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INF3490/INF4490 Biologically inspired computing

Future Perspectives on Artificial Intelligence

- What to expect and should we worry?



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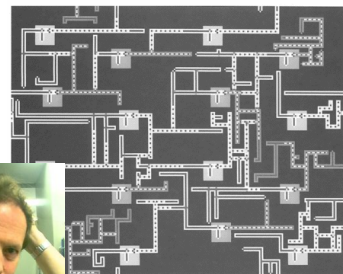
When and Where will a Breakthrough Come?

- Technology breakthroughs often happens randomly and not linked to major initiatives and projects.
- AI breakthroughs depend on the invention of **scalable** learning methods.
 - Need to understand more about how scalability and complexity arises in nature.
- Contributors to progress in AI:
 - Researchers mimicking biological or medical phenomena.
 - Researchers solving engineering problems

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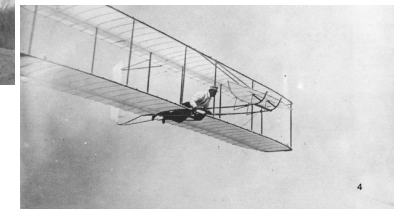
CAM (Cellular Automata Machine) Brain



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What Methods are Best?






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Autonomous Systems

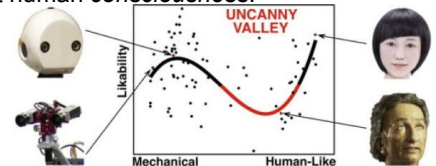
- Systems that can operate with **no or limited human control**
- Degrees of human control:
 - Full autonomy (human decides only the goal)
 - Remotely monitored (autonomous planning but human take over if the system is **misbehaving**)
 - Remotely operated (autonomous steering using human planning)
 - Remotely controlled (human take all decisions)

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How Similar to Humans?

- Similarity depends on progress in a number of fields such as AI methods, computing power, vision systems, speech recognition, speech synthesis, human-computer interaction, mechanics and actuators.
- Design and usability will be essential for future robots but they should not necessarily be as similar as possible to humans (ref. *uncanny valley*).
- We will see robots having human-like *behavior*, but not human *consciousness*.



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Would AI be Good or Bad?

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Is Terminator Coming Close?




“Humans, limited by slow biological evolution, couldn’t compete and would be superseded by A.I.”

AI is our “biggest existential threat”

I am in the camp that is concerned about super intelligence.

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Ethical Risks of Developing AI Systems

- People may become unemployed because of automation.?
- We get too much free time.?
- Artificial intelligence can be used for destructive and unwanted tasks.? (“1984”)
- Successful KI can lead to the extinction of mankind?

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Future Scenario with Autonomous Interacting AI Systems

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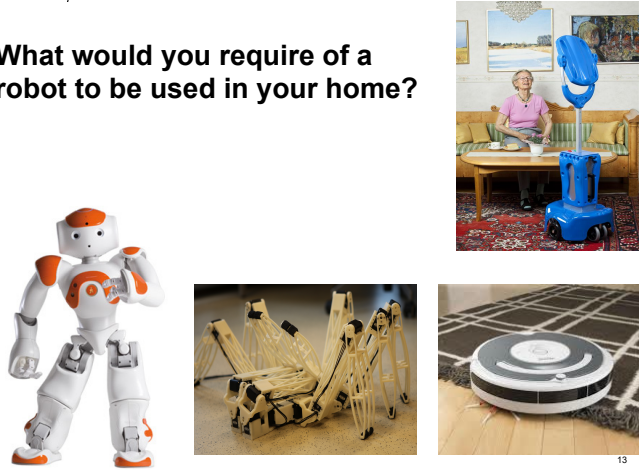
Ethics for Programmers

- In the book “Moral Machines” it is argued that ethic competence should be included during program development by e.g.
 - machine learning methods based on examples of ethical and unethical behavior
- Software that will replace human evaluation and social function should adhere to criteria such as
 - accountability (no. ansvarlighet)
 - inspectability
 - manipulation robustness
 - predictability (no. forutsigbarhet)

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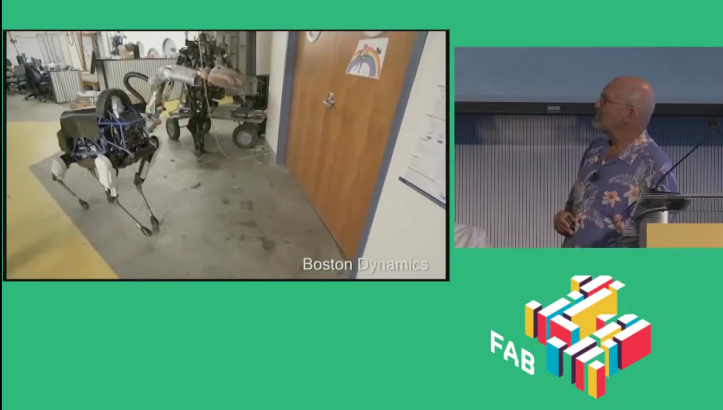
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What would you require of a robot to be used in your home?



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Boston Dynamics

FAB

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Ethical Guidelines for Robots and their Developers (Asimov 1942)

- A robot **may not harm a human being**, or through inaction, allow a human to be injured.
- A robot **must obey orders given by human beings** except where such orders would conflict with the first law.
- A robot **must protect its own existence** as long as such protection does not conflict with the first or second law.



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Ethical Recommendations for Commercial Robots (Euronet Roboethics Atelier)

- **Safety:** There must be mechanisms (or opportunities for an operator) to control and limit a robot's autonomy.
- **Security:** There must be a password or other keys to avoid inappropriate and illegal use of a robot.
- **Traceability:** Similarly as aircraft, robots should have a "black box" to record and document their own behavior.
- **Identifiability:** Robots should have serial numbers and registration number similar cars.
- **Privacy policy:** Software and hardware should be used to encrypt and password protect sensitive data that the robot needs to save.

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