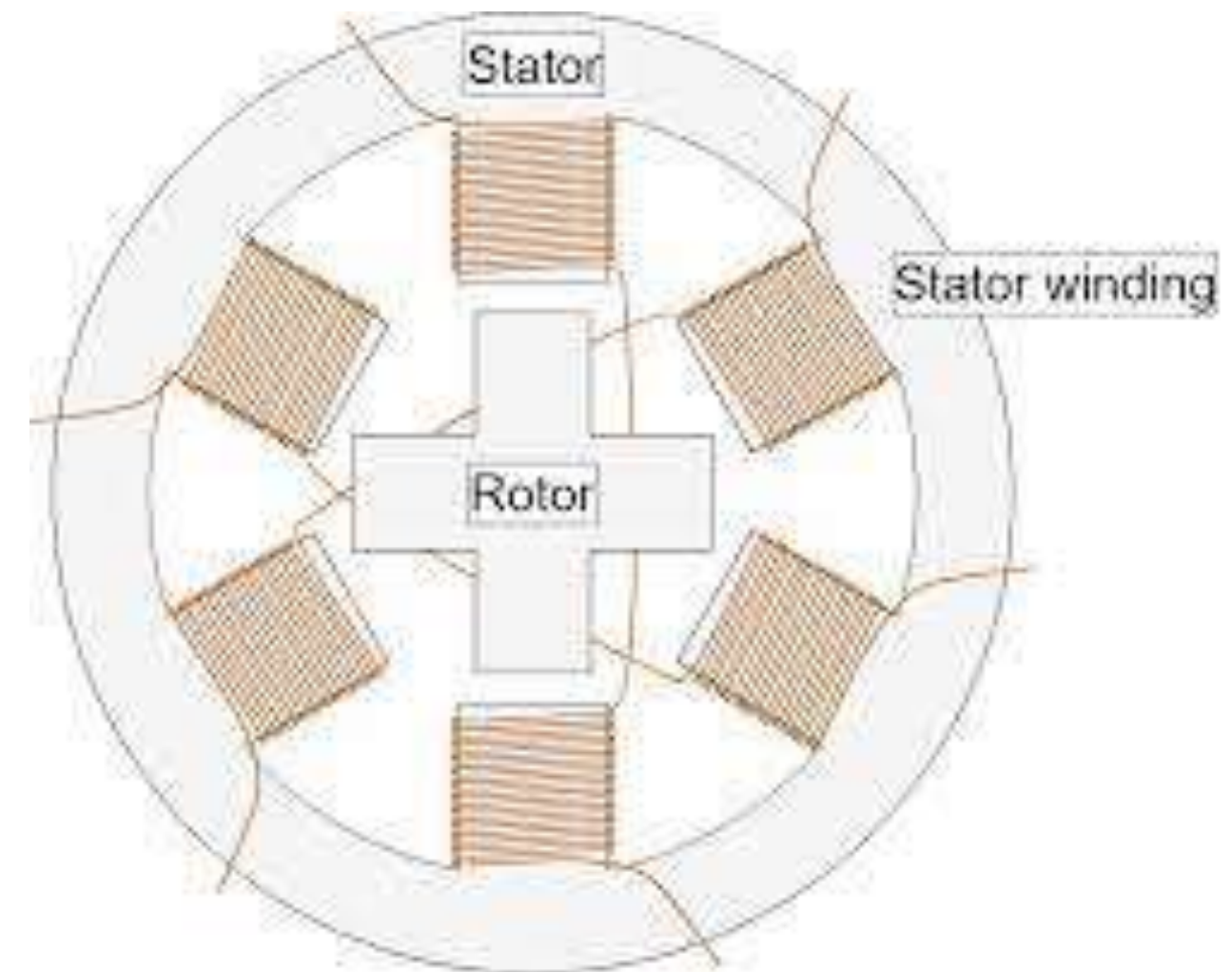




Stepper motors

- The stepper motor is an electromagnetic device that converts digital pulses into mechanical shaft rotation. Advantages of step motors are low cost, high reliability, high torque at low speeds and a simple.

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ADVANTAGES



- Low cost for control achieved
- High torque at startup and low speeds
- Ruggedness
- Simplicity of construction
- Low maintenance Less likely to stall or slip
- Will work in any environment
- Can be used in robotics in wide scale
- High reliability

V 2

Vision Title 3



APPLICATIONS



- The stepper motor is used for precise positioning with a motor like hard disk drives, robotics, telescopes and some toys
- Industrial Machines-Stepper motors are used in automotive gauge and machine tooling automated production equipment
- Security-New surveillance products for the security industry Medical-Stepper motors are used inside medical scanner. sampler and also found inside digital dental photography.

Vision Title 3