

Robot vocabulary

A

accuracy – Genauigkeit (f) – précision (f)

The ability to accurately position the robot end-effector into a preprogrammed pose. The distance between the point reached by the robot end-effector and the preprogrammed one.

actuator – Aktuator (m), Antrieb (m) – actionneur (m)

Motor converting electrical, hydraulic or pneumatic energy into power producing movement.

admittance control – Admittanzregelung (f) – commande (f) en admittance (f)

Method of control of robot manipulator which is in contact with the environment. The reference inputs to the controller are represented by the desired forces (torques) and their derivatives.

anthropomorphic robot – anthropomorpher Roboter (m) – robot (m) anthropomorphe

Robot with all joints rotational. Its movements are similar to those of the human arm.

arm, robotic – Arm (m), robotisch – bras (m) robotisé

Serial chain of segments, connected with joints powered by motors.

articulated robot – Gelenkroboter (m) – robot (m) articulé

Robot with at least two consecutive rotational joints acting around parallel axes.

assembly, robotic – Montage (f), robotische – assemblage (m) robotisé

Robot manipulation of components in order to put them together into an assembled product. Typical examples include assembly of electronic printed circuits, electric motors and computer hard drives.

automatically guided vehicle – automatisch geführter Wagen (m) – véhicule (m) à guidage automatique (m)

Robot cart without human operator. By the use of wire or rail guidance, it transports raw material, tools or finished parts over greater distances in industrial halls.

automation, robotic – Automatisierung (f), robotische – automatisisation (f) robotisée

Includes kinematics, dynamics, control, simulation and programming of robot systems. Comprises also sensory systems, man-machine interfaces and elements of production technology.

autonomous robot – autonomer Roboter (m) – robot (m) autonome

Robot with ability to produce and execute its own plan and strategy of movement.

axis, rotational – Drehachse (f) – axe (m) de rotation (f)

Two robot segments enabling rotation of one segment with respect to the other.

axis, translational – Translationsachse (f) – axe (m) de translation (f)

Two robot segments enabling linear motion of one segment with respect to the other.

B

base – Fundament (n) – base (f)

The platform to which the robot arm is attached. The end of a kinematic chain opposite to the robot end-effector.

base coordinate frame – Referenzkoordinatensystem (n) – repère (m) de la base (f)

Cartesian coordinate frame attached to the robot base. Its z axis points perpendicularly out of the base.

backdrivability – Rücktreibbarkeit (f) – réversibilité (f)

Measure determining how accurately the force or movement, produced at the output of a transmission system, is transferred to its input.

C

cartesian robot – kartesischer Roboter (m) – robot (m) cartésien

Robot with three translational joints. Its workspace has the shape of prism.

collision avoidance – Kollisionschutz (m) – évitement (m) d'obstacle (m)

System of machine vision, ultrasound, infrared or microwave sensors assessing the presence of an obstacle and planning a new robot path.

coordinate measuring machine – Koordinatenmesssystem (n) – machine (f) à mesurer

Passive robotic mechanism with a probe at the end-effector enabling contact or contactless assessment of distance.

compliance – Nachgiebigkeit (f) – compliance (f)

Feature of a robot allowing for small displacements due to elastic behavior between robot end-plate and the gripper or tool.

computer aided manufacturing – computergestützte Fertigung (f) – fabrication (f) assistée par ordinateur (m)

Producing a product by the use of computer technologies encompassing planning of products, tools and processes by numerically controlled machines.

contact sensor – taktiler Sensor (m), Kontaktsensor (m) – détecteur (m) de contact (m), capteur (m) tactile

Detects contact between robot end-effector and environment.

continuous path control – Bahnregelung (f) – commande (f) continue

Robot control where the robot end-point moves between closely spaced points. The continuous trajectory is achieved by interpolation.

coordinate transformation – Koordinatentransformation (f) – transformation (f) des coordonnées (f)

A 4×4 matrix used to describe pose (position and orientation) or displacement (translation and rotation) of a coordinate frame in space.

coating, robotic – Oberflächenbearbeitung (f), robotische – pulverisation (f), peinture (f) robotisée

Robot manipulation of a tool, e.g. a spray gun, to apply material such as paint to the surface of an object. Robotic coating results in more uniform application of material, reducing waste of material and reducing exposure of humans to toxic materials.

cylindrical robot – zylindrischer Roboter (m) – robot (m) cylindrique

Robot with two translational and one rotational degree of freedom. The shape of workspace is cylindrical.

D

degree of freedom – Freiheitsgrad (m) – degré (m) de liberté (f)

Number of independent coordinates (not including time) necessary for the complete description of the pose of a mechanical system. The number of independent ways the end-effector can move. Number of translational and rotational robot joints.

dexterity – Fertigkeit (f), Geschicklichkeit (f) – dextérité (f)

The ability of the robot gripper to achieve various orientations with the robot end-point in a specified position.

disassembly – Zerlegung (f) – désassemblage (f)

Process where products are decomposed into parts and subassemblies.

distal – distal – distal

Direction away from the robot base toward the robot end-effector.

dynamics, direct, inverse – Dynamik (f), direkte, inverse – dynamique (f) directe, inverse

Direct dynamics denotes calculation of robot end-point trajectories from the known joint forces and torques. Inverse dynamics is the calculation of joint forces and torques resulting in the desired robot end-point trajectories.

E**emergency stop – Nothalt (m) – arrêt (m) d’urgence (f)**

Removing of the drive power from the robot actuators.

encoder – Codierer (m) – codeur (m)

Transducer converting position of a translational or a rotational joint to digital data.

end-effector – Endeffektor (m) – effecteur (m) terminal

The end of a kinematic chain opposite to the robot base. Enables attachment of a gripper or a tool such as spraying nozzle or welding gun.

end-point control – Endpunktregelung (f) – commande (m) de l’effecteur (m) terminal

Control of robot joints such that the end-point moves along a desired path.

Euler angles – Eulerwinkel (m) – angles (m) d’Euler

Three angles determining the orientation of an object in space.

exoskeleton – Exoskelett (n) – exosquelette (m)

Robot mechanism with rotational joints which can be attached to the human extremity, usually applied for teleoperation purposes.

external sensor – externer Sensor (m) – capteur (m) externe

Device which by the use of sensory information affects robot movements and is not part of the robot manipulator.

exteroception – Umgebungswahrnehmung (f) – extéroception (f)

Assessment of robot environment with external sensors.

F

finishing, robotic – Endbearbeitung (f), robotische – finition (f) robotisée

Use of an industrial robot performing continuous path movements needed for finishing tasks such as spraypainting or coating.

force closure – Kraftschluss (m) – fermeture (f) des forces (f)

The ability of the robot grasp to resist arbitrary external forces.

force-torque sensor – Kraft-Momenten sensor (m) – capteur (m) d'effort (m)

Sensor in robot wrist measuring force and torque between robot end-effector and environment in three orthogonal directions.

form closure – Formschluss (m) – fermeture (f) géométrique

Geometric property of robot grasp described by complete constraint of the grasped object.

force control – Kraftregelung (f) – commande (f) en effort (m)

Robot control with respect to the difference between the desired force and the force measured at the robot end-point.

G

gantry robot – Portalroboter (m) – robot (m) portique

Overhead mounted cartesian robot with at least three degrees of freedom. It is characterized by a large workspace and heavy payload.

grasp planning – Griffplanung (f) – planification (f) de prise (f)

Capability of a robotic system to determine where and how to grasp objects in order to provide a stable grasp.

gripper – Greifer (m) – préhenseur (m)

Gripper (usually with two fingers) grasping objects of different shape, mass and material. It is actuated by either pneumatic, hydraulic or electrical motors. It can be equipped with sensors of force or of proximity.

H

hand, robotic – Hand (f) robotische – main (f) robotisée

Robot gripper with more than three fingers, each having two or three segments. Robot hands are capable of dexterous tasks resembling those of the human hand.

hand coordinate frame – Werkzeugkoordinatensystem (n) – repère (m) de l'effecteur (m) terminal

Coordinate frame attached to the robot end-effector.

harmonic drive – Wellengetriebe (n) – réducteur (m) harmonique

System with high transmission ratio using inner and outer gear bands to provide smooth robot joint motion.

hexapod – Sechsfüßler (m) – hexapode (m)

A robot using six legs in order to walk over uneven terrains.

homogenous transformation – homogene Transformation (f) – transformation (f) homogène

Matrix 4×4 describing position and orientation of a coordinate frame with respect to the reference frame. It is used also to describe the displacement i.e. translation and rotation.

human-machine interface – Bedienungsschnittstelle (f) – interface homme (m)-machine (f)

Interface between the robot and the operator through devices such as teach pendant or computer.

humanoid – Humanoide (m) – humanoïde (m)

Robot having physical properties of a human appearance, bipedal walking, manipulation and machine vision.

hybrid control – Hybridregelung (f) – commande (f) hybride

Control of robot end-effector position with simultaneous control of the contact force between robot and environment.

hyperredundant manipulator – unterbestimmter Manipulator (m) – manipulateur (m) hyper redondant

Robot mechanism with many redundant degrees of freedom with respect to the task performed.

I

industrial robot – Industrieroboter (m) – robot (m) industriel

Industrial robot is a feedback controlled, reprogrammable, multipurpose system. It is programmable in three or more degrees of freedom.

inspection, robotic – Prüfung (f), robotische – inspection (f) robotiséé

Robot manipulation and sensory system (video camera, laser, ultrasonic detector) checking the compliance of a part or assembly with specifications.

interface, robotic – Schnittstelle (f) – interface (m) robotique

Mechanical connection between robot end-point and gripper. Mounting plate at the end of the last robot segment enabling attachment of various tools.

impedance control – Impedanzregelung (f) – commande (m) en impédance (f)

Method of control of a robot in contact with the environment. The reference inputs to the controller are the desired positions and their derivatives.

J**Jacobian matrix – Jacobimatrix (f) – matrice (f) jacobienne**

Matrix of partial derivatives describing the linear relation between velocities expressed in base and joint coordinates.

joint – Gelenk (m) – articulation (f)

Contact of two surfaces which either slide (translate) or rotate.

K**kinematic singularity – kinematische Singularität (f) – singularité (f) cinématique**

The kinematic singularity occurs when it is not possible to solve the inverse Jacobian matrix and thus calculate the joint velocities from the known velocities of the robot end-point. It is reflected in decreased mobility of the robot mechanism.

kinematic structure – kinematische Struktur (f) – structure (f) cinématique

Physical composition of the robot including joints, links, actuators and end-effector tools.

kinematic chain – kinematische Kette (f) – chaîne (f) cinématique

Combination of successive robot segments connected by rotational or translational joints.

kinematic pair – kinematisches Paar (n) – paire (m) cinématique

Two robot segments connected by translational or rotational degree of freedom.

kinematic model – kinematisches Modell (n) – modèle (m) cinématique

Mathematical model describing relations between trajectories, velocities and accelerations of joints and end-effector.

kinematics, direct, inverse – Kinematik (f), direkte, inverse – cinématique (f) directe, inverse

Direct kinematics calculates the robot end-effector pose (velocities, accelerations)

from the known joint positions (velocities, accelerations). Inverse kinematics calculates the joint positions (velocities, accelerations) from the known end-effector pose (velocities, accelerations).

L

laser welding, robotic – Laserschweißen (n), robotisches – soudage (m) à laser (m) robotisé

Robotic control of a light beam focused to a very small spot, where the metal melts and the weld is formed.

load capacity – Belastung (f) – capacité (f) de charge (f)

The maximal total weight that can be applied at the end of the robot arm without violating the specifications of the robot.

M

machine loading, robotic – Bestückung (f), robotische – chargement (m) robotisé

Use of robots for grasping a workpiece from e.g. conveyor belt, orienting it correctly and inserting it into a machine. After processing the robot unloads the workpiece. The greatest efficiency is usually achieved when a single robot is used to service several machines.

machining, robotic – Bearbeitung (f), robotische – usinage (m) robotisé

Robot manipulation necessary to perform drilling, grinding, routing or other similar operations.

manipulation, robotic – Manipulation (f), robotische – robotique (f) de manipulation (f)

Robotic handling of the objects by moving, inserting or orienting them, to be in the proper pose for machining or some other operation.

manipulator – Manipulator (m) – robot (m) manipulateur (m)

Mechanical aspect of the robot mechanism consisting of a series of successive segments connected by joints.

manufacturing cell – Produktionszelle (f) – cellule (f) de production (f)

Manufacturing unit consisting of robots, numerically controlled machines or workstations, transport systems and storage buffers.

material handling, robotic – Materialhandhabung (f), robotische – manutention (f) robotisée

Capability of robot to transport objects. Cooperation of robot with material handling devices, such as containers, pallets, loading bins, conveyors, guided vehicles or carousels.

mechatronics – Mechatronik (f) – mécatronique (f)

Integration of mechanical and electrical engineering with control and computer engineering with the aim to design and manufacture industrial products or processes.

medical robotics – Medizinrobotik (f) – robotique (f) médicale

Usage of robots in planning and execution of medical procedures.

micromanipulation – Mikromanipulation (f) – micromanipulation (f)

Technology of assembly of micromechanical systems.

micromechanical system – mikromechanisches System (n) – système (m) micromécanique

Mechanical components, whose size typically ranges from 10 to a few 100 μm . They are manufactured by using computer-aided design, lithographic approaches and micromachining tools. Their applications are in accelerometers, oscillators, optical components, fluidic and biomedical components.

microrobot system – Mikrorobotisches System (n) – système (m) microrobotique

Robotic system including micromanipulators, micromachines, and human-machine interfaces.

mobile robot – mobiler Roboter (m) – robot (m) mobile

Programmable wheeled robot usually moving over level surfaces.

modular robot – modularer Roboter (m) – robot (m) modulaire

Robot built of independent blocs (segments, joints, actuators), which can be combined into a variety of kinematic structures.

motion planning – Bewegungsplanung (f) – planification (f) de mouvement (m)

Planning of the path of the robot end-effector or mobile robot from initial to final point, while avoiding obstacles in the environment.

multi-robot system – Mehrrobotersystem (n) – système (m) multi-robots

Robotic system consisting of two or more robots executing a task requiring collaboration of robots.

O

orientation – Orientierung (f) – orientation (f)

Three rotational degrees of freedom of an object in space.

P

palettizing – Palettieren (n) – palettisation (f)

Loading of parts into containers keeping them in organized order.

parallel manipulator – Parallelmanipulator (m) – robot (m) parallèle

Robotic mechanism where two or more closed kinematic chains connect the end-effector to the base. Parallel manipulators are characterized with higher accuracy than serial manipulators.

path – Bahn (f) – trajectoire (f)

Trajectory of a robot end-effector or of a mobile robot when performing a specific task.

pick-and-place – Punktsteuerung (f) – prise et pose

Positioning task where the robot grasps an object at one place and releases it at another.

point-to-point control – Punkt-zu-Punktregelung (f) – commande (m) point à point (m)

Programming of robot to move from one position to the next. The intermediate path is determined by the robot controller.

pose – Stellung (f) – pose (f)

Position and orientation of a body.

position – Position (f) – position (f)

Three translational degrees of freedom describing the site of an object in space.

position control – Positionsregelung (f) – commande (m) en position (f)

Robot control where the reference signal represents the desired position of the robot end-point.

position sensor – Lagesensor (m) – capteur (m) de position (f)

Sensor detecting the position of the rotor relative to the stator of a motor.

programming of robot – Roboterprogrammierung (f) – programmation (f) de robot (m)

Development of a computer program with the instructions for robot operation.

proprioception – Propriozeption (f) – proprioception (f)

The assessment of the state of the robot system by use of internal sensors in robot joints.

proximity sensor – Näherungssensor (m) – capteur (m) de proximité (f)

Sensor detecting short distances. Proximity sensors typically work on the principle of triangulation.

proximal – proximal – proximal

Direction away from the robot end-effector toward robot base.

pushing, robotic – Schieben (n), robotisches – contrôle (m) par poussée (f)

Pushing of an object with robot fingers in order to decrease the uncertainty in the pose of the object.

R**redundant manipulator – redundanter Manipulator (m) – robot (m) redondant**

Robot manipulator with more degrees of freedom than required for execution of the robot task.

rehabilitation robotics – Rehabilitationsrobotik (f) – robotique (f) de réhabilitation (f)

Robotic systems helping paralyzed persons or substituting lost motor function. Robotic systems can also execute training of paralyzed upper or lower extremities. Special mobile robots can guide blind people.

remote center compliance (RCC) device – nachgiebiges Werkzeug (n) – outil (m) compliant RCC

Passive device at the robot end-effector allowing small translational and rotational displacements which make part insertion operations easier.

repeatability – Wiederholgenauigkeit (f) – répétabilité (f)

Variance of robot end-point positions obtained during repeated movements performed under the same conditions.

resolver – Drehgeber (m) – résolveur (m)

Device converting rotational or translational velocities into analog electrical signals.

robot cell – Roboterzelle (f) – cellule (f) robotisée

Group of robots, workstations and transport systems in which a single family of parts is produced.

robotics – Robotik (f) – robotique (f)

Science of designing, building and applying robots.

robot learning – robotisches Lernen (n) – commande (f) de robot (m) par apprentissage (m)

Robot learning is performed either on-line by teach pendant or off-line through computer programming.

robot language – Programmiersprache (f), robotische – langage (m) de programmation (f) robotique

Computer programming language with commands enabling interaction between robot system and human operator. It is based either on robot movements or on robot tasks.

robot system – Robotersystem (m) – système (m) robotique

A robot system includes robot manipulator, power supply, control system, grippers and sensory systems required for the accomplishment of a robot task. A robot system comprises hardware and software.

roll, pitch, yaw – Rollwinkel (m), Nickwinkel (m), Gierwinkel (m) – roulis (m), tangage (m), lacet (m)

Three angles determining the orientation of an object in space.

rotation matrix – Rotationsmatrix (f) – matrice (f) de rotation (f)

3×3 matrix describes orientation of a coordinate frame with respect to the reference frame. It is also used to represent rotation.

rotational joint – Rotationsgelenk (n) – articulation (f) rotoïde

The rotational joint constrains the movement of two neighboring segments to rotation. The relative position of one segment with respect to the other is given by an angle of rotation around the joint axis.

S

SCARA robot – SCARA Roboter (m) – robot (m) SCARA

Selective compliant assembly robotic arm (SCARA) has two rotational and one translational joint. Its workspace is of cylindrical shape. SCARA robots are used predominantly in assembly processes.

sealing, robotic – Abdichtung (f), robotische – soudure (f) robotisée

Robot moves along the sealing path while applying a precise amount of sealing compound.

segment, robotic – Glied (n), robotisches – segment (m) de robot (m)

Robotic segment or link is a basic part of the robot mechanism connecting two neighboring joints.

sensor fusion – Sensorintegration (f) – fusion (f) de capteurs (m)

Integration of data from diverse sensors in the robot environment with the aim to produce reliable information required for operation of a robotic system.

service, robotic – Service (m), robotischer – robotique (f) de service (m)

Nonindustrial use of robots. Applications include health, safety, cleaning and maintenance, food delivery and entertainment.

shipbuilding, robotic – Schiffsbau (m), robotischer – construction (f) navale robotisée

Application of special robotic systems for welding and coating of large hull structures of ships.

simulation, robotic – Simulation (f), robotische – simulation (f) robotique

Robot simulation represents a useful computer tool in off-line robot programming and planning of robot cell actions in the virtual environment.

slip sensor – Schlupfsensor (m) – capteur (m) de glissement (m)

Sensor that measures distribution and amount of tangential component of the contact force in the robot gripper.

sorting, robotic – Sortieren (n), robotisches – tri (m) robotisé

Robotic and sensory system discriminating different types of items and classifying them into appropriate groups.

space robot – Weltraumroboter (m) – robot (m) spatial

Autonomous robot system performing geological or atmospheric investigations in space.

spherical robot – sphärischer Roboter (m) – robot (m) sphérique

Robot with two rotational and one translational degree of freedom resulting in a spherical workspace.

stiffness – Steifigkeit (f) – raideur (f)

The relation between the amount of contact force and displacement of compliant environment.

surgery, robotic – Chirurgie (f), robotische – robotique (f) chirurgicale

The application of robotic systems in planning and execution of endoscopic (inspection of the interior of the body) and minimally invasive surgical procedures. Surgical robotic systems make use of medical imaging and provide high accuracy and repeatability of operation.

T

teach pendant – Programmiergerät (n) – boîtier (m) de commande (f)

Portable hand-held device containing pushbuttons, switches and joy-sticks used for on-line programming and positioning of the robot end-effector.

telemanipulation – Telemanipulation (f) – télémanipulation (f)

Manipulation of objects by the help of teleoperation.

teleoperation – Teleoperation (f) – téléopération (f)

Remote control of robot manipulators in hazardous environments or in space.

tendon drive – Seilzug (m) – robot (m) à câbles (m)

Transmission system from motor to a remote mechanism via flexible cables and pulleys.

trajectory – Trajektorie (f) – trajectoire (f)

Set of points through which the robot passes during the task.

translational joint – Verschiebegelenk (n) – articulation (f) prismatique

The translational joint constrains the movement of two neighboring segments to movement along a line. The relative position of one segment with respect to the other is given by the distance along the joint axis.

U

ultrasonic sensor – Ultraschallsensor (m) – capteur (m) ultrasonique

Device measuring distance by emitting a narrow band pulse of sound and detecting the reflected sound.

unmanned air-vehicle, drone – Drohne (f) – drone (m)

Teleoperated flying mobile robots mostly in military applications.

V

vacuum gripper – Sauggreiffer (m) – pince (f) à aspiration (f)

Pneumatic device enabling attachment of objects by the use of vacuum pressure.

vision, computer – Computersehen (n) – vision (f) artificielle

Use of camera system and computer to assess, interpret and process visual information.

visual servoing – Sichtsteuerung (f) – asservissement (m) visuel

Use of computer vision to control the pose of the robot end-effector with respect to the environment.

W**welding, robotic – Schweißen (n), robotisches – soudage (m), robotique**

Robot assisted spot, arc or laser welding is currently the largest application of industrial robots. Robots for spot or arc welding are capable of arbitrary positioning and orienting of welding gun in the dexterous robot workspace.

workspace, reachable, dexterous – Arbeitskreis (m), greifbar, gewandt – espace (m) de travail (m) accessible, dextre

Reachable workspace represents the set of points that can be reached by the robot end-point. Dexterous workspace is a part of the reachable workspace where each point can be reached with an arbitrary orientation of the end-effector.

wrist, robotic – Handgelenk (n), robotisches – poignet (m), robotique

Mechanical system between robot arm and gripper, usually with three rotational joints whose axes intersect at the same point.

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