

19MO611-AUTOTRONICS

UNIT 3- SENSOR AND ACTUATORS STEPPER MOTOR ACTUATORS





AGENDA

Introduction to Stepper Motor Actuator

Types of Stepper Motors

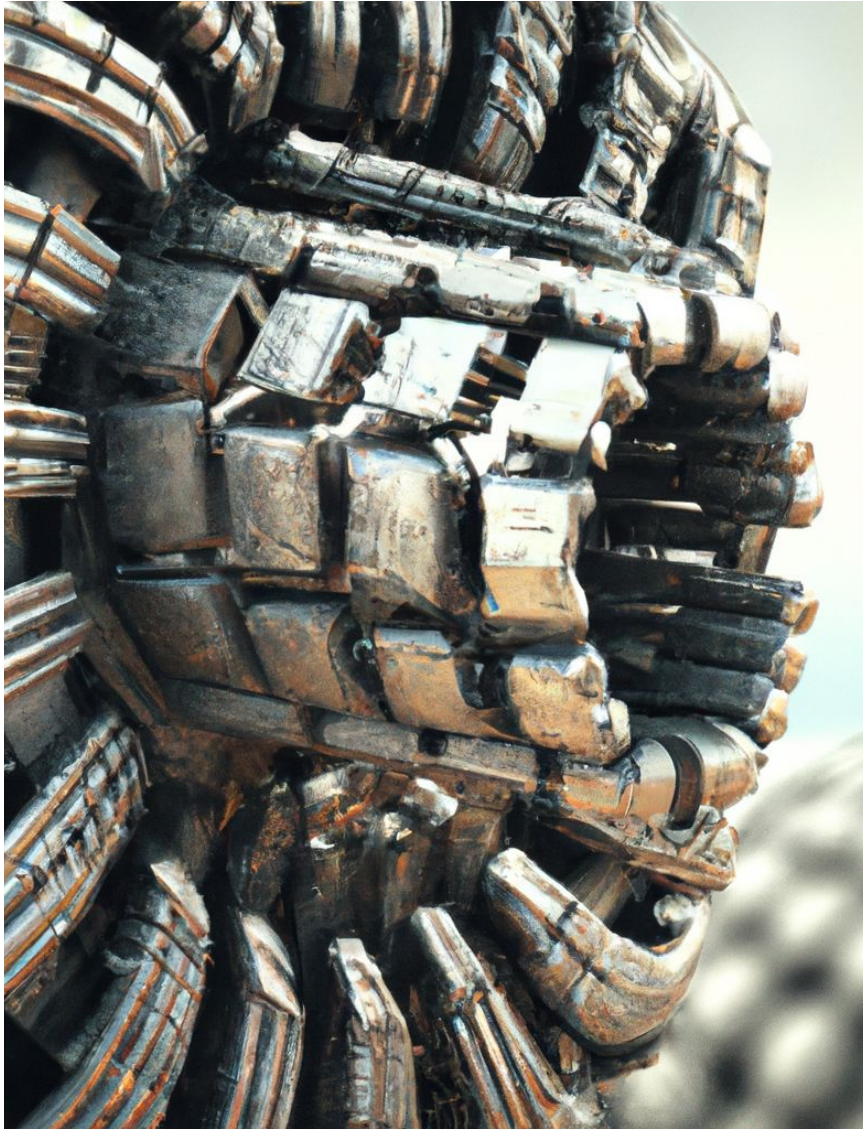
Working Principle of Stepper Motors

Advantages of Stepper Motors

Applications of Stepper Motors

Conclusion

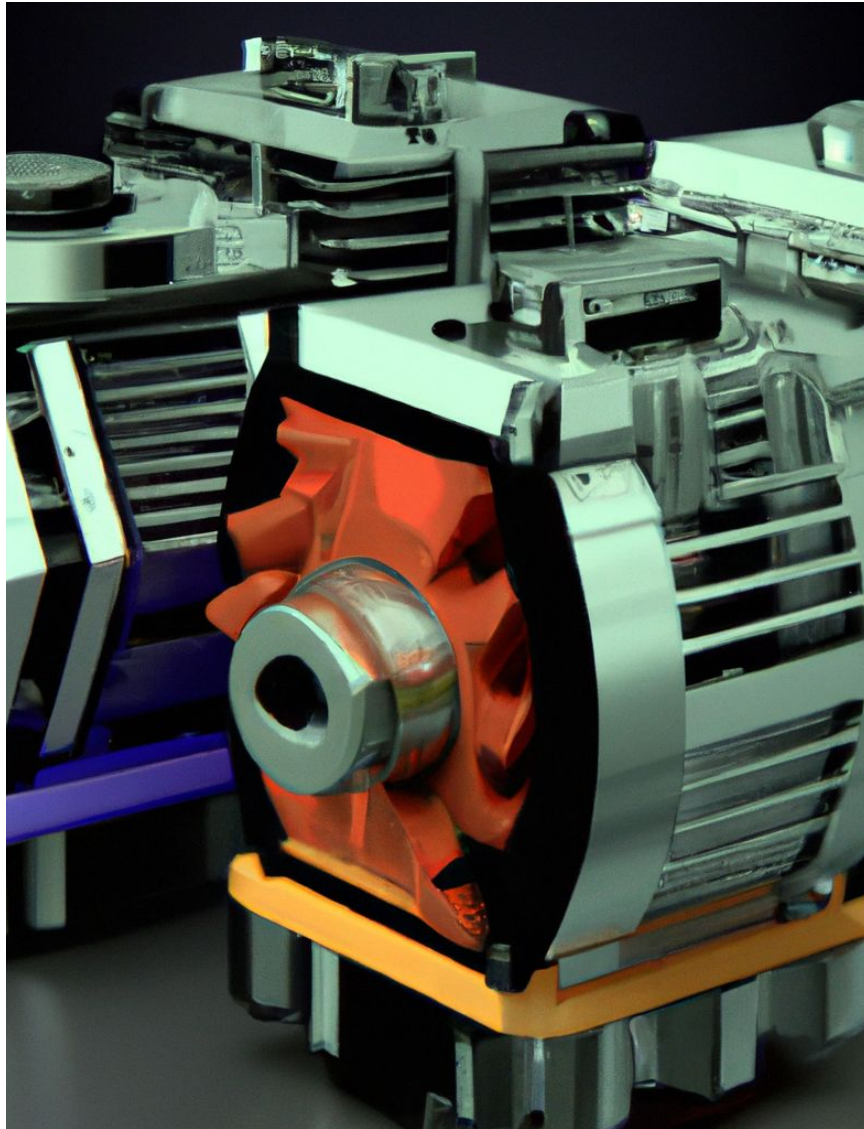




INTRODUCTION

A stepper motor actuator is a device that converts electrical signals into mechanical motion. It is widely used in various applications, including robotics, automation, and precision control systems.

Unlike traditional motors, stepper motors operate in a step-by-step manner, allowing for precise control of position and speed. This makes them ideal for applications that require high accuracy and repeatability.

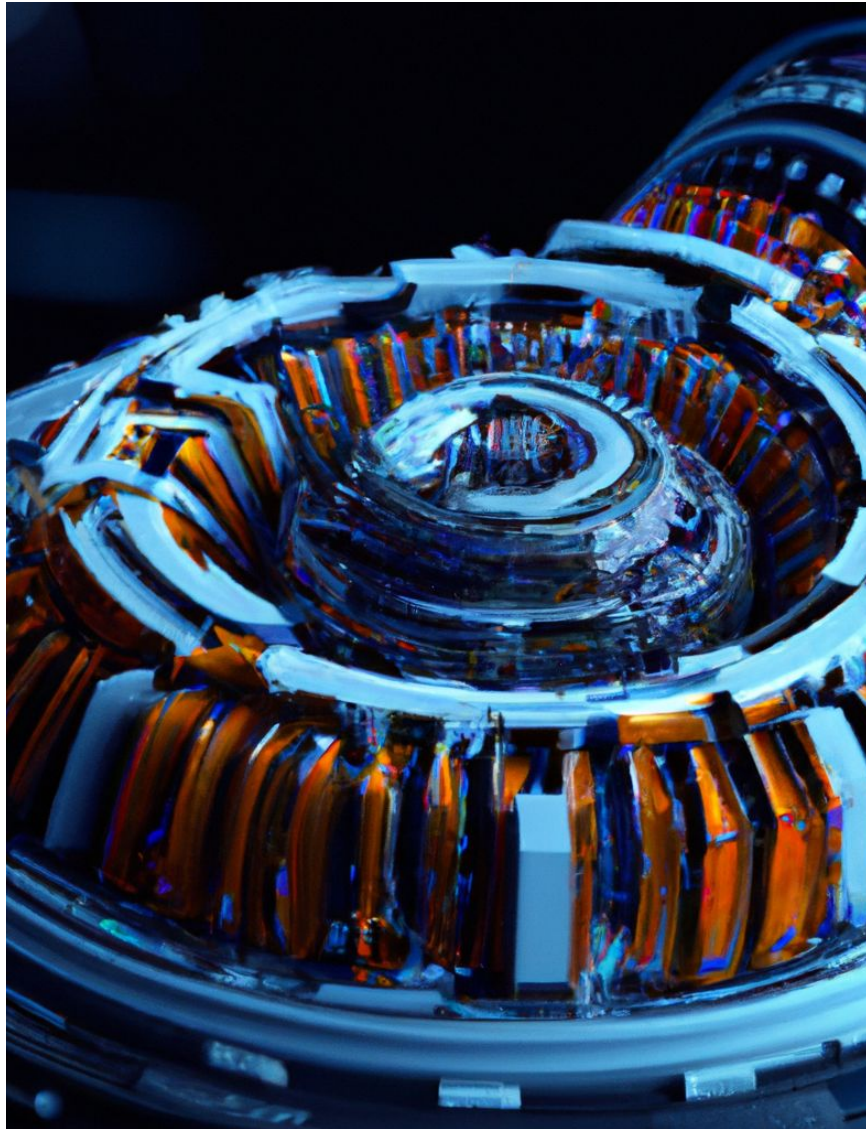


TYPES OF STEPPER MOTORS

There are three main types of stepper motors:

permanent magnet (PM) stepper motors, variable reluctance (VR) stepper motors, and hybrid stepper motors.

PM stepper motors are the simplest type and use a permanent magnet rotor. VR stepper motors use a toothed rotor and stator with no magnetic material. Hybrid stepper motors combine the features of both PM and VR motors, making them the most versatile and widely used type.

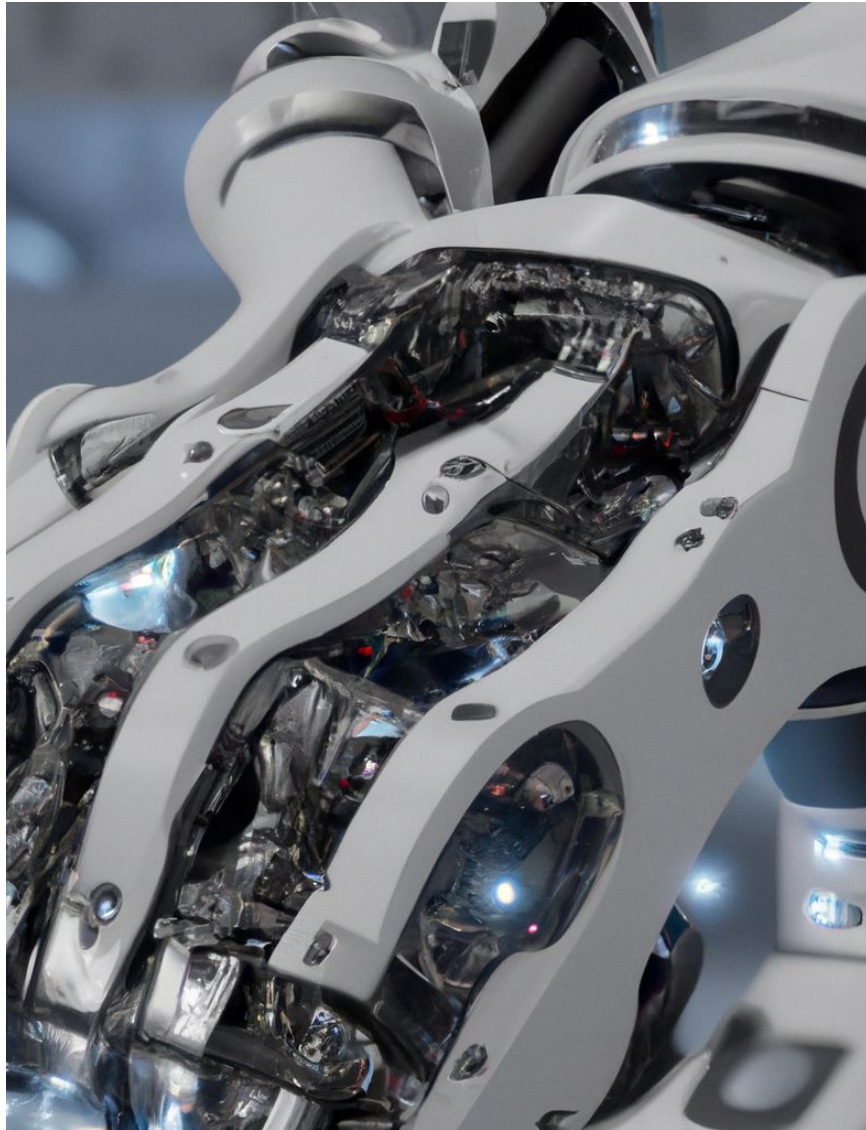


WORKING PRINCIPLE OF STEPPER MOTORS

Stepper motors work by converting electrical pulses into rotational motion. These pulses are generated by a controller and sent to the motor through a driver circuit.

The motor then moves in small steps, with each step corresponding to a fixed angle of rotation.

The number of steps per revolution depends on the motor's design and can range from a few hundred to several thousand steps.

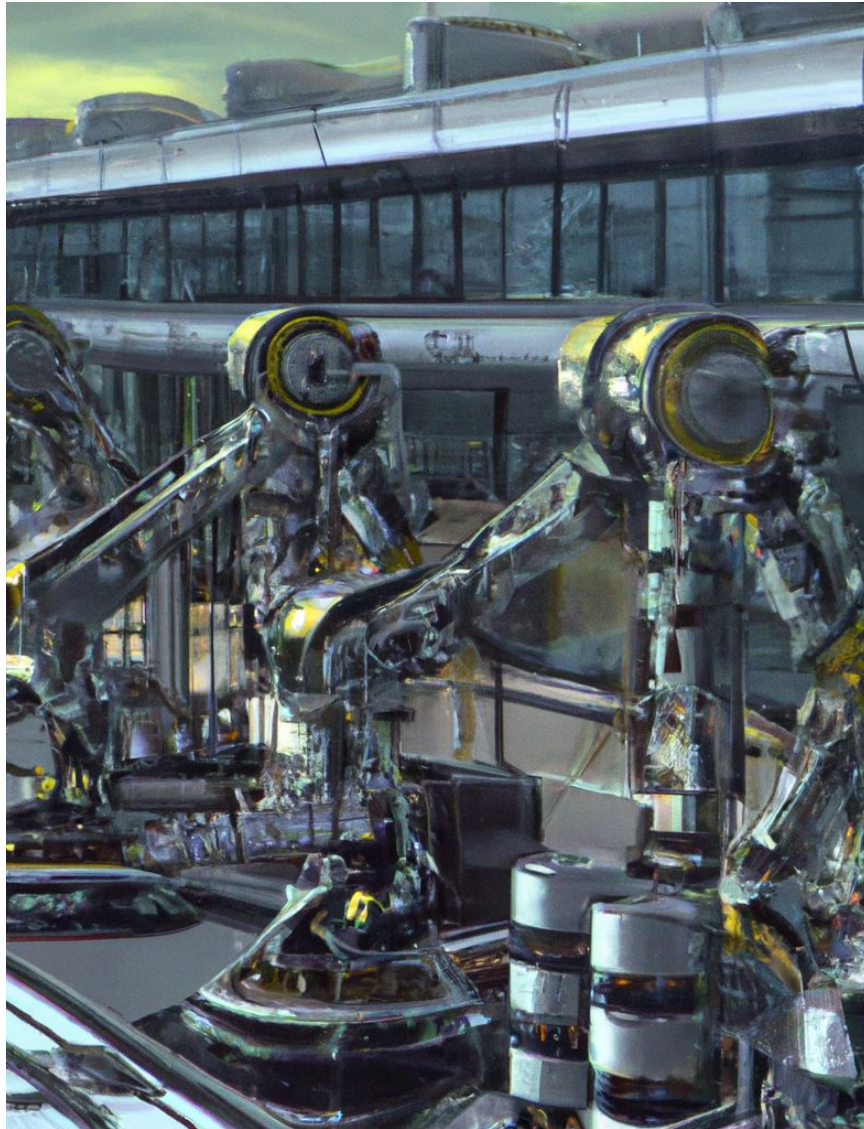


ADVANTAGES OF STEPPER MOTORS

Stepper motors offer several advantages over traditional motors. They have high accuracy and repeatability, making them ideal for applications that require precise control of position and speed.

They also have a simple design and are easy to use, with no feedback or closed-loop control required.

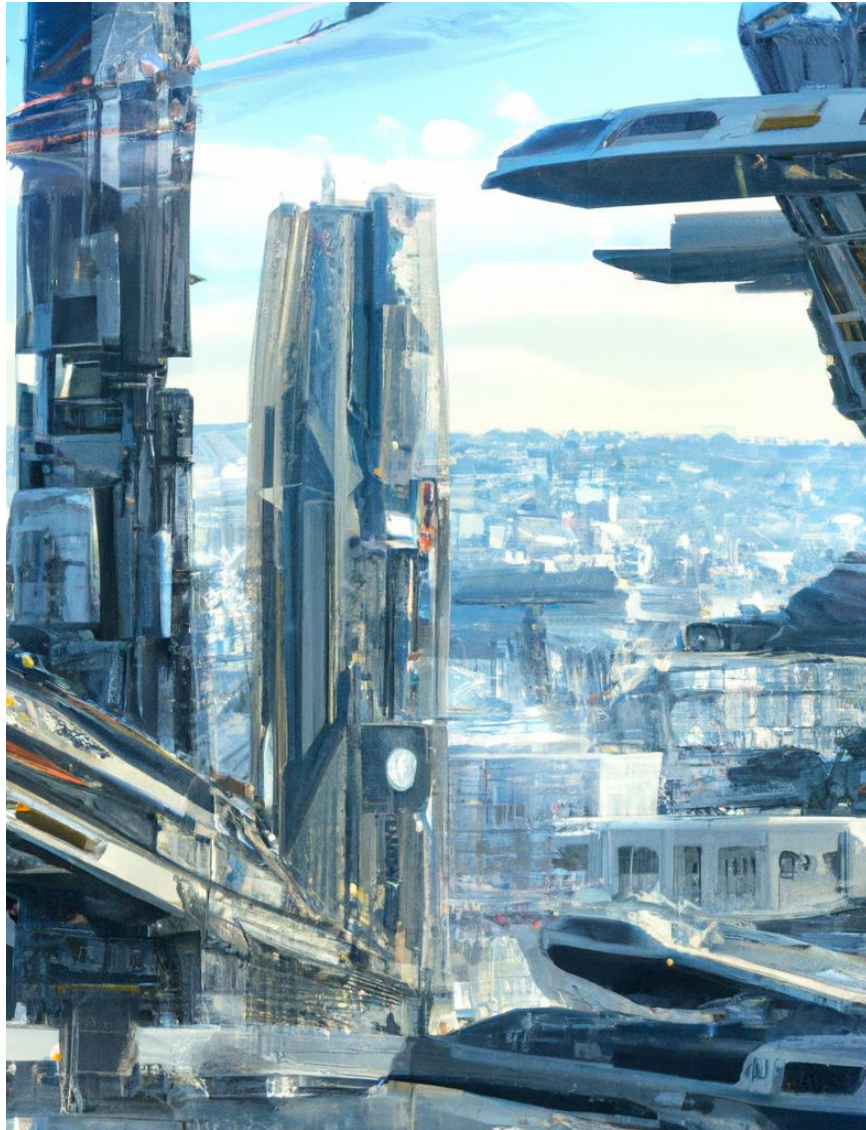
Additionally, they can operate at low speeds without losing torque, making them suitable for applications that require low-speed operation.



APPLICATIONS OF STEPPER MOTORS

Stepper motors are used in a wide range of applications, including robotics, automation, CNC machines, 3D printers, and medical equipment.

They are also used in consumer electronics, such as cameras and printers, where they provide precise control of movement and positioning.



CONCLUSION

In conclusion, stepper motor actuators are an essential component of modern automation and control systems. Their high accuracy, repeatability, and versatility make them ideal for a wide range of applications.

As technology continues to advance, stepper motors will continue to play a critical role in shaping the future of robotics, automation, and precision control systems.



THANK
YOU