

# Chapter 1

## History of Service Robots

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### **ABSTRACT**

*The short history of service robots with its precursors is given. Next, the definition of service robot is discussed and some statistical data is given. The described history of service robots covers the ancient period with robot precursors, the middle ages, and the period of industrial revolution. The representative examples of different kinds of service robots built in the twentieth century are given. The chapter is concluded with future trends.*

### **BACKGROUND: WHAT IS A SERVICE ROBOT**

Service robots have no strict officially accepted definition, they represent very different structures and abilities and are used in many different applications.

International Federation of Robotics (IFR) gives the following provisional definition: “A service robot is a robot which operates semi- or fully-autonomously to perform services useful to the well-being of humans and equipment, excluding manufacturing operations.”

And it continues with this explanation:

*With this definition, manipulating industrial robots could also be regarded as service robots, provided they are installed in non-manufacturing operations. Service robots may or may not be equipped with an arm structure as is the industrial robot. Often, but not always, the service robots are mobile. In some cases, service robots consist of a mobile platform on which one or several arms are attached and controlled in the same mode as the arms of the industrial robot.*

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By the end of 1990s, the International Service Robot Association (ISRA) issued following working definition of service robots: “Machines that sense, think, and act to benefit or extend human capabilities and to increase human productivity” (Pransky, 1996).

In general there exists no uniform robot categorisation. Here, we refer to the classification proposed in Zielinski (2010) where the robots are classified according to the type of acting environment.

- **Industrial robots** Are operating in a fully structured environment. For example, in the work cell all devices are strictly co-operating, so it is sufficient that the robot control is position based, and therefore not many external sensors are needed.
- **Personal service** Robots are operating in a quasi-structural environment, created by man for its own purposes. It means that the surrounding is not exactly adjusted to the needs of the performed job (e.g., regular home, waiting hall, office, restaurant).
- **Field robots** Work for the group of anonymous recipients in the natural environment which is fully unstructured, for example: the forest, sky space, sea bottom, ruins, mountains. Field robots represent the category of professional service robots.

Personal and field robots are combined in one group called *service robots*. The actions of service robots depend on information gathered by external sensors.

With the fast development of robotics and the variety of robots, the conclusion formulated by Joseph Engelberger—the “father” of robotics—is very proper: “I can’t define a robot, but I know one when I see one.”

Joseph Engelberger predicted that service robots would one day become the largest class of robot applications, outnumbering the industrial uses by several times; this is becoming a fact.

The idea of helping the human in heavy or repetitive work by artificial means has been observed since the beginning of humanity. Thus, tools and machines were conceived, built and used as intermediate solutions with increasing performances over the time.

It is difficult to specify when the first service robots appeared. Machines helping or entertaining the human can be treated as its precursors.

The first robots resembling humanoids were built in the beginning of the twentieth century for exhibitions and entertainment purposes. They are precursors of service robots and with this point of view the history of service robots is older than the history of industrial robots which started in 1950s.

The first helpmate indoor mobile robots appeared in the 1980s.

Currently, service robots are built for variety of applications, including: housekeeping and cleaning tasks, edutainment, inspection, rehabilitation and medical applications, surveillance, guidance and office works, agriculture, construction works, fire fighting, demining tasks, palletising, handling and picking goods, and search and rescue missions. The number of applications expands over the years.

Taking into account the type of performed task, the following four categories of service robots can be listed (Zielinski, 2010):

- Professional service providers (acting on the ground, in offices, in hospitals),
- Domestic service robots (helping in personal works, operating in the house, robots for entertainment, and education),
- Security robots (working for defence, safety, and rescue), and
- Space robots (working on space and doing planet exploration).

Soon service robots (“serving us” robots) will have millions of end-users in houses, hospitals, restaurants, offices, airports, etc.

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