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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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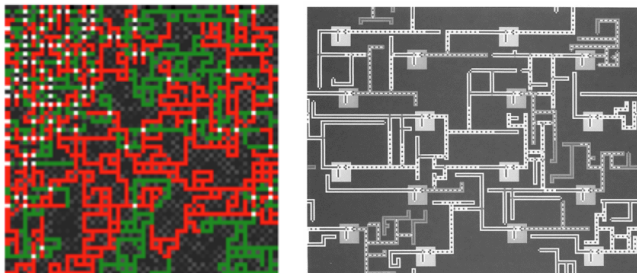
## When and Where will a Breakthrough Come?

- 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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## 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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## Future Scenario with Autonomous Interacting AI Systems



## 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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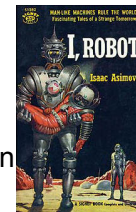
## Ethics for Programmers

- 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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## 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.