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Robotics — Vocabulary

Robotiques — Vocabulaire

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 299, *Robotics*.
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This **third** edition cancels and replaces the **second** edition (ISO 8373:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

— xxx xxxxxxxx xxx xxxx

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Introduction

This International Standard specifies vocabulary used in relation with robots. It is not a dictionary but rather a list of terms most commonly used in standards developed by ISO TC 299.

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Robotics — Vocabulary

1 Scope

This International Standard defines terms used in relation with robots.

2 General terms

2.1

manipulator

mechanism usually consisting of a series of segments, jointed or sliding relative to one another, for the purpose of grasping and/or moving objects usually in several **degrees of freedom** (4.4)

NOTE 1 to entry: A **manipulator** does not include an **end-effector** (3.11).

2.2

autonomy

ability to perform intended tasks based on current state and sensing, without human intervention

NOTE 1 to entry: For a particular application, degree of autonomy can be evaluated according to the quality of decision making and independence from human. For example, metrics for degree of autonomy exists for medical electrical equipment in IEC/TR 60601-4-1.

2.3

robot

programmed actuated mechanism with a **degree of autonomy** (2.2) to perform locomotion, manipulation or positioning

NOTE 1 to entry: A robot includes the **control system** (2.5) and interface of the control system.

EXAMPLES Manipulator (2.1), mobile platform (3.16), and wearable robot (3.17).

2.4

robotic technology

practical application knowledge to design, develop, and utilize **robot** (2.5)

2.5

control system

set of hardware and software components implementing logic and power control, and other functions which allows monitoring and control a behaviour of the **robot** (2.3) and its interaction and communication with other objects and humans in the environment

2.6

industrial robot

automatically controlled, reprogrammable multipurpose **manipulator(s)** (3.2), programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications

NOTE 1 to entry: The **industrial robot** includes:

- the **manipulator** (3.2), including **robot actuators** (3.1) controlled by the robot controller;
- the robot controller.

NOTE 2 to entry: This includes any auxiliary axes that are integrated into the kinematic solution.

NOTE 3 to entry: The following are considered industrial robots for this part of ISO 10218:

- hand guided robots;
- the manipulating portions of mobile robots;
- power and force limited robots;
- robots with built-in speed and separation monitoring safety functions.

[Source: ISO 10218-1]

2.7

service robot

robot (2.3) that performs useful tasks for humans or equipment excluding industrial automation applications

NOTE 1 to entry: Industrial automation applications include, but are not limited to, manufacturing, inspection, packaging, and assembly.

NOTE 2 to entry: While **articulated robots** (3.14.5) used in production lines are **industrial robots** (2.6), similar **articulated robots** (3.14.5) used for serving food are **service robots** (2.7).

2.8

medical robot

robot (2.3) intended to be used as medical electrical equipment or medical electrical systems

2.9

mobile robot

robot (2.3) able to travel under its own control

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NOTE 1 to entry: A **mobile robot** (2.9) can be a **mobile platform** (**Error! Reference source not found.**) with or without **manipulators** (3.2).

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NOTE 2 to entry: In addition to autonomous operation, **mobile robot** (2.9) can have means to be remotely controlled.

2.10

robot system

system comprising **robot(s)** (2.3), **end-effector(s)** (3.11) and any machinery, equipment, devices, or sensors supporting the robot performing its task

2.11

industrial robot system

machine comprising:

- industrial robot (*Error! Reference source not found.*);
- end-effector(s) (*Error! Reference source not found.*);
- any end-effector sensors and equipment (e.g. vision systems, adhesive dispensing, weld controller) needed to support the intended task;
- task program;

NOTE 1 to entry: The robot system requirements, including those for controlling hazards, are contained in ISO 10218-2.

[Source: ISO 10218-1]

2.12

robotics

science and practice of designing, manufacturing, and applying **robots** (2.3)

2.13

operator

person designated to start, monitor and stop the intended operation of a **robot** (2.3) or **robot system** (2.10)

2.14

task programmer

person designated to prepare the **task program** (5.1.1)

NOTE 1 to entry: Different ways of programming are defined in 5.2.

2.15

collaboration

purposely designed robot and person working within the same space

2.16

robot cooperation

information and action exchanges between multiple **robots** (2.3) to ensure that their motions work effectively together to accomplish the task

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2.17

validation

confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use have been fulfilled

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NOTE 1 to entry: Adapted from ISO 9000:2015, definition 3.8.13.

2.18

verification

confirmation by examination and provision of objective evidence that the requirements have been fulfilled

NOTE 1 to entry: Adapted from ISO 9000:2015, definition 3.8.12.

3 Mechanical structure

3.1

actuator

robot actuator

power mechanism that converts electrical, hydraulic, or pneumatic energy to effect motion of the robot

3.2

robotic arm

arm

primary axes

interconnected set of **links** (3.6) and powered joints of the **manipulator** (2.1), comprising links of longitudinal shape, which positions the **wrist** (3.3)

3.3**robotic wrist****wrist****secondary axes**

interconnected set of **links** (3.6) and powered **joints** (3.7) of the **manipulator** (3.2) between the **arm** (3.2) and **end-effector** (3.11) which supports, positions and orients the **end-effector** (3.11)

3.4**robotic leg****leg**

link (3.6) mechanism which is actuated to support and propel the **mobile robot** (2.9) by making reciprocating motion and intermittent contact with the **travel surface** (7.7)

3.5**configuration**

(kinematics) set of all **joint** (3.7) values that completely determines the shape of the **robot** (2.3) at any time

(modularity) arrangement of the modules to achieve the desired functionality of a **robot** (2.3)

3.6**link**

rigid body connecting neighbouring **joints** (3.7)

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3.7**joint**

connecting part of two **links** (3.6), which enables constrained relative motion between them

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NOTE 1 to entry; A **joint** (3.7) is often active/powering, or passive/unpowered.

<http://www.iso.org/obp/ui/#iso:code:dis:8373:dis-8373>

3.7.1**prismatic joint****sliding joint**

assembly between two **links** (3.6) which enables one to have a linear motion relative to the other

3.7.2**rotary joint****revolute joint**

assembly connecting two **links** (3.6) which enables one to rotate relative to the other about a fixed **axis** (4.3)

3.7.3**cylindrical joint**

assembly between two **links** (3.6) which enables one to translate and rotate relative to the other about an **axis** (4.3) linked to the translation

3.7.4**spherical joint**

assembly between two **links** (3.6) which enables one to pivot relative to the other about a fixed point in three **degrees of freedom** (4.4)

3.8**base**

structure to which the origin of the first **link** (3.6) of the **manipulator** (2.1) is attached

3.9

base mounting surface

connection surface between the **arm** (3.2) and its supporting structure

3.10

mechanical interface

mounting surface at the end of the **manipulator** (3.2) to which the **end-effector** (3.11) is attached

NOTE 1 to entry: See ISO 9409-1 and ISO 9409-2.

3.11

end-effector

device specifically designed for attachment to the **mechanical interface** (3.10) to enable the **robot** (2.3) to perform its task

EXAMPLES **Gripper** (**Error! Reference source not found.**), welding gun, spray gun.

3.12

end-effector coupling device

plate or shaft at the end of the **wrist** (3.3) and locking devices or additional parts securing the **end-effector** (3.11) to the end of the **wrist** (3.3)

3.13

gripper

end-effector (3.11) designed for seizing and holding

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3.14 Types of mechanical structure of **manipulator**

3.14.1

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rectangular robot

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Cartesian robot

robot (2.3) whose **arm** (3.2) has three **prismatic joints** (3.7.1), whose **axes** (4.3) are coincident with a Cartesian coordinate system

EXAMPLE Gantry robot (see Figure A.1)

3.14.2

cylindrical robot

robot (2.3) whose **arm** (3.2) has at least one **rotary joint** (3.7.2) and at least one **prismatic joint** (3.7.1) and whose **axes** (4.3) form a cylindrical coordinate system

NOTE 1 to entry: See Figure A.2.

3.14.3

polar robot

spherical robot

robot (2.3) whose **arm** (3.2) has two **rotary joints** (3.7.2) and one **prismatic joint** (3.7.1) and whose **axes** (4.3) form a polar coordinate system

NOTE 1 to entry: See Figure A.3.

3.14.4

pendular robot

polar robot (3.14.3) whose mechanical structure includes a universal joint pivoting subassembly

NOTE 1 to entry: See Figure A.4.

3.14.5**articulated robot**

robot (2.3) whose **arm** (3.2) has three or more **rotary joints** (3.7.2)

NOTE 1 to entry: See Figure A.5.

3.14.6**SCARA robot**

robot (2.3) which has two parallel **rotary joints** (3.7.2) to provide **compliance** (5.3.7) in a selected plane

NOTE 1 to entry: SCARA is derived from Selectively Compliant Arm for Robotic Assembly.

3.15 Types of mechanical structure of mobile robot**3.15.1****wheeled robot**

mobile robot (2.9) that travels using wheels

NOTE 1 to entry: See Figure A.6.

3.15.2**legged robot**

mobile robot (2.9) that travels using one or more **legs** (3.4)

NOTE 1 to entry: See Figure A.7.

3.15.3**biped robot**

legged robot (3.15.2) that travels using **two legs** (3.4)

NOTE 1 to entry: See Figure A.8.

3.15.4**crawler robot****tracked robot**

mobile robot (2.9) that travels on crawlers/tracks

NOTE 1 to entry: See Figure A.9.

3.15.5**humanoid robot**

robot (2.3) with body, head and limbs, looking and moving like a human

3.16**mobile platform**

assembly of all components of the **mobile robot** (2.9) which enables locomotion

NOTE 1 to entry: A **mobile platform** (Error! Reference source not found.) can include a chassis which can be used to support a **load** (6.2.1).

NOTE 2 to entry: Because of possible confusion with the term “**base**” (3.8), it is advisable not to use the term “mobile base” to describe a **mobile platform** (Error! Reference source not found.).