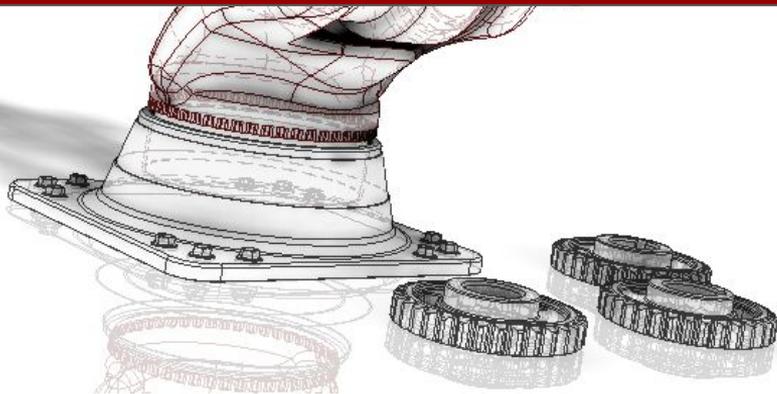


Introduction

Robotics in Industry



Industrial Robotics

Industrial Robotics: technology dealing with the design, construction, and operation of robots in automation

Reasons for using Industrial Robotics:

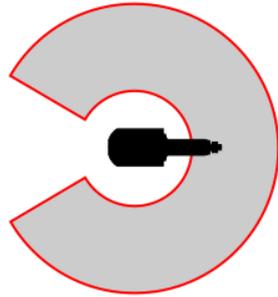
- Repetitive motions
- Complex operations
- Increased production
- Reduced Labor Cost
- Hazardous Tasks
- Increased Consistency

Example Applications: Welding, Painting, Handling Material, Inspecting, Packaging, Assembly

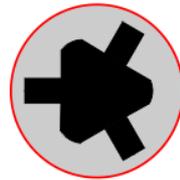


Robotics Work Envelope

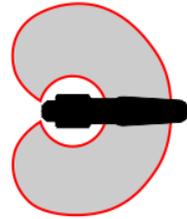
Work Envelope: Defined as the range and area each robot may work within. The shape and size of the envelope is determined by a robot's degrees of freedom, style of movement (linear or rotation) and size/range.



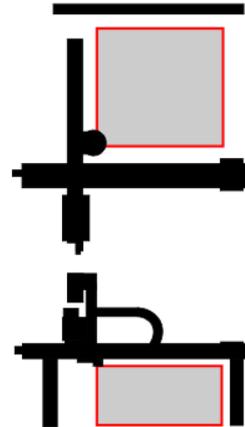
ARTICULATED / JOINTED



DELTA / PARALLEL



SCARA

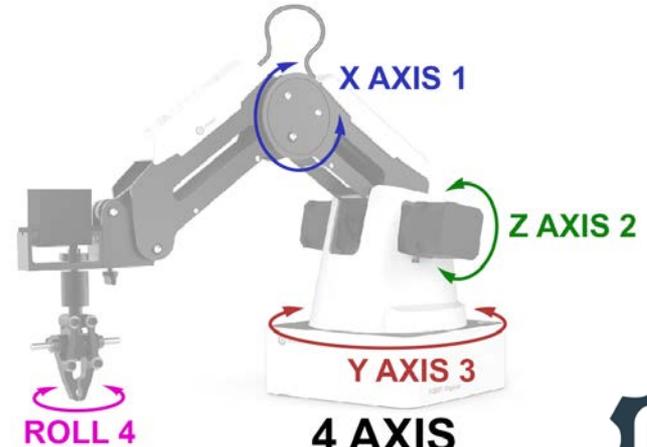
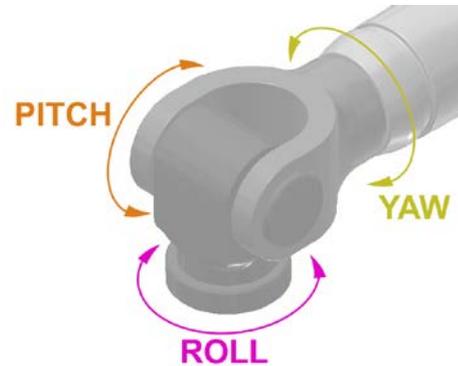
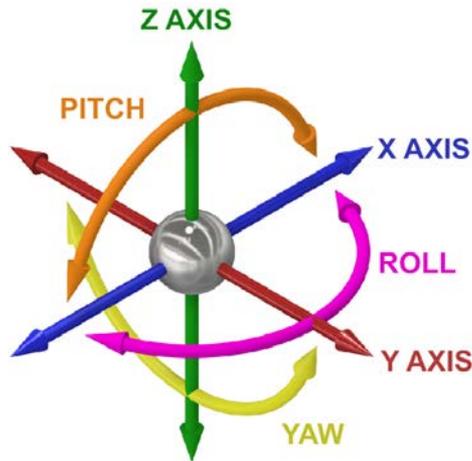


CARTESIAN / GANTRY



Degrees of Freedom (DoF)

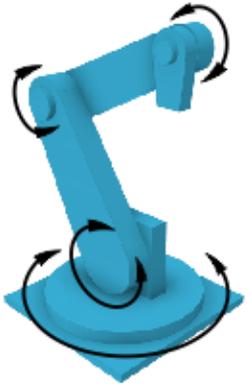
Degrees of Freedom (DoF): Defined by the number of joints that can be controlled and provide each robot design with its range of motion. Industrial robots can have up to six degrees of freedom. Robots with more degrees of freedom have a greater range of motion and a wider scope of application.



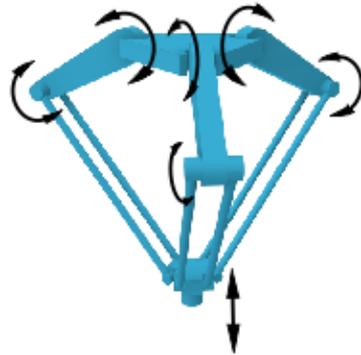
**4 AXIS
JOINTED ROBOT**



Types of Industrial Robotics



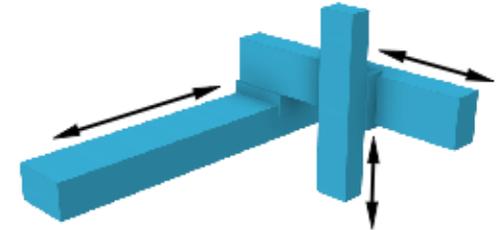
**Articulated/
Jointed**



**Parallel/
Delta**



SCARA



**Cartesian/
Gantry**



Definitions

Workcell: A workcell is the complete environment around each robot. May include tools, machines and/or other robots.

Payload: The size and weight of the material each robotic arm can lift. A robot's total payload must also include the existing weight of the robots end effector or tooling

Teach Pendant: A handheld device used to manually control, program, and troubleshoot a robotic arm without the need for a full control terminal.





Parts of a Robot

Parts in an Industrial robotic arms are broken into five different categories: main controller, robotic arm, drive system, end of arm tooling, and sensors.

Main Controller: The brain of the robotic system. Used to control the motion of and programming of the robot as well as control various inputs and outputs and communicate with other elements in a work cell.

Robotic Arm: The positionable part of the the robot that is used to locate and position the end of arm tooling.

Drive System: The power or motors that are used to control the positioning of the robotic arm.



Parts of a Robot

Drive System: A robot's drive system is either electric, pneumatic, or hydraulic

Electric Drive System: Used for high accuracy repeatability and speed. Used to control motors, servos, or stepper motors.

Pneumatic Drive System: Used in smaller robots. Used to control rotary actuators or sliding joints. Typically used for high speed operations, and limited movements,

Hydraulic Drive Systems: Used for larger robots that require a large amount of power. Linear movements are produced by hydraulic pistons while rotary is produced by rotary vanes.



Parts of a Robot

End effector / End of Arm Tooling (EoAT): A robot's end effector is defined as the tooling added to the end of a robot's arm that allows it to perform specific operations. Examples: Spot Welders, Paint Sprayers, Grippers, Inspection Probes

OUTPUTS

PNEUMATIC GRIPPER



LASER ENGRAVER



3D PRINT HEAD



QUICK CHANGE ROLL ANGLE SERVO

VACUUM GRIPPER



TOOL HOLDER



Parts of a Robot

Sensors: Provide feedback as inputs to the robots controller about its environment. Sensors can be used to find objects, defereniate objects, keep robots from colliding into obstructions, other robots, or identify when unwanted obstacles have entered the work cell.

INPUTS



Resources

robotics. 2018. In Merriam-Webster.com.
Retrieved June 20, 2018, from <https://www.merriam-webster.com/dictionary/robotics>

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