Ethics and Authority Sharing for Autonomous Armed Robots

RDA2

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Preliminary notes

- Robot = 'Autonomous' armed robot

- Difference between :
  - Morality : rules for action, good/evil evaluation
  - Ethics : **reasoning** in case of a conflict or an absence of rules

Introduction

- Increasing use of 'autonomous' robots in numerous domains
- 'Autonomous' robots are supervised by human operators : authority is shared

- Our goal : to consider several ethical issues raised by the deployment of robots in the framework of authority sharing between a robot and a human operator

Authority sharing

- Literature on robot autonomy => omission of the operator or operator considered as a last resort
- Authority => robot and operator equally taken in account as agents [Tessier & Dehais, 2012]
- Agents can have authority over a resource (weapon, etc.)
- Authority conflict : unexpected / misunderstood authority changes [Pizziol, Tessier & Dehais, 2012, this afternoon]

- Authority sharing = **relationship** between agents

Our approach

- Review ethical questions concerning robots
- Consider those questions in the framework of authority sharing
- Study authority conflicts related to ethical issues through :
  - Experimental approach
  - Scenarios

Ethical questions concerning robots - Autonomy

- Kant : Categoric imperative and human autonomy of end
- Rousseau / Rawls : Contract theory

- Operational definition : decisional autonomy of means [Schreckenghost et al., 1998 ; Huang et al., 2005]

- Desirability of fully autonomous robots ?

Ethical questions concerning robots - Responsibility

- Many different approaches
- Causal responsibility *vs.* **Moral responsibility** (Choice)
- Possible leads :
  - Reduced responsibility (negligence, vicarious liability, slave morality) [Lin et al., 2008]
  - Treatment [Lokhorst & Van den Hoven, 2012]
  - Moral status [Abney, 2012 ; Himma, 2007]

Ethical questions concerning robots – Moral status and consciousness

- Moral status : **attributed** to conscious beings
- Two non-discrimination principles [Bostrom & Yudkowsky, 2011] :
  - Principle of Substrate Non-Discrimination
  - Principle of Ontogeny Non-Discrimination

- Triage Turing Test [Sparrow, 2004]

Ethical questions concerning robots – Ethical reasoning

Three different approaches :

- Top-down [Ganascia, 2007; Bringsjord & Taylor, 2012]
- Bottom-up [Lang, 2002; Harms, 2000]
- Hybrid [Arkin, 2007, 2009; Wallach & Allen, 2009; Anderson et al., 2006]

Ethical questions concerning robots – Ethical reasoning

Top-down

- Ethical theory => Set of implementable rules (consequentialism, logic-based)

  + : global, fixed, easily understood rules

  - : frozen, incomplete rules

Bottom-up

- Development of rules and ethical abilites through learning

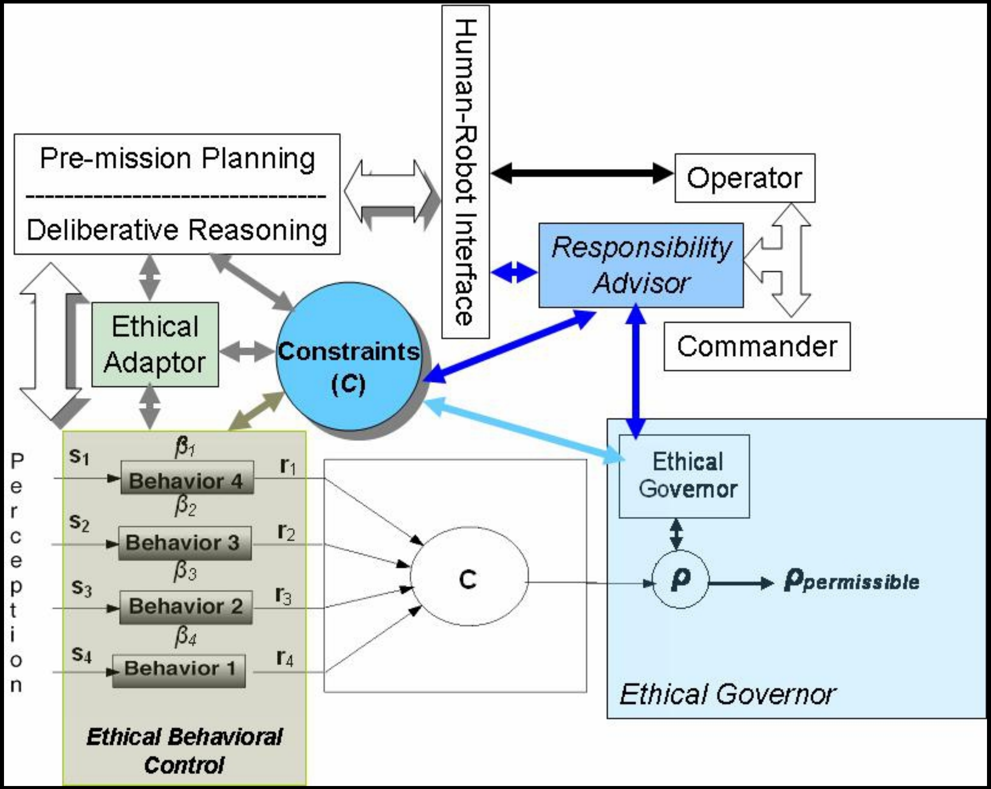
  + : adaptability, optimization

  - : expensive, untraceable, determining a criterion

Ethical questions concerning robots – Ethical reasoning

Hybrid

- Combination of top-down and bottom-up approaches
- Most applicable results
- Three directions :
  - Case-based reasoning [McLaren, 2006 ; Anderson et al., 2006]
  - Virtue ethics [Wallach & Allen, 2009]
  - Arkin's deliberative / reactive architecture [Arkin, 2007]



Ethics and authority sharing

- Reminder : Authority sharing => Relationship between agents

- Autonomy : more decision-making power through authority taking
- Responsibility :
  - Authority to the operator : robot as a tool, responsibility of the operator
  - Authority to the robot : treatment, responsibility of the deployer
- Contract theory => Specific clauses for agents to respect

Ethics and authority sharing

- Moral status and consciousness : better situational assessment on the robot's side through human operator 'state' assessment [Regis et al., 2012 ; Pizziol, Dehais & Tessier, 2011]

- On-going work :
  - Ethical reasoning : assistance by the robot in case of ethical conflict
  - Integration of authority sharing to Arkin's architecture (action evaluation through ethical governor)

Scenarios

- Goal : to test the robot's compliance with a set of rules of engagement during an authority conflict
- Two scenarios designed to simulate a battlefield

- Morally difficult situations (hostile crowd, explosive planting)
- Production of a morally incorrect behaviour => Robot takes authority => Authority conflict => Solving through correct behaviour

Conclusion / Further work

- Assess whether :
  1) Better performance achieved by a human-robot system : better situation assessment, adaptability, compliance with rules through reasoning and authority sharing
  2) Ethical autonomous armed robots : possible with authority sharing ?
- Need for an evolution of the legal and philosophical framework