



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

ROBOTICS AND AUTOMATION IN MEDICINE

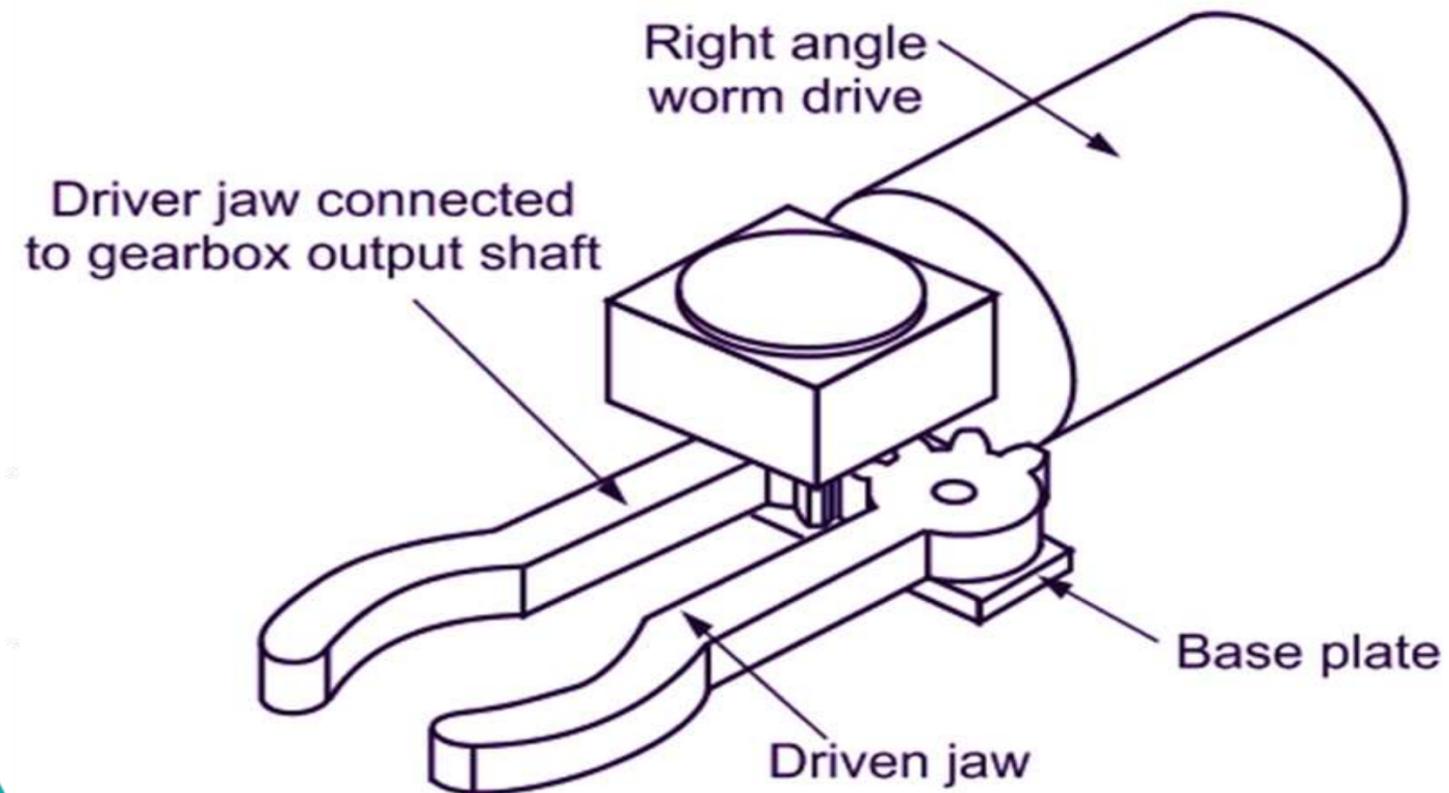
III Year : VI Semester

TITLE : VARIOUS TYPES OF GRIPPERS



An Introduction to Grippers in Robotics

Grippers are essential components in the field of robotics since they operate as the robots hands and enable interaction and manipulation of the real environment. With the help of these end-effectors, robots may now carry out a vast range of jobs in a variety of industries. The varieties, uses, and functions of grippers in robotics are examined in this investigation.





Various types of Grippers in Robotics

Types of Grippers Used in Robots :

- Vacuum Grippers.
- Pneumatic Grippers.
- Hydraulic Grippers.
- Electric Grippers.
- Cobot Software and Grippers.





VACUUM GRIPPERS



Vacuum grippers are a type of end effector that uses suction to lift and manipulate objects. They are widely used for robotic palletizing, which is the process of stacking and arranging products on pallets for transportation or storage. Vacuum grippers have many advantages over other types of grippers, such as:

- They can handle a variety of objects, such as boxes, display boxes, cartons and some types of packed products and bags.
- They can lift objects from above, without needing to grip them from the sides or below.
- They can be customized to fit different sizes and shapes of objects, by adjusting the number and position of suction cups or valves.
- They can save energy and reduce noise, by using self-closing valves that only activate when needed.



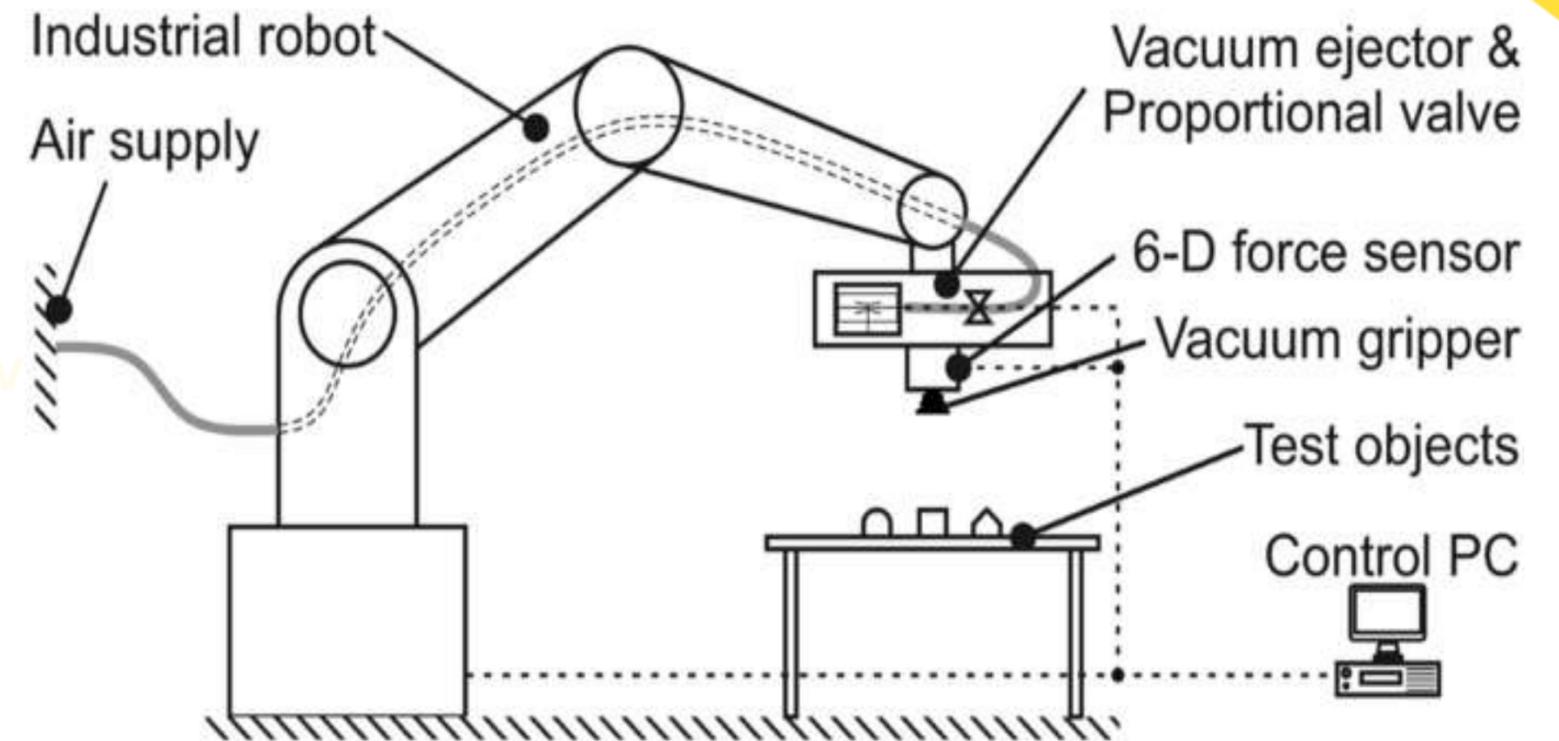
VACUUM GRIPPERS

Features of Vacuum Grippers:

- Suction Mechanism
- Adaptive Cup Designs
- Lightweight Construction
- Modular Configurations

Applications of Vacuum Grippers in Robotics:

- Packing and Palletizing:
- Automated Assembly:
- Logistics and Warehousing:
- Material Handling:





PNEUMATIC GRIPPERS



Pneumatic grippers emerge as versatile and efficient end-effectors. These grippers utilize compressed air to perform gripping and releasing actions, contributing to a wide array of industrial applications. This exploration delves into the key features, advantages, and applications of pneumatic grippers in the realm of robotics.

Features of Pneumatic Grippers:

- Actuation Mechanism
- Speed and Force
- Simple Design
- Customization





PNEUMATIC GRIPPERS

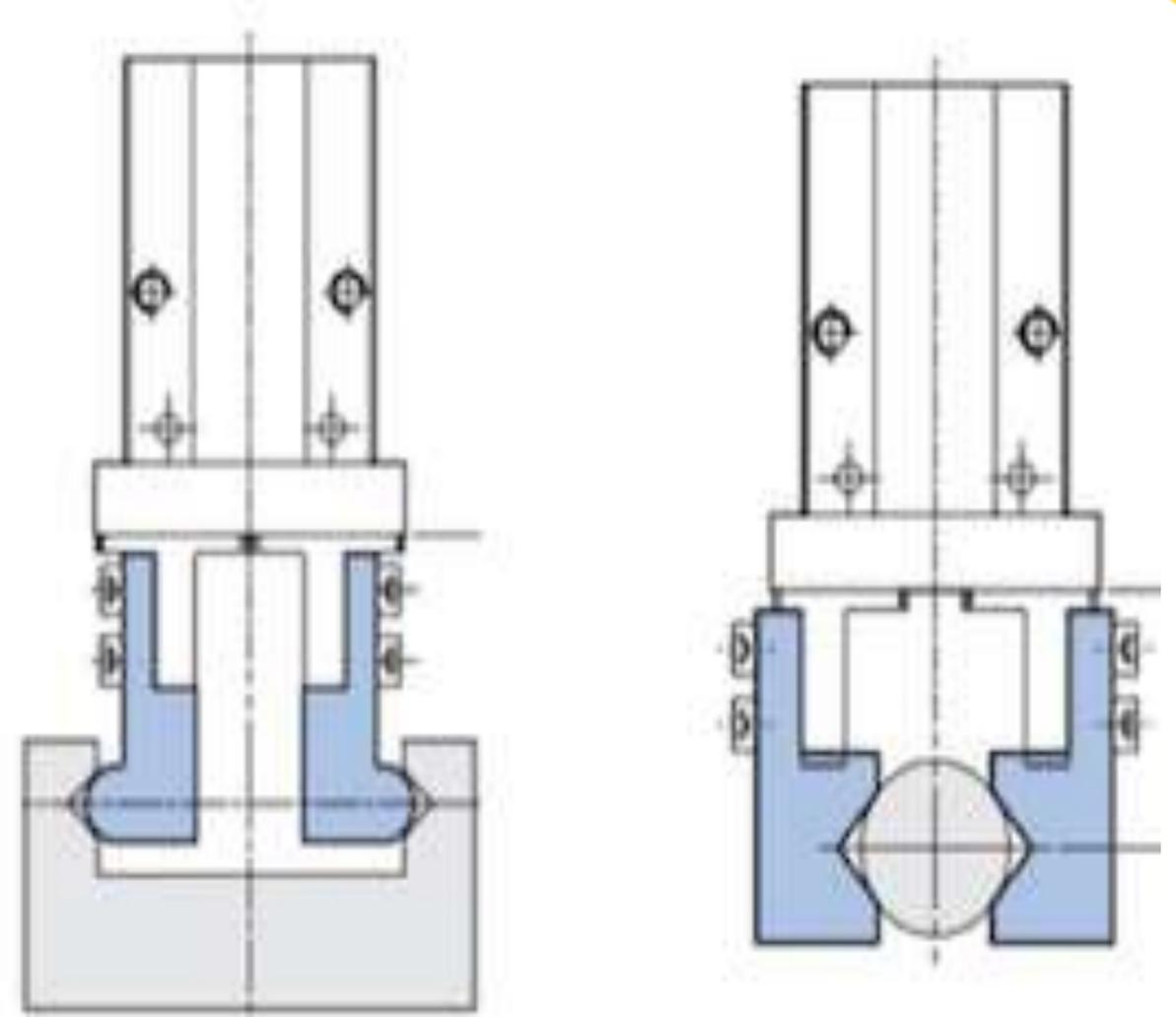
Advantages of Pneumatic Grippers:

- Cost-Effectiveness
- Rapid Response
- High Power-to-Weight Ratio
- Safety

Applications of Pneumatic Grippers in Robotics:

- Manufacturing and Assembly
- Material Handling
- Automated Welding and Machining
- Food and Packaging Industry
- Medical Robotics

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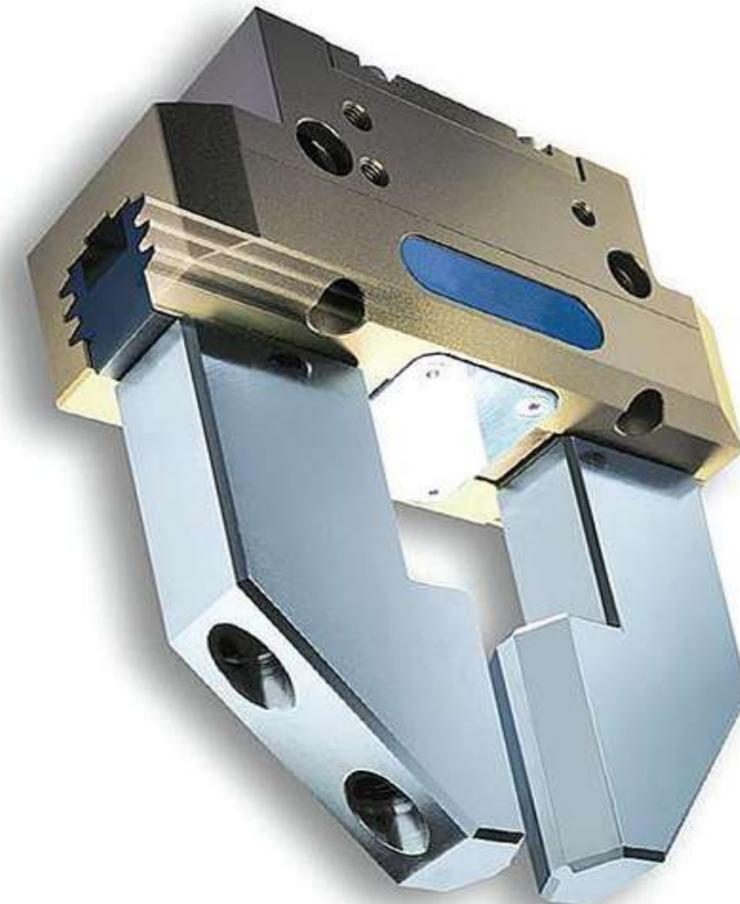


HYDRAULIC GRIPPERS

Hydraulic grippers stand out as powerful and versatile end-effectors. These grippers harness the force of hydraulic fluid to execute robust gripping and manipulation actions. This exploration delves into the key features, advantages, applications, and considerations associated with hydraulic grippers in the field of robotics.

Features of Hydraulic Grippers

- Hydraulic Actuation
- High Force Output
- Variable Force Control
- Sturdy Construction





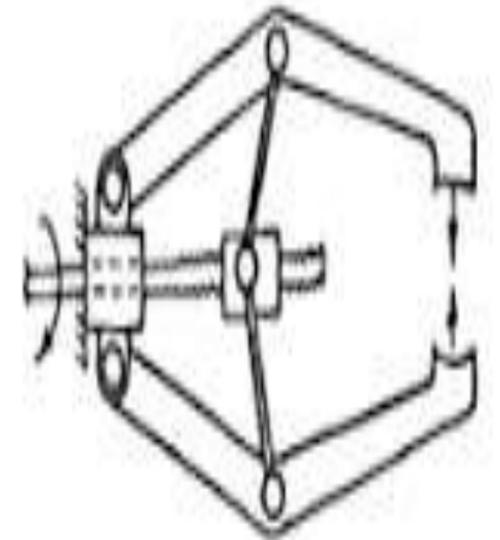
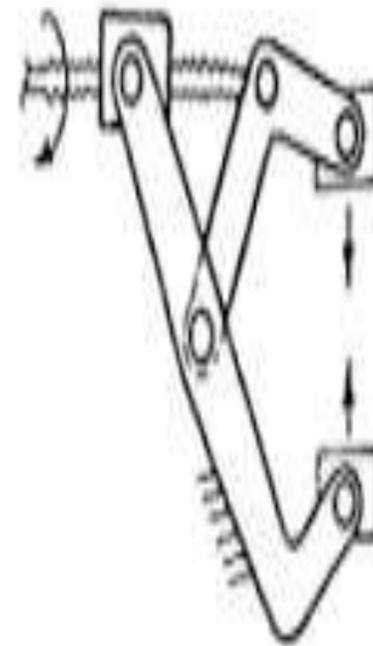
HYDRAULIC GRIPPERS

Advantages of Hydraulic Grippers:

- High Force-to-Weight Ratio
- Precision and Control
- Durability and Reliability
- Adaptability

Applications of Hydraulic Grippers in Robotics:

- Heavy-Duty Material Handling
- Automated Welding and Machining
- Construction and Demolition Robotics
- Aerospace Industry



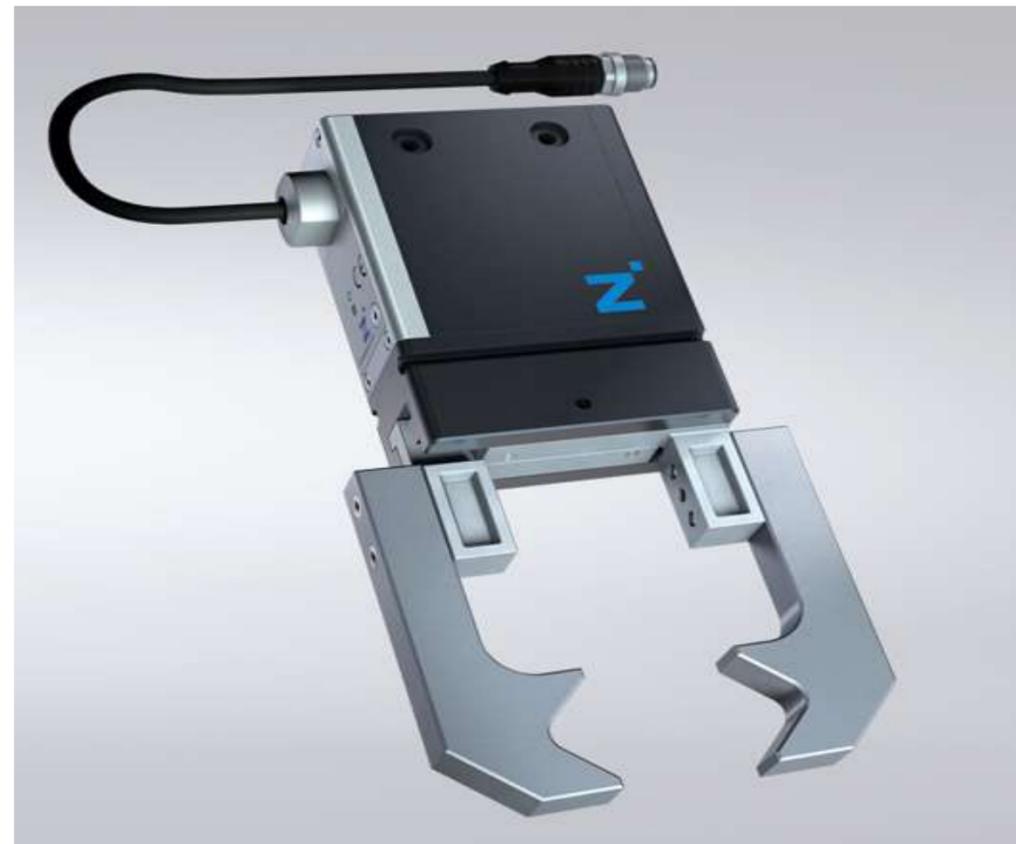


ELECTRIC GRIPPERS

Electric grippers represent a cutting-edge solution in the world of robotics, providing precision, adaptability, and energy efficiency. Unlike traditional hydraulic or pneumatic grippers, electric grippers leverage electrical actuators to achieve controlled gripping and manipulation actions. This exploration delves into the key features, advantages, applications, and considerations associated with electric grippers in the field of robotics.

Features of Electric Grippers:

- Electric Actuation
- High Precision
- Programmability
- Compact Design





ELECTRIC GRIPPERS

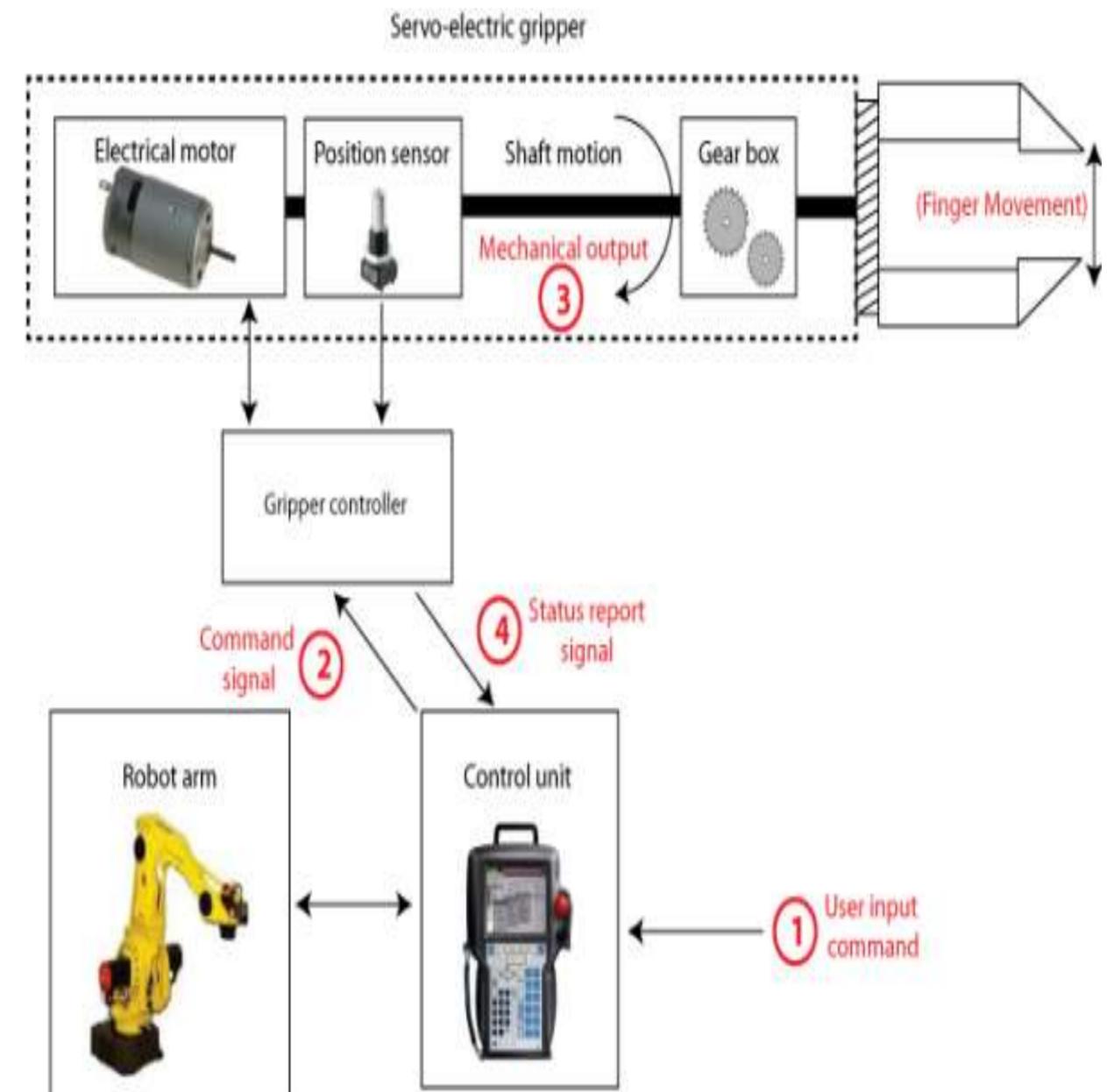
Advantages of Electric Grippers:

- Energy Efficiency
- Adaptive Force Control
- Reduced Maintenance
- Ease of Integration

Applications of Electric Grippers in Robotics:

- Precision Assembly
- Electronics Manufacturing
- Laboratory Automation
- Food and Beverage Industry

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COBOT SOFTWARE AND GRIPPERS

Collaborative robots, or cobots, are transforming the landscape of industrial automation by working alongside humans in shared workspaces. The effectiveness of cobots is significantly enhanced by sophisticated software and adaptive grippers. This exploration delves into the key aspects of cobot software and grippers, examining how they contribute to the versatility, safety, and efficiency of collaborative robotic systems.

Cobot Software:

- User-Friendly Programming
- Force and Tactile Sensing
- Collision Detection and Avoidance
- Path Planning and Optimization
- Human-Robot Collaboration (HRC)
- Remote Monitoring and Control
- Integration with IoT and Industry 4.0





COBOT SOFTWARE AND GRIPPERS



Cobot Grippers:

- Adaptive Gripper Designs
- Soft and Sensitive Grippers
- Vision-Based Gripping
- Force and Torque Sensing
- Dual Gripper Systems
- Tool Changers

Applications:

- Pick-and-Place Operations
- Assembly Tasks
- Quality Inspection
- Material Handling
- Collaborative Workstations



General Functions of Grippers:

1. Grasping:

1. Grippers are designed to securely hold objects, ranging from small components on an assembly line to larger items in warehouse logistics.

2. Lifting and Moving:

1. Grippers facilitate the lifting and transportation of objects within a defined workspace. They contribute to the automation of material handling processes.

3. Releasing:

1. Controlled release of objects is a crucial function, ensuring precise placement or handover of items. Grippers provide the necessary finesse for controlled operations.



General Applications Across Industries:



1. Manufacturing:

Grippers are extensively used in manufacturing for tasks such as assembly, pick-and-place operations, and quality control. They contribute to increased efficiency and precision in production lines.

2. Logistics and Warehousing:

In logistics and warehousing, grippers are deployed in robotic systems for palletizing, sorting, and order fulfillment. Their speed and accuracy enhance the overall efficiency of warehouse operations.

3. Healthcare and Medical Robotics:

Soft grippers find applications in medical robotics for delicate tasks such as handling biological samples or assisting in minimally invasive surgeries.

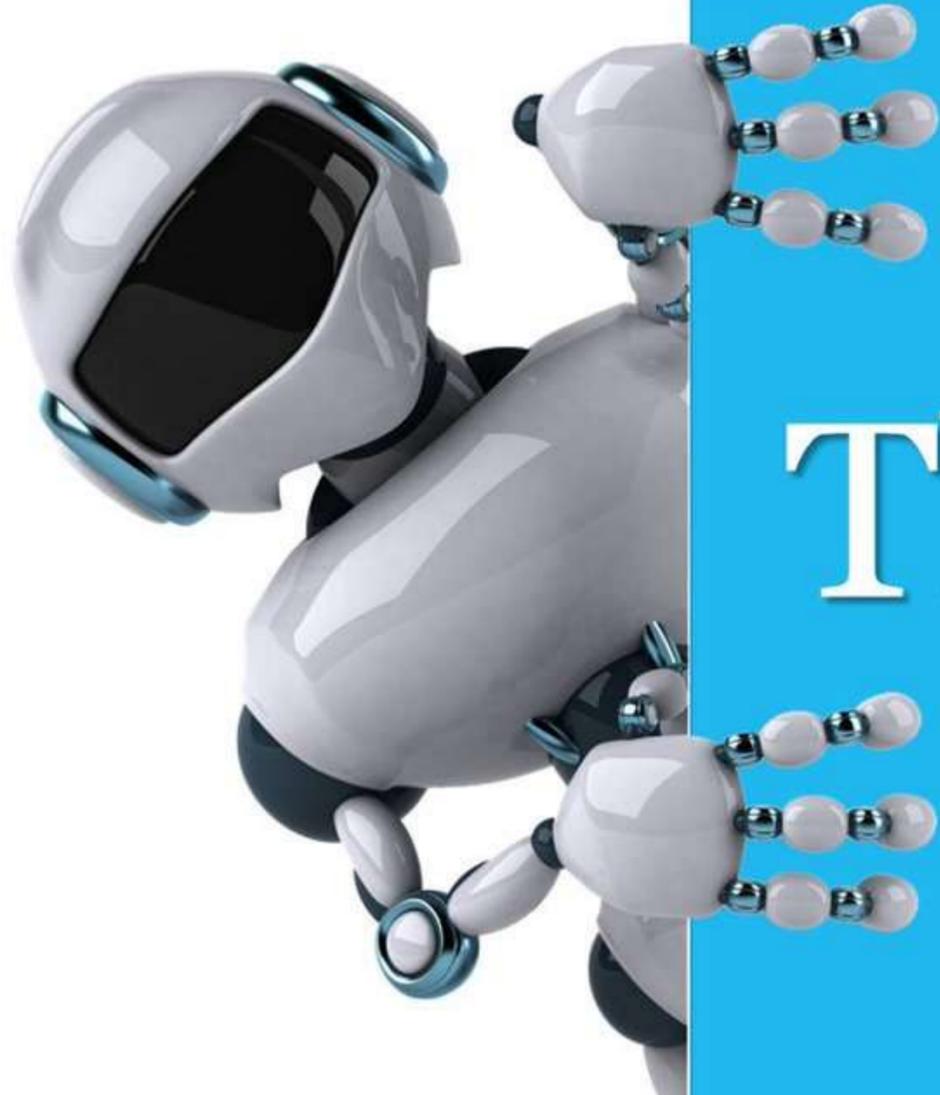
4. Space Exploration:

Grippers are integral to space exploration missions, where robots are deployed to handle tools, collect samples, and perform tasks in environments where human intervention is challenging.



Conclusion

- Grippers stand at the forefront of robotic capabilities, enabling machines to interact with the physical world in ways that were once confined to human dexterity. As robotics continues to advance, the evolution of gripper technologies will play a crucial role in expanding the applications and capabilities of robotic systems across various industries.
- Whether in manufacturing, logistics, healthcare, or space exploration, grippers serve as the tactile connection between robots and the tasks they perform, driving innovation and efficiency in the world of automation.



Thank you