

## New ISO 13482 robot safety standard published

ISO has just published ISO 13482 which presents the safety requirements for personal care robots. CLAWAR Association has been instrumental in the creation of this new ISO standard, the work for which started way back in 2006 under the leadership of CLAWAR's chairman, Gurvinder Virk. Personal care robots are service robots designed to work in close interaction with humans and permit human-robot contact in their intended tasks to improve the quality of life of people. The close human-robot interaction is a new scenario from the "separate the human from the robot" approach adopted in the design of traditional industrial robots which have been around for around 50 years.

Since the late 1990s, many countries have been pushing to create new robot markets able to meet the demands of society for technology able to provide a variety of services and the term "service robots" has been coined by the International Federation of Robotics (IFR; [www.ifr.org](http://www.ifr.org)) to describe the new area and its distinction from industrial robotics which have been regulated for safety since the 1980s. ISO 10218 Parts 1 and 2 recently updated, present the safety requirements for industrial robots. Although the trend is to introduce a collaborative mode, the main thrust is still largely along the human-robot separation principle. In the collaborative mode, the industrial robot has to reduce speed, power or maintain some safety distance when a human enters its operational space. In other words, the presence of a human normally interrupts the industrial robot from doing its operations. This is vastly different from designing robots which allow humans and robots to interact closely and to allow human-robot contact as part of the intended task of the robot.

Many regions and some companies have been trying to develop new service robot products but the lack of an international safety standard has hampered their efforts even though many innovations have been made in R&D projects and numerous human-robot collaborative robot prototypes for specific applications have been realised (guide robots, assistive robots, agricultural robots, etc). Some examples of these are shown in Figures 1-3. The commercial risk of marketing any such new service robot product has been seen to be too high. This is due to the fact that if there was an accident involving the new robot product, the manufacturing company could easily be taken to court and sued for potentially huge damages as having caused the accident; the manufacturer would have great difficulty to prove that all necessary steps had been taken to ensure that the new robot was "safe" and not at fault.



Care-O-Bot3



REEMC



Azimo



Roomba

Figure 1: Mobile servant robots



HAL



Walk Assist



Robuwalker



HULC

Figure 2: Physical assistant robots



Figure 3: Person carrier robots

The purpose of international safety standards is to facilitate trade between countries by defining agreed rules in key areas of common interest. Among the areas, safety comes at the top as all products sold need to be “safe” and it is the role of ISO safety standards to present what these are in various sectors. Such safety requirements are based on international consensus and once published are often used by regulatory bodies since they present state-of-the-art to achieve the safety requirements. In Europe, harmonised safety standards are a means of demonstrating compliance to Directives; in this respect ISO 13482 has been assessed to comply with the EC Machinery Directive and will soon also be published as a harmonised standard.

CLAWAR Association identified the need in 2002 when it existed as an EC Network of Excellence for Climbing and walking robots. Through its network of partners it was instrumental in bringing the matter to the attention of ISO TC 184/SC2 which has been the primary sub-committee responsible for robot standardisation. It was through these efforts that the need for forming new robot safety requirements for personal care were needed and a new work group on personal care robot safety was created in 2006 with Gurvinder Virk as the convener. It is this group which has grown to around 50 international robot experts from 14 countries (China, Denmark, France, Germany, Hungary, Italy, Japan, The Netherlands, Romania, South Korea, Sweden, Switzerland, UK and USA) who have been working tirelessly since then to develop an acceptable strategy for moving the community forward in this new area of robotics. Four CLAWAR Trustees have participated and contributed to the development of the standard, namely Gurvinder Virk (as convener) and Osman Tokhi (from UK), Suengbin Moon (from South Korea) and Abul Azad (from USA).

With the publication of ISO 13482, we now have an international robot safety standard which provides the regulatory framework to use for ensuring safety under close human-robot interactions in a variety of personal care robot applications. Personal care robots are classified into three types, which are:

- 1) Mobile servant robots capable of travelling to perform serving tasks in interaction with humans.
- 2) Physical assistant robots that physically assists a user to perform required tasks by providing supplementation or augmentation of personal capabilities, and
- 3) Person carrier robots with the purpose of transporting humans to an intended destination.

It is the intention to provide more details of what is in ISO 13482 and how it should be used in future articles for the international community, but interested parties may contact Gurvinder Virk if you have specific queries on the new standard and how it may assist your activities.

Gurvinder Virk, 16 February 2014