# INF3490/INF4490 Biologically inspired computing

Future perspectives on Artificial Intelligence
- What to expect and should we worry?

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

# CAM (Cellular Automata Machine) Brain
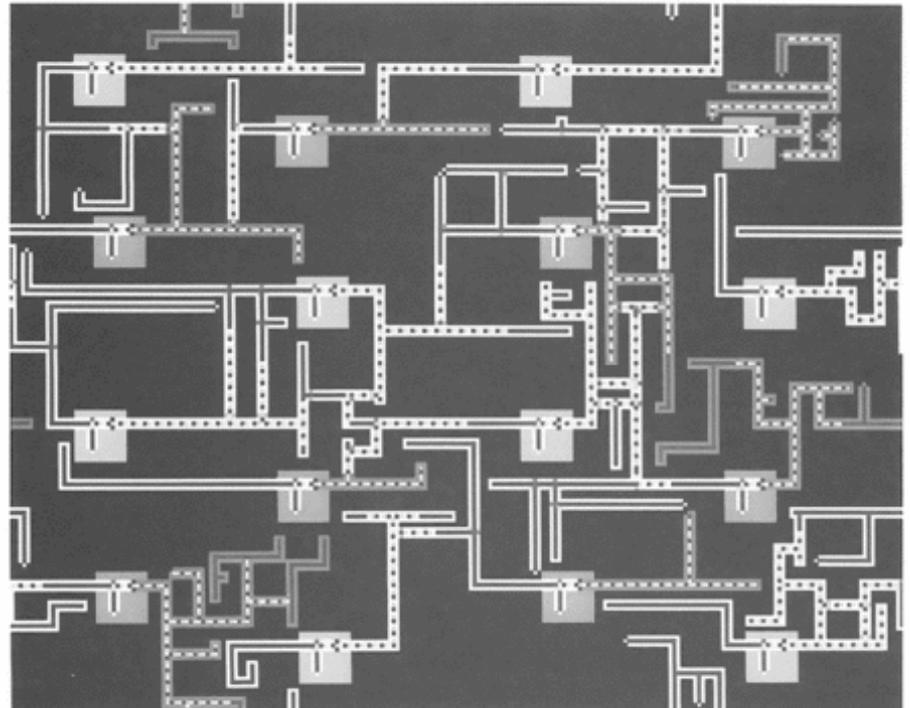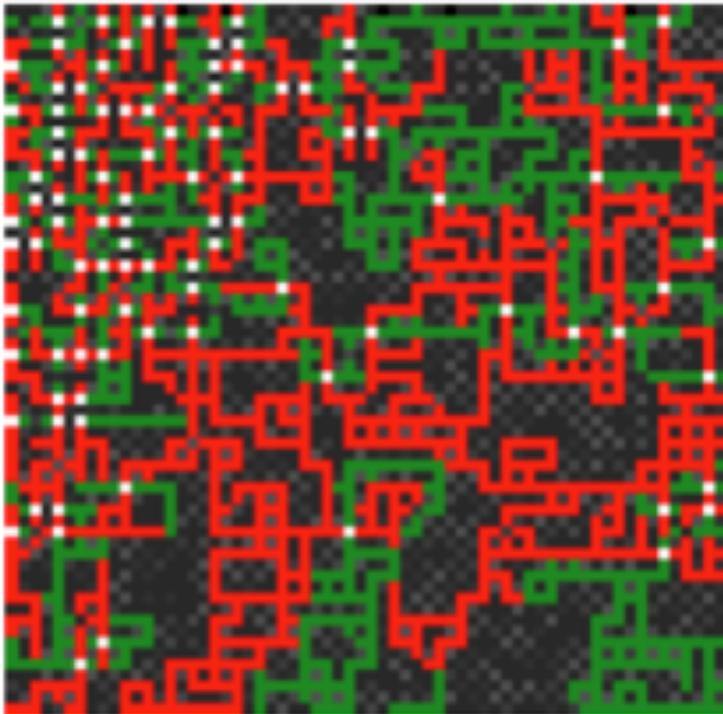
How Similar to Humans?

- 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. u*ncanny valley)*.

- We will see robots having human-like *behavior*, but not human *consciousness*.

Future Scenario with Autonomous Interacting AI Systems
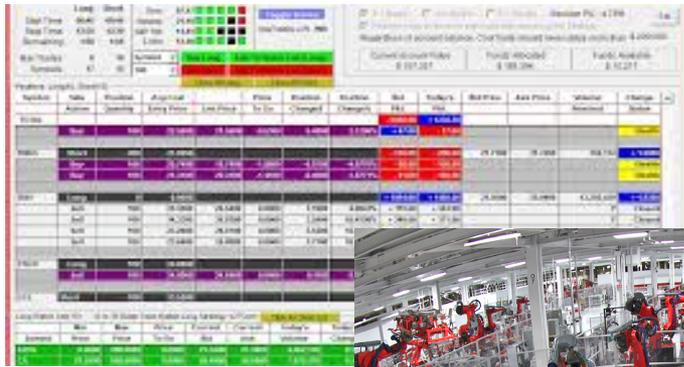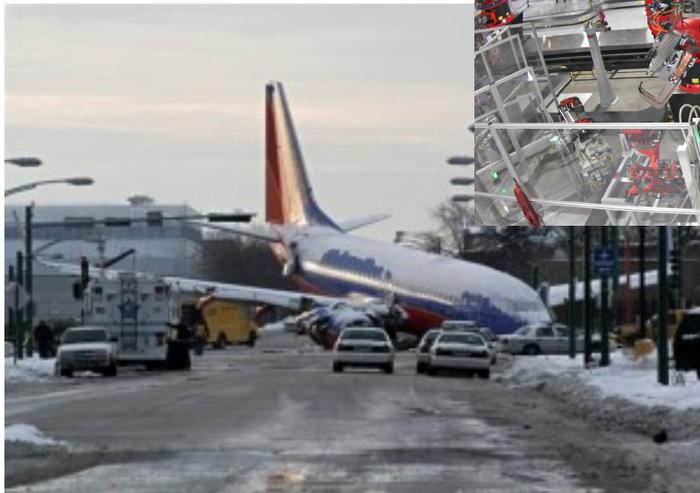
Ethical Risks of Developing AI Systems

- 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?

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)

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.
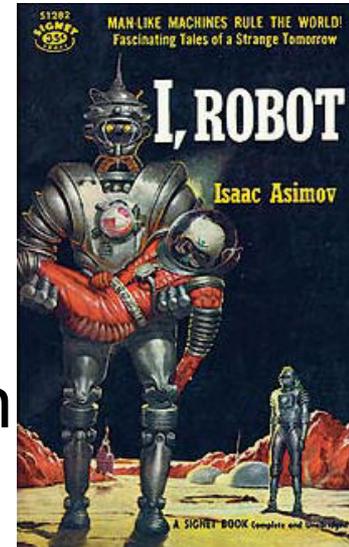
Ethical Recommendations for Commercial Robots (Euronet Roboethics Atelier)

- *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.