# The Birth of Roboethics

*Gianmarco Veruggio*
*Scuola di Robotica*
*C.P. 4124, P.za Monastero, 4 - 16149 Genova Italy*
*gianmarco@veruggio.it, info@scuoladirobotica.it*

## Extended Abstract

The importance, and urgency, of a Roboethics lay in the lesson of our recent history. Two of the front rank fields of science and technology, Nuclear Physics and Genetic Engineering, have already been forced to face the ethical consequences of their research's applications under the pressure of dramatic and troubling events. In many countries, public opinion, shocked by some of these effects, urged to either halt the whole applications, or to seriously control them.

Robotics is rapidly becoming one of the leading field of science and technology, so that we can forecast that in the XXI century humanity will coexist with the first alien intelligence we have ever come in contact with - robots. It will be an event rich in ethical, social and economic problems. Public opinion is already asking questions such as: "Could a robot do "good" and "evil"? "Could robots be dangerous for humankind?".

## The Debate

Among the many who sounded apocalyptic alarm, Nobel Prize and nuclear physicist **Joseph Rotblat**, Chairman of the Pugwash Conference on Science and World Affairs, repeatedly spoke against "thinking computers, robots endowed with artificial intelligence and which can also replicate themselves. This uncontrolled self-replication is one of the dangers in the new technologies".

**Bill Joy** (USA, cofounder and Chief Scientist of Sun Microsystems) wrote an article *Why the future doesn't need us*, published in the March 2000 issue of *Wired Magazine*. The subtitle of the article is: "Our most powerful 21st-century technologies - robotics, genetic engineering, and nanotech - are threatening to make humans an endangered species"..

One of more optimistic interventions, that by **J. Storrs Hall** (Foresight Institute, USA), from his *Why Machines Need Ethics*: "Suppose we can build (or become) machines that can not only run faster, jump higher, dive deeper, and come up drier than we can, but have moral senses similarly more capable? (…) The inescapable conclusion is that not only should we give consciences to our machines where we can, but if we can indeed create machines that exceed us in the moral as well as the intellectual dimensions, we are bound to do so. It is our duty. If we have any duty to the future at all, to give our children sound bodies and educated minds, to preserve history, the arts, science, and knowledge, the Earth's biosphere, "to secure the blessings of liberty for ourselves and our posterity" -- to promote any of the things we value --those things are better cared for by, *more valued by*, our moral superiors whom we have this opportunity to bring into being. It is the height of arrogance to assume that we are the final word in goodness. Our machines will be better than us, and we will be better for having created them".

The collaboration between **José Maria Galvan** (Professor of Theology, Pontifical University of the Holy Cross) and **Paolo Dario** (Arts Lab, Scuola Superiore Sant'Anna, Pisa, Italy) gave birth to Technoetics. Speaking at the Workshop "Humanoids, A Techno-ontological Approach" which took place in the frame of the International Conference on Humanoid Robots, IEEE Robotics and Automation Society at the Waseda University, 2001, Galvan spoke about the Ethical dimension of technology as Technoetics.

And, Paolo Dario: "Today, the mission of the robotics engineer is to design and built robots able to co-operate with humans. It is an activity deeply different from that of the traditional engineer, who built industrial robots designed for specialized and technical end-users (…) In this new enterprise, our European humanist culture is an experienced and solid base to face these problems in an original and satisfying way".

Those and similar questions are plausible and justified, although sometimes put down in a very dramatic way. Actually, we know about robots helping mankind in scientific, humanitarian and ecological enterprises, useful for safeguarding our planet and its inhabitants. But we know also about "intelligent" weapons which kill people. And, there are many Robotics' application which compel scientist and stakeholders to carefully analyse new rules and procedures.

## The First International Symposium on Roboethics

In January 2004, Scuola di Robotica - in collaboration with Arts Lab of Scuola Superiore Sant'Anna, Pisa, and the Theological Institute of Pontificia Accademia della Santa Croce, Rome - organized the First International Symposium on Roboethics (www.Roboethics.org).

Philosophers, jurists, sociologists, anthropologist and moralists, together with robotic scientists, were called to contribute to lay the foundations of the Ethics in the designing, developing and employing robots.

Anthropologist **Daniela Cerqui** identified three main ethical positions emerging from two days of intense debate:

1) Those who are not interested in ethics. They consider that their actions are strictly technical, and do not think they have a social or a moral responsibility in their work.

2) Those who are interested in short-term ethical questions. According to this profile, questions are expressed in terms of "good" or "bad," and refer to some cultural values. For instance, they feel that robots have to adhere to social conventions. This will include "respecting" and helping humans in diverse areas such as implementing laws or in helping elderly people. (Such considerations are important, but we have to remember that the values used to define the "bad" and the "good" are relative. They are the contemporary values of the industrialized countries).

3) Those who think in terms of long-term ethical questions, about, for example, the "Digital divide" between South and North, or young and elderly. They are aware of the gap between industrialized and poor countries, and wonder whether the former should not change their way of developing robotics in order to be more useful to the South. They do not formulate explicitly the question what for, but we can consider that it is implicit.

## The European Case

Roboethics is a problem the individual scientist, the end user or the concerned person have to deal with in her/ his own consciousness? Or, is it a social problem to be addressed at institutional level?

Actually many international institutions have brought up Science/Ethics issues in they daily life. One of them, the EC, issued directives on the subject of Ethics. In the *"Ethics - The Ethical Review Procedure"* section of *Science and Society Action Plan*, it is said:

*"Article 3 of the FP6 states that "All the research activities carried out under the Sixth Framework Programme must be carried out in compliance with fundamental ethical principles.*

*In order to implement this article the European Commission has introduced an ethical review for proposals raising sensitive ethical issues into the evaluation process (…)*

*All proposals for research submitted to the European Commission for funding must include a section describing the ethical issues raised by the project regarding its methodology, the objectives and the possible implications of the results and the way they will be tackled (…) principles reflected in the Charter of fundamental rights of the European Union such as protection of human dignity and human life, protection of personal data and privacy as well as the environment (…)*

*The objective of this additional assessment is to make sure that the European Union is not supporting research which might violate fundamental ethical principles.*

*Integrated Projects and Networks of Excellence in the priority areas of research are encouraged to take on board specific research and stakeholder groups to study the ethical impact of the research undertaken".*

Moreover the Action Plan "Science and Society" specifies some of the principles leading the decision making and everyday behaviour of the Europeans. These are governed by the respect for: a) human life, b) human dignity, c) integrity of the person, d) democracy, e) the rule of law, f) cultural, religious and linguistic diversity, g) the freedom of arts and research, h) health care, i) consumer protection, j) the right of the child, the elderly and the handicapped, h) environment, k) privacy, l) liberty and security.

## Important Steps towards Roboethics

In 2004, leading international institutions addressed the ethical issued implicit in Robotics.

In Fukuoka, Japan, during the International Robot Fair, February 2004, the participants signed the **World Robot Declaration**. Here the main points:

> "Confident of the future development of robot technology and of the numerous contributions that robots will make to Humankind, this World Robot Declaration is issued to assess that:
>
>> 1. Next-generation robots will be partners that coexist with human beings;
>>
>> 2. Next-generation robots will assist human beings both physically and psychologically;
>>
>> 3. Next-generation robots will contribute to the realisation of a safe and peaceful society.
>
> We need "Promotion of public acceptability of robots through the establishment of standards and upgrading of the environment, and stimulation of adoption through promotion of introduction of robots by public organisations".

In 2004, IEEE-Robotics & Automation Society established a Technical Committee (TC) on Robo-Ethics, to provide the IEEE-RAS with a framework for taking care of ethical implications of robotics research, by promoting the discussion among researchers, philosophers, and ethicists, but also supporting the establishment of shared tools for managing ethical issues in this context.

The TC, composed by Paolo Dario, Ron Arkin and Kazuo Tanie, organised this workshop in the frame of ICRA 2005.

## EURON Roboethics Atelier

EURON, the European Robotics Research Network inside the EC 6th Framework Programme 2003-2007, funded in 2005 a Research Atelier on Roboethics proposed by Scuola di Robotica, jointly with CNRS-Laboratoire d'Analyse et d'Architecture des Systèmes (LAAS), and Scuola Superiore Sant´Anna.

The Roboethics Atelier, will take place in Rome in October 2005 and it will call for contributions and thoughts not only from robotic scientists, but also from philosophers, jurists, sociologists and many scholars involved in related problems.

The first aim of the Atelier is to produce a **Roboethics Roadmap**, providing a common tool within the interested community to:

- develop a common language among scholars and stakeholders on Roboethics;
- learn about each other field, make connections and generate ideas;
- develop a general Survey on the main ethical paradigms in the different cultures, religions, faiths;
- define a Rosetta Stone of the ethical guidelines "adjusted" to the different cultures, religions, faiths;
- activate specific studies;

The Roboethics Atelier will contribute to the fostering of the state-of-the-art in Robotics because:

- it will collect contributions to Robotics from several field of investigations and many disciplines in Humanities. The resulted contribution to closing the gap between the "two cultures" cannot but improve to find solutions in the field of Robotics as such;
- it will improve the understanding of Human-Robot Communication;
- the discussions on Roboethics, and the adequate disseminations of the Atelier's results, can help scholars, stakeholders and the general opinion to understand the positive uses of Robotics, and to prevent its abuse.

## Roboethics' Fields of Application

In this context, the debate should analyze the effects of Robotics, from the stated principles, in the applications fields where the potential problems are more important and evident:

- *Economy*

  Technological change continually disrupts employment patterns. Machines have already replaced people in a variety of jobs. This can only increase, as machines become more intelligent.

- *Effects on society*

  What is it going to happen when these smart robots will be our servants and house stewards, and when our lives will depend on them? Technology addiction to robots can be more dangerous and disrupting than to TV, Internet, and Videogames.

- *Health Care*

  Medical Ethics starts to investigate issues concerning the progress of surgery through Robotics and a possible shift of the focus from patients to technology.

  Bio-robotics, designing and applying robotic prosthesis and Hybrid-Bionic Systems, is going to face Bioethics problems.

- *Lack of access*

  Excessive or incorrect patenting of intelligent machines may reduce commercial competition and make Robotic products too expensive for many to benefit.

- *Deliberate abuse/terrorism*

  Robots will have a dramatic effect on the ways wars are fought. If we no longer had to worry about human life the war would be far less costly.

- *Law*

  The entitlement of responsibility for actions or non actions done by robots.