



## Robotics, AI and Humanity: Science, Ethics and Policy



Atti del Workshop

*Robotics, AI and Humanity: Science, Ethics and Policy*

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(editors)

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Opening Statement

Marcelo Sánchez Sorondo | Bishop Chancellor of the Pontifical Academies of Sciences (PAS) and Social Sciences (PASS)

Introductory remarks

Joachim von Braun | PAS President

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Stefano Zamagni | PASS President

### 1. FOUNDATIONAL ISSUES IN AI AND ROBOTICS (consciousness)

Could a robot be conscious? Lessons from the cognitive neuroscience of consciousness

Stanislas Dehaene | Collège de France, Paris

Discussion

Could a robot be conscious? Lessons from philosophy

Markus Gabriel | Bonn University, Germany

Discussion

### 2. THE SCIENCE AND ENGINEERING OF AI AND ROBOTS

(robotics engineering, industries, internet of things and robot-robot and human-robot interactions)

Logic in computer science and proof systems

Gilles Dowek | INRIA, France

Discussion

Foundation of artificial intelligence and effective universal induction

Armin Cremers | B-IT Emeritus Research Group, Germany

Discussion

Compliant and impedance controlled robots: the paradigm change for innumerable “collaborative” applications (e.g. health and elderly care, factory of the future, space exploration, mobility)

Gerhard Hirzinger | DLR / Technical University Munich, Germany

Discussion

### 3. AI/ROBOT – HUMAN INTERACTIONS AND ETHICAL IMPLICATIONS

(robotics, cognitive science, and social theory)

Moral development in the digital environment

Antonio Battro | Academia Nacional de Educacio#n, Buenos Aires, Argentina

Discussion

Critical ingredients of autonomy, lessons from neuroscience

Wolf Singer | Max Planck Institute for Brain Research, Frankfurt, Germany

Discussion

Human-robot interactions and affecting computing: the ethical implications

Laurence Devillers | Paris-Sorbonne, LIMSI-CNRS, France

Discussion

What is it to implement human-robot joint action?

Aure#lie Clodic | LAAS/CNRS, Toulouse, France

Discussion

### 4. ROBOTICS CHANGING THE FUTURE OF WORK, FARMING, POVERTY AND ECOLOGY

(labour markets, and employment; impacts on the unskilled and poor, industry 4.0, opportunities and challenges for poverty reduction; precision farming; environment and ecology opportunities and risks)

Industrial robotics and the global organization of production

Koen De Backer | OECD, Paris, France

AI/robotics implications for poverty and marginalization

Joachim von Braun | Director Centre for Development Research, Germany

Discussion

Farming robots for precision agriculture

Ciryll Stachniss | University of Bonn, Germany

Robotics and AI for food security and innovation

Maximo Torero | Assistant Director General for Economics, FAO

Discussion

AI and robots in workplaces

Arisa Ema | University of Tokyo and Visiting Researcher at RIKEN Center for Advanced Intelligence Project

Discussion

### 5. ROBOTICS AND SERVICES

(education, the aged, health services/personalized medicine, mobility, homes...)

Explainability and plausibility as prerequisite for trusted AI

Christoph Peylo | Global Head of Bosch Center for Artificial Intelligence, Stuttgart, Germany

Discussion

Regulating AI in the financial services industry

Frank Pasquale | University of Maryland, Baltimore, USA

Discussion

Robotics in the classroom. Hopes or threats?

Pierre Le#na | Universite# Paris-Diderot and Paris Observatory, France

Discussion

Human-robot synergy and its emergent properties

Margaret Archer | Visiting Professor, Arctic University of Norway, Tromsø

Discussion

6. ROBOTICS, AI, AND MILITARIZED CONFLICT Chair: Armin Cremers

Designing robots for the battlefield: state of the art

Bruce Swett | Johns Hopkins University Applied Physics Laboratory, Baltimore, USA

Discussion

Military applications of AI and the relevance of virtue ethics

Gregory M. Reichberg and Henrik Syse | Peace Research Institute Oslo, Norway

Discussion

The use of AI in cyber war: ethical and regulatory challenges

Sophie-Charlotte Fischer | Center for Security Studies, ETH Zurich, Switzerland

Discussion

The impact of AI on nuclear deterrence and military strategy, including the ethical implications

Nobumasa Akiyama | Hitotsubashi University, Tokyo, Japan

Discussion

7. SOCIETY, ETHICAL, RELIGIOUS, AND REGULATORY DIMENSIONS OF ROBOTICS/AI

(identifying dividing lines between robots and AI/human 'enhancement', 'personhood' and robots; 'self-consciousness', empathy, defining risks, and what should be prevented; altering of legislation and regulation, e.g. accountability, judicial and insurance issues, criminal responsibility, public and corporate governance)

Robots and rights

Wolfgang M. Schroeder | Katholisch-Theologische Fakultät Würzburg, Germany

Responsible robotics

Aimee van Wynsberghe | Delft University of Technology, Netherlands

Discussion

Impact of robotics on human relations

Pierpaolo Donati | Alma Mater Professor University of Bologna, Italy

Discussion

Regulating AI: considerations that apply across domains

Angela Kane | Vienna Center for Disarmament and Non-Proliferation, Austria

Discussion

AI regulation: finding a balance between efficiency and social effects

Stefano Quintarelli | Chair, Italian Digital Agency

Discussion

Conclusions and discussion of workshop statement

Joachim von Braun, Stefano Zamagni, and Margaret Archer