Number	LANCS-D4.1-RN-B-Flagship.1	A-PI--

Title	Research Note (RN) for D4.1
Subtitle	Ethical aspects of development **B : Flagship Development** : *Assistive Robotics*

PROBLEM		SOLUTION	

Research Note	X		Selected Annotation	

Categories: | | |

Summary:

This note addresses developments in assistive robotics for operations in semi-structured and unstructured environments: in homes, public and occupational spaces. It lists the main ethical considerations surrounding advanced sensory and data management capabilities as well as the abilities of robots to serve as pets or companions.

CONTEXT

A policy perspective published by the European Commission (European Commission, 2008) states that "[t]omorrow's robots will not be confined to industry, but work in the 'real world', providing solutions for many societal issues". Indeed, we might look forward to sharing our lives with perceptive and cognitive robots, with integrated sensors and free-range mobility. Engineers have come under growing pressure to develop machine intelligence that is more *in-hand* and *at-home* in both production and ordinary everyday affairs. Representative models of mind gave way to models of neural networks and reinforced learning, complex sensory technologies, embodied intelligence and, more recently, models of social intelligence and affective experience (e.g. Breazeal, 2003) which serves the attempt to embed artificial agents in emotionally and socially sensitive activities.

(Key readings include: Arkin, 2008; Arras and Cerqui, 2005; Asimov, 2004; Bekey, 2005; Capurro et al, 2006; Christensen et al, 2009; Coeckelbergh, 2009, 2010; Cortés et al, 2008; Dautenhahn, 2004; EUROP, 2009a, 2009b; European Commission, 2008, 2011; Gernot Kronreif and Hochgatterer, 2005; Heerink et al, 2006; Heerink et al, 2008; Hsu et al, 2005; Ishii, 2006; Lohse et al, 2008; Looijea et al, 2010; Murphy and Woods, 2009; Pacchierotti et al, 2005; Petersen, 2007; Salter et al, 2008; Sharkey, 2008; Sparrow and Sparrow, 2006; Sparrow, 2009: Tamura et al, 2004; Wallach and Allen, 2008; Walters et al, 2005; Warwick, 2010; Weng, 2009; Whitby, 2008).

FACTS

Robotic assistive devices are conceived with physical-cognitive characteristics which include *anthropomorphic characteristics* (humanoid or partially humanoid appearances, virtual appearances in human-like or semi-human form and human-like cognitive abilities), *animal-like characteristics* (morphology, morphosis, locomotion, swarms, bird's eye) and *specialised hardware and software characteristics* (airlifting, driving, physical strength, micro-vision, micro-motor control, broadcast, reception and processing).

A significant area of development in human-robot relations puts the communicative abilities of robots to the test. It puts to the test as well their abilities to operate in semi-structured and unstructured scenarios in ordinary private, occupational and public settings, in the natural habitat and in cyberspace. Such robotic agents also include virtual agents like the data harvesters that trawl the Internet (e.g. the Google bots), or avatars who can be classified as remote controlled robots.

The physical-cognitive characteristics of robotic devices (as conceived by the experts) and how the devices are conceived in relation to surrounding environments, can be layered onto different *types* of real-life conditions and varying capabilities of the technology to assist people.

Research and development of robotic assistive devices include:

1. conceptions of autonomous agents, agent groups or robotic swarms. They should be mobile and able to co-operate with humans and/or with each other to carry out particular purposeful goal-oriented tasks.
2. devices conceived as autonomous mobile agents operating and interacting in 'intelligent environments' in which a range of purpose- or goal-specific data is made available by smart sensory and recording capabilities embedded in their design and surroundings.
3. devices (mobile or not) conceived of primarily for entertainment, educational and companionship purposes in the home, in schooling or healthcare setting
4. devices conceived as only partially autonomous and sometimes physically 'locked in' where hybrid human-machine activities take place in hybrid virtual-physical scenarios.

COMMENT

Ethical research has already been undertaken in this area (Capurro, et al, 2006; also EthicBots *FP6-Society, Nov. 2005 - Nov. 2007*), and there is ongoing commitment to ethical reflection among roboticists (Veruggio, 2006; also http://www.roboethics.org/). Ethical questions surrounding the development of assistive robotics, centre on issues of human dignity, human relations, protection from bodily harm, and the management of data. They implicate a host of concerns for reflection and debate:

Autonomy and independent living
Quality of Life
Risk management
Safety and liability
Human self-understanding and identity
The idea of 'man'
Dignity and privacy
Data protection
Robots for selected social groups
Robots for security
Robots for tracking
Robots for managing health and illness
Human-robot relations / intimacy
Robot empathy / companionship / deception
Human vulnerability as a tool in H-R relations
The border between nature and artificiality
Technological 'fix'

1. Using robotic assistance in healthcare, health and safety operations, law enforcement, infrastructural maintenance, and related activities, brings home concerns about fitting these devices with advanced sensory and data management capabilities, as well as leaving them to manoeuvre by virtue of their

unique physical abilities around the home, in hospitals, in the streets and in natural habitats.

- Where does the value lie in using these advanced technologies?
- To what extent will they actually save money, make work easier or relieve humans from dangerous, dirty, dull and boring tasks?
- To what extent are assistive robotics – designed with the aim to improve the autonomy of persons – at risk of introducing new dependencies and, in fact, less autonomy?
- To what extent are elderly and frail persons willing to give up some of their privacy for improved emotional and social engagement made possible with assistive robotics?
- Do we want 'machine rights' rather than owner / user rights?
- What are 'machine responsibilities' compared to the responsibilities of those who own the machines, configure them, operate them, discard of them, and so on.
- What is the threshold for mistakes, accidents and conflicts, and to what extent should humans always be in the operational loop?

2. Using robotic assistance for companionship has raised a whole host of concerns about what precisely human-robot relations consist of and how to understand robot companionship in care, at home, in teaching, and other principally social and emotional scenarios. For example, ‘Paro’ is a therapeutic robot seal, shown to reduce patient stress, improve motivation and stimulate interaction between patients and their caregivers. Paro is promoted as a companion to the elderly, those suffering from dementia and autism.

   Warnings that machines can never replace humans abound on the grounds that machines cannot actually care for and truly understand humans (e.g. Sparrow and Sparrow, 2006). The objection is that such companionships are deceptive—that a robot is always merely a machine and cannot meet social and emotional needs. But it can also be argued that human-robot relations are something more akin to the relationships children form with dolls and teddy bears or adults with their pets and favourite gadgets—relations that mirror our own vulnerabilities, evoke empathy and a sense of ‘fellow feeling’ (Coeckelbergh, 2010).

   - What does ‘companionship’ stand for in human-robot relations?
   - How do people reflect their vulnerabilities in companionships?
   - What is the role of imitation and make-believe in companionships?
   - Is there a principled difference between relating to a robot, a doll, living pet, other humans?
   - To what extent could human-robot relations *replace* the company of other humans?