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

- 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)

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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

- 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?

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