GEMBENCH 09

Standards for Service Robots Why, How, When

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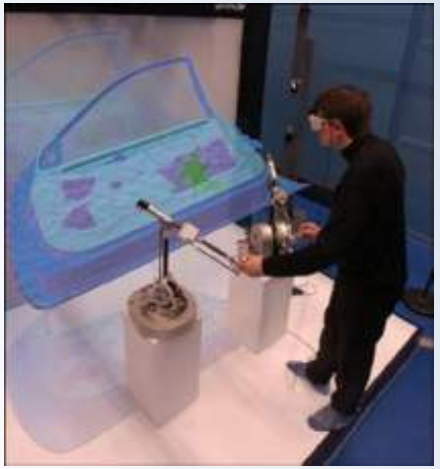
Why Standards for Service Robots ?

- **Some current standards on robots are obsolete**
  - Meant for industrial robots
  - Technology has changed
- **Industry needs standards**
  - There will be an industry of service robots
  - Standardisation of components
  - Benchmarking
  - Safety issues
- **But**
  - Standards could be a constraint for development
  - Industrial feedback does not exist yet
  - It could be too early

What is a Service Robots ?



What is a Service Robot ?

- **Robot that provides service outside industrial automation applications**
- **Industrial robot**
  - Multipurpose robot, programmable in three or more axes, for use in industrial automation applications



How do you do a Standard ?

- **You ask ISO if someone works on the subject**
  - ISO TC184 / SC 2 : www.isotc184sc2.org
  - Technical Committee 184 : Industrial Automation System and Integration
  - Sub Committee 2 : Robots and robotic devices
- **You propose ISO to change the current standard**
  - ISO asks an Advisory Group (AG1) to think about it
  - Advisory Group says to create Project teams on important subjects
    - PT2 : Safety Standards for Service robots in Personal Care
    - PT3 : Vocabulary on robots and robotic devices
  - Project teams produce a Committee Draft to propose a Work Item to ISO
  - Based on this CD, ISO proposes a Draft International Standard (DIS)
  - After discussion of the DIS, publication of the new International Standard (IS)
- **How to write a Committee Draft ?**
  - Read everything has been written in the world on the subject
  - Select what you prefer
  - Suppress what you don't like
  - Write what is missing

What has been done?

- **Meetings**
  - 8 for AG1 (Seungbin Moon)
  - 7 for PT2 (Gurvinder Virk)
  - 5 for PT3 (Rodolphe Gelin)
  - People from Korea, Japan, UK, Germany, France, USA, Sweden, Italy
  - All over the world
  - Connection with existing PT1 : Industrial robot – 10218

- **Reorganisation**
  - WG1 replaces PT3: Vocabulary
  - WG3 replaces PT1: Industrial Safety
  - WG7 replaces PT2: Personal Care Safety
  - WG8 replaces AG: Service Robots

Advisory Group (now WG8)

- **Creation of two project teams**
  - PT2 : Safety for Personal Care Robots (now WG7)
  - PT3 : Vocabulary on Robots and Robotic devices (now WG1)

- **Other subjects to be considered**
  - Roadmap for standardization for service robots
  - Ethical issues
  - Farm animal handling
  - Performance of service robots
  - Robot modularity

Working Group 1: Vocabulary

- **Identification of existing documents**
  - ISO8373, Korea, Japan, ANSI
  - Rosta, Euron, CARE

- **Merging, organizing, cleaning, selecting, rephrasing, changing…**
  - General Terms (France)
  - Classification (Korea)
  - Mechanical Structures (Germany)
  - Geometry and Kinematics (UK)
  - Mobility (Japan)
  - Manipulation (Japan)
  - Programming and Control (UK)
  - Perception and sensing (France)
  - Autonomy and Learning (Sweden)
  - Safety (Korea)
  - Performances (Germany)

Some examples

- **Robot**
  - 1. automatically controlled, reprogrammable manipulator or mobile mechanism, with a degree of autonomy, programmable in more than one axis, to perform an intended task.
  - 2. automatically controlled, reprogrammable manipulator or mobile mechanism, programmable in more than one axis, to perform an intended task.
  - 3. automatically controlled, reprogrammable manipulator or mobile mechanism, to perform an intended task.

- **Mobile Robot**
  - **Robot** able to control the motion of its **base** in the **world coordinate system**.

  Instead of "which carries all of the means needed for its monitoring and movement"

- **New definitions**
  - Holonomic, non-holonomic
  - Body center

- **Deleted definitions**
  - Playback robot : playback is a function not a characteristic
  - Fixed sequence manipulator : it is not a robot anymore

Working Group 7: Safety for Personal Care Robots

- **Non-invasive robots**
  - Medical robots
  - Mobile servant robots
  - Physical assistance supplementation robots
  - Physical assistance augmentation robots
  - Personal care robotic devices

- **Table of Contents of Committee Draft Document**
  - Section 3 - Terms and definitions (all)
  - Section 4 - Hazard Identification and Risk Assessment (Japan)
  - Section 5 - Safety Requirement (UK)
  - Section 6 - Protective Measures (Korea)
  - Section 7 - Verification and Validation (Korea)
  - Section 8 - Information for Use (UK)
  - Annex A: List of Significant Hazards (Japan)

Working Group 7: Vocabulary for Service Robots

- **Personal service robot** is a service robot for personal use, ie, a robot used in non-commercial situations
- **Professional service robot** is a service robot for professional use, ie service robot used in commercial situations
- **Domestic robot** is a service robot used in a domestic environment
- **Personal care robot** is a service robot with the purpose of either aiding actions or performing actions that contribute directly towards the improvement of the quality of life of individual.
- **Physical assistant robot** is a personal care robot which assists a person physically, to perform required tasks, by providing the capabilities needed
- **People carrier robot** is a personal care robot for the purpose of transporting people
- **Mobile robot** is a robot able to control the motion of its base in the world (or absolute) co-ordinate system. Note: mobile robot can be with, or without, a manipulator.

Agenda

- **WG1: Vocabulary**
  - Committee draft: June 2009
  - Draft International Standard: March 2010
  - International Standard publication: beginning of 2011
- **WG7: Personal Care Safety**
  - Committee Draft: November 2009
  - Draft International Standard: May 2010
  - International Standard publication: summer of 2011

Conclusion

- **A lot of work has been done and still has to be done**
- **Industry usually carries out standardisation work**
  - But industry is too young
  - And work has to progress
- **Research community has to commit in this task**