



CERNA

Commission de réflexion sur l'Éthique de la Recherche en sciences et technologies du Numérique d'Allistene

On the Ethics of Research in Robotics

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Éthique de la recherche en robotique

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http://cerna-ethics-allistene.org/digitalAssets/38/38704_Avis_robotique_livret.pdf

ERF Ethics Workshop
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Robotics Research and Applications

- Robotics research has reached a stage of maturity capable to provide for operational robot functions : perception, motion planning and control, human-robot interaction, ...
- Autonomous operation is possible in some situations
- New applications are booming in many sectors: transport, services, military, agriculture, construction, medicine and health, etc.

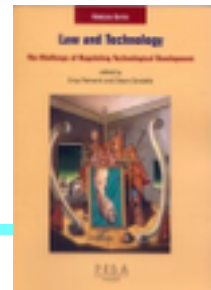
Ethical, legal and Societal Issues in Robotics

- Questions on the ethical use of robots have emerged and are becoming more and more important to the public.
- Discussions about jobs, but also about robots and AI taking over the world.
- Impact on several areas of robotics, especially when humans and robots interact together.
- Autonomous robots raise additional questions mainly in military applications (Autonomous Lethal Weapons).
- **Our duties as researchers** are to:
 - Educate the public about the actual state of the art in the area and its prospects so that ethical questions are grounded in reality (and not speculations).
 - To take into account ethical questions in early stages of our own research.

ELS Issues

- Robot autonomous decisions,
- Accountability and responsibility,
- Privacy, intimacy, intrusion, surveillance,
- Human dignity,
- Dependence, isolation,
- Cognitive and affective bonds,
- Bio-mimicry,
- Human identity,
- Human augmentation,
- Human ethics in using robots,
- The status of the robot in human society

Robot Ethics



- Moral and legal responsibilities of scientists
- Scientists have started to reflect on the question of the ethical implications of robotic technology and of autonomous robots about ten years ago
- Robot Ethics is now an *interdisciplinary* research in the intersection of applied ethics and robotics
- In Europe several projects addressing the topic (e.g. lately Robolaw).
- In some countries ethics committees on robotics have been formed.

Approach

- 5 case domain examples raising ethical issues:
 - Defence and security
 - Rehabilitation and human augmentation
 - Assistant robots for vulnerable people
 - Robot companions and robots for the general public
 - Autonomous cars
- 4 Robot capacities raising ethical issues, and recommendations:
 - Autonomy
 - Human augmentation
 - Emotions and bonding
 - Bio-mimicry

Robotic Applications Raising Ethical Issues

- Drones, swarms, autonomous robots, UGVs, in defense and security



Predator



Crusher CMU



Drones for security monitoring

IRobot Packbot

Robotic Applications Raising Ethical Issues

- Robotic devices for rehabilitation and Human augmentation



U. Saragozza



RIC Institute



Ekso
Bionics



RB3D

Robotic Applications Raising Ethical Issues

- Assistive robots for vulnerable and fragile persons (elderly, children, handicapped).



S. Korea



Paro



Telenoid - Osaka U.



Aldebaran Romeo

Robotic Applications Raising Ethical Issues

- Robot companions, personal assistant robots, sexual robots.



Aldebaran Nao



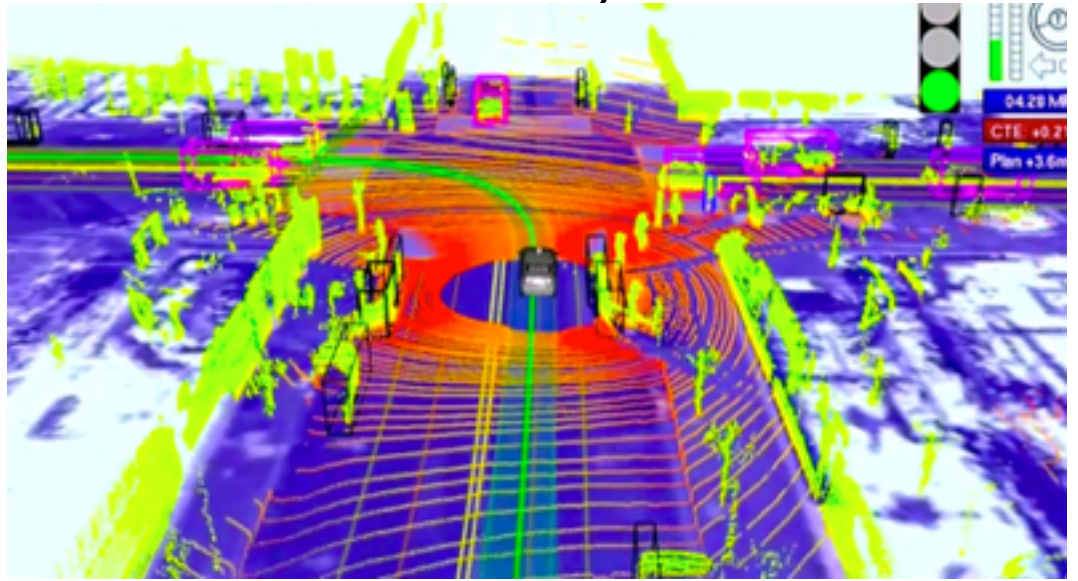
The Big Bang Theory

Robotic Applications Raising Ethical Issues

- Autonomous cars (more focused on the Legal and social issues, but also about ethical dilemmas)



Google



Nissan

Focus: Robot Autonomy and Ethics

■ Issues

- Robot+Operator: shared autonomy
- Autonomous decision-making vs. Autonomous operation
- Human awareness of robot state; surprises.
- Robot situation awareness and interpretation
- Human over-confidence in robots
- Moral buffer
- Robot responsibility vs. human responsibility.

Recommendations for Research (on Autonomy)

- Clearly define conditions of human control/robot control
 - Analyse authority sharing: who controls what? (not fixed during a mission)
 - Robot shouldn't take complex decisions involving judgment.
 - Conditions of robot takeover: a diminished operator is not able to take good decisions (stress, emotions...)
- Always enable human takeover

Recommendations for Research (Autonomy)

- Clearly define limits of robot capacities: decision-making algorithms, perception, ... (e.g., possibility of distinction between combatant / non-combatant)
- Explanation of robot decisions to the operator
- Qualify uncertainties.
- Design for resilience (“unpredictable” events)

Focus: Human Augmentation and Ethics

- Issues

- Rehabilitation vs augmentation?
- Privacy (data).
- Status of the augmented human

- Recommendations for Research

- Respect medical ethics
- Preserve of natural human capacities
- Enable reversibility of augmentation
- Anticipate psychological and social consequences

Focus: Emotions, Bonding and Ethics

■ Issues

- Interpretation of robot “emotions”
- Bonding and Isolation of humans
- Dependence for vulnerable persons
- Understanding the status and capacities of the robot

■ Recommendations for Research:

- Make explicit that robot emotions are an illusion.
- Take precautions when young children are involved in interactions with robots on the impact on the development of their emotional capacities.
- Take precautions on the consequences of isolation and bonding (e.g., conduct preliminary studies).

Focus: Bio-mimicry and Ethics

- Bio-mimicry
 - What is a robot vs. a living being?
 - Human identity vs. android
 - Status of the robot in Human Society



Osaka U.

Recommendations for Research (Bio-mimicry)

- *Why* do you need to mimic living beings? (purpose of research)
- Clarify the limits of imitation to avoid over-attribution of capacities
- Keep a clear distinction between a living being and a machine.

Some General Conclusions

- Define an ethics charter for Robotics research
- Reach and international consensus
- Balance between open research and ethical recommendations
- Set up operational ethics committees for research practice in Robotics.

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(Will be shortly also available in English)

