How Philosophy Can Enhance the Critical Abilities of Computer Engineering Students

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A different perspective

- Educational challenges in CS
- Possible role for philosophy in computer engineering education
- Exploiting transformations + taking responsibility
- Not just ethics, but philosophy in general
- *Philosophical Topics of Computer Science*, Politecnico di Milano
Introducing philosophy

- Politecnico di Milano, School of Information Engineering
- Philosophy for engineering students
  - Traditional topics (mathematics, applied sciences, ...) + conceptual tools (from philosophy) for a reflective practice
- General and specific reasons
  - Learning conceptual tools useful for present students and future professionals
  - Gaining the capability of students to critically analyze concepts
Critical analysis

- **What**
  - To stimulate students to reflect on concepts (information, computation, algorithm, ...)

- **Why**
  - To improve conceptual clarity and help in diagnosing errors
Philosophical Topics of Computer Science

- Computer Engineering Master degree (last year)
- Aims and goals: to gain students’ awareness on central concepts, to improve their critical skills, to make them reflect on foundational issues
- Three parts
  - Scientific and philosophical issues discussed from a philosophical standpoint
  - Critical analysis of computer science and engineering concepts
  - Critical essay (supervised)
Philosophy of mind

- From the mind-brain problem to the brain-machine problem
- ‘Is brain a computer?’
- Analysis of the meaning and truth conditions
- High standards of qualitative rigor
- Conceptual clarity (hidden presuppositions)
Philosophy of science

- Good experimental methodologies in autonomous robotics
- Debate about the role of experiments in computing
- General experimental principles: comparison, reproducibility, repeatability, justification
- Autonomous robotics
  - Experiments as *proof tests* to evaluate a given artifact (engineering)
  - Experiments to understand the nature and functioning of systems (science)
- Investigation on the *nature and method* of computer science
History and praxis

- Not to teach philosophy and its history, but how to apply **philosophical analysis** to **engineering problems**
  - **Historical** dimension
    - Evolution of concepts and ideas
    - Pluralistic view of science, technology, and engineering
  - **Pragmatic** dimension
    - Conceptual clarity
    - Consequences in practice
Looking at the future

- Looking for better **assessment data**
  - Qualitative evaluation (very positive)
  - Quantitative evaluation
- Ex-post methodology integrated with ex-ante methodology?