Chapter 6
History of Service Robots and New Trends

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ABSTRACT

The chapter gives an overview of the current developmental trends in service robotics. First the short history of service robots with its precursors is presented together with the definitions. The developmental trends and statistical data are summarized. The overview of service robots includes the ancient robot precursors, the middle ages, and the period of industrial revolution. The representative examples of different kinds of service robots built in the 20th and 21st centuries are also given. The chapter is concluded by discussing the perspectives of service robotics.

INTRODUCTION

Till the year 2012 the term service robots had no strict officially accepted definition: they had very different structures, capabilities and applications.

By the end of the nineties the International Service Robot Association (ISRA) issued the 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).

International Federation of Robotics (IFR) gave 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 continued with 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.

In 1999 International Federation of Robotics (IFR) and the United Nations Economic Commission for Europe for the first time included service robots in statistical reports. The fast development of this class of robots caused, that in 2008 IFR decided to split their World Robotics Yearbook containing robot statistics into two volumes, with one dedicated only to the service robots.

The effort directed at the terminology unification was started in 1995 by the United Nations Economic Commission for Europe (UNECE) and IFR: it resulted in novel ISO-Standard 8373 definition which became effective in the year 2012, it states:

"A robot is an actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks. Autonomy in this context means the ability to perform intended tasks based on current state and sensing, without human intervention.

A service robot is a robot that performs useful tasks for humans or equipment, excluding industrial automation application. This statement matches the ISO 8373 definition of service robot by The International Organization for Standardization. A personal service robot or a service robot for personal use is a service robot used for a non-commercial task, usually by lay persons. Examples are: domestic servant robot, automated wheelchair, personal mobility assistive robot, or pet exercising robot. A professional service robot or a service robot for professional use is a service robot used for a commercial task, usually operated by a properly trained operator. Examples are: cleaning robot used in public places, delivery robot in offices or hospitals, fire-fighting robot, rehabilitation robot or surgery robot in hospitals. In this context an operator is a person designated to start, monitor and stop the intended operation of a robot or a robot system.

The above classification takes into account the type of the user (professional versus personal user) as a classification criterion. Another possible robot categorisation takes into account the type of the environment the robot acts in (Zielinski, 2010):

Industrial robots operate in a fully structured environment. For example, in the work cell all devices are precisely located, so it is sufficient that robot control is position based, and therefore not many external sensors are needed.

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