Ethical, Legal and Social Implications of Robotics

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- Ethical, legal and social implications of:
  - Personal, care robots
  - Bionic systems (robotic prostheses and exoskeletons)
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Collaborative Robots

- Even a collaborative industrial robot like Baxter has a humanoid face!
- Socially intelligent, care robots can perform many jobs: caregivers, clerks, educators, companions, etc.

Baxter – Rethink Robotics

Robotic Exoskeleton

- Non-medical exoskeletons can be used to enhance workers' capabilities (e.g. to lift heavy loads with ease)

Robotic exoskeletons at Daewoo's South Korean shipyard

Lower Body Exoskeleton – Audi Chairless Chair

Definition of «Companion/Care Robots»

- ‘robots that typically perform tasks to improve the quality of life of intended users, irrespective of age or capability, excluding medical applications’.

ISO 13482:2014, *Safety requirements for personal care robots.*

Care robots

The distinctive feature of a care robot is the capacity to interact with people at different levels, sometimes altogether: physical, cognitive and social/emotional levels.

In the future, robots will be able to serve as teachers for the young, and caretakers for the old.

Robots have become socially intelligent

- Robots are endowed with **human-like social characteristics:**
  - to communicate with high-level dialogue;
  - to perceive and express emotions using natural multimodal cues (e.g. facial expression, gaze, body posture)
  - to exhibit distinctive personalities and characters
- Expanded market for social robots:
  - Robots are sold as: “new family member”, “personal assistant”, “companion robot”, friends, pets, utilities…

Main motivations for developing care robots

- to address the problems of an ageing society
- In therapeutic applications with people suffering from senile dementia or from cognitive disorders
  - Example: Paro, the baby seal robot which is defined ‘the most therapeutic robot’.

Safety of care robots

- Hard risks
  - derive from *physical* human-robot interaction. They involve hazards related to body impact (e.g. collisions or crashes) between a human and a robot.
  - Hard risks concern fixed or mobile robots, endowed with DoFs.
- Soft risks
  - Derive from *psychological* human-robot interaction. They involve hazards related to mental impact, which can affect a person's cognitive, social and even emotional levels.
  - Soft risks concern all robots, endowed with cognitive and affective capabilities including softbot or chatbots.
  - Contrary to hard risks, psychological damages are caused by normal functioning of the robot

Authenticity

- ‘For an individual to benefit significantly from ownership of a robot pet they must systematically delude themselves regarding the real nature of their relation with the animal. It requires sentimentality of a morally deplorable sort. Indulging in such sentimentality violates a (weak) duty that we have to ourselves to apprehend the world accurately’.
- ‘The design and manufacture of these robots is unethical in so far as it presupposes or encourages this delusion.’

R Sparrow (2002) ‘The March of the Robot Dogs’. Available Online: http://www.cs.cmu.edu/afs/cs/project/robocomp/social/www/reading/Sparrow1.pdf

Nurturing machines – Sherry Turkle

- Sherry Turkle 'finds that there is a difference between the type of projection that people have traditionally engaged in with objects, such as small children comforting their dolls, and *the psychology of engagement that comes from interacting with social robots, which create an* ***effective illusion of mutual relating***. While a child is aware of the projection onto an inanimate toy and can engage or not engage in it at will, *a robot that demands attention by playing off of our natural responses may cause a* ***subconscious engagement*** *that is less voluntary*.'

Sherry Turkle (2007) 'Authenticity in the age of digital companions'. In Interaction Studies. Social Behaviour and Communication in Biological and Artificial Systems 8:3

In touch with complexity…

‘Relationship with computational creatures may be deeply compelling, perhaps educational, but they do not put us in touch with the **complexity**, **contradiction**, and **limitations of the human life cycle**. They do not teach us what we need to know about empathy, ambivalence, and life lived in shades…’

Sherry Turkle (2007) ‘Authenticity in the age of digital companions’. In Interaction Studies. Social Behaviour and Communication in Biological and Artificial Systems 8:3

Loss of human contact

- «If robots begins to be trusted to monitor and supervise vulnerable members of society, and to perform tasks such as feeding, bathing, and toileting, a probable consequence is that some young and old humans could be left in the near-exclusive company of robots»

N. Sharkey and A. Sharkey, The Rights and Wrongs of Robot Care, in P. Lin, K. Abney, and G.A. Bekey Eds. Robot Ethics, The Ethical and Social Implications of Robotics, MIT Press, 2012

Emotion Control

- Social robots can detect a person's emotional state and induce positive emotions either to make him/her feel better, or just to make them more efficient and productive

Bionics

Robotic prostheses and exoskeletons

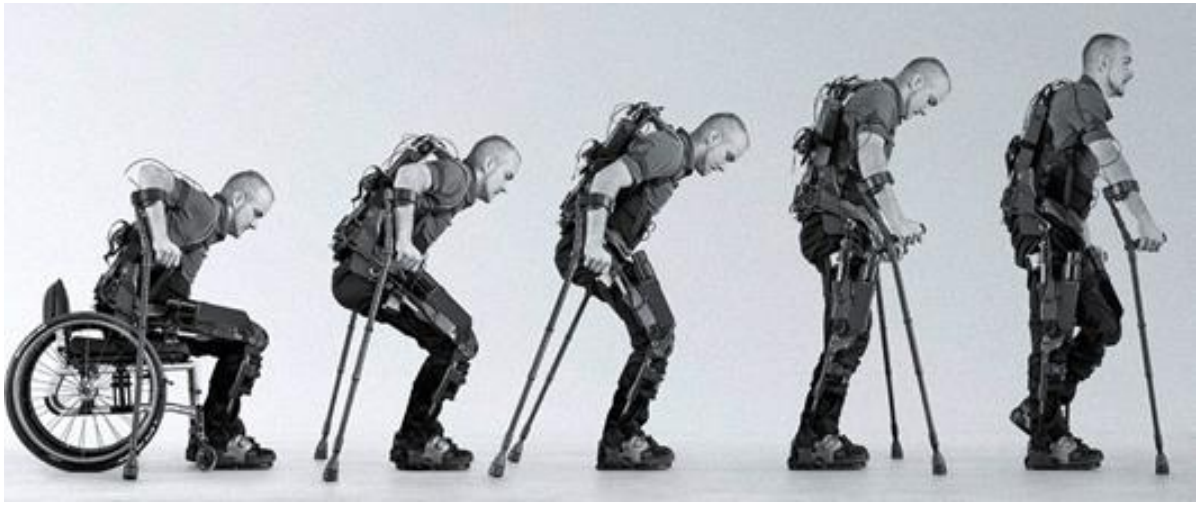
- Mechatronic devices controlled by using signals detected in the person's muscles or nervous system
- Thanks to an innovative technique called 'osseointegration', today, limb prostheses can be implanted directly into the bone, with consequent advantages in terms of usability for the amputee

Sensory feed-back and Neuromorphism

- Last but not least, there are promising results for restoring also sensory feed-back.
- Recent advances in neuromorphism are making possible to replicate tactile sensations by means of biolectrical impulses that emulate the natural ones.

Main motivation for developing bionic devices

- Robotic limb prostheses and exoskeletons can provide great benefits to people affected by sensory-motor impairments due to pathological or traumatic causes.
- The meaning of disability is changing



Fair and Equal Access

- Robotic prostheses and exoskeletons provide health benefits to people with disabilities:
  - Can improve self-determination
  - Can restore inclusion in the labour market
- It is crucial to ensure fair and equal access to these technologies for all citizens.
- However, the prices of these devices are still very high and due to this they cannot be bought through the National Health Service.

Enhanced vs. non-enhanced humans

- Disabled people might be endowed with extraordinary capabilities and have an advantage on so called “healthy” people
- This could lead to
  - Discrimination attitudes towards decisions to choose or reject an implant
    - A worker may refute to don a technological device for increasing productivity or ensure protection
  - New risks of injury for employee

Conclusions

Responsible Research and Innovation

- ‘Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).’ (Von Schomberg, 2011)

Techno Fix

- It is the belief that technology can fix any problem.
- It addresses only the symptoms instead of the root cause
- It is called «fix» because it does not result in a real, long term lasting solution
- Techno-fix are often used to solve:
  - problems caused by previous technologies (i.e. counter technologies)
  - Social problems (i.e. social fix).

Huesemann, Michael H., and Joyce A. Huesemann (2011). Technofix: Why Technology Won't Save Us or the Environment, New Society Publishers, Gabriola Island, British Columbia, Canada, ISBN 0865717044, 464 pp.

Acceptance

- Acceptance cannot be reduced simply on whether people would «like» certain robots capabilities or applications.

Robotics, needs and profits…

- The notion that technological developments arise to ‘fill needs’ is reflected in the myth that ‘necessity is the mother of invention’. It presents technology as a benevolent servant of the human species. But as Carroll Purcell puts it, ‘many modern "needs" are themselves inventions, the product of an economy that stimulates consumption so that it can make and market things for a profit’ (in Chandler 2006)

References
Daniel Chandler (2006) Technological or Media Determinism. Available Online: http://www.aber.ac.uk/media/Documents/tecdet/tecdet.html
C. Purcell 1994, White Heat: People and Technology, University of California Press; First edition. Edition, p. 40.