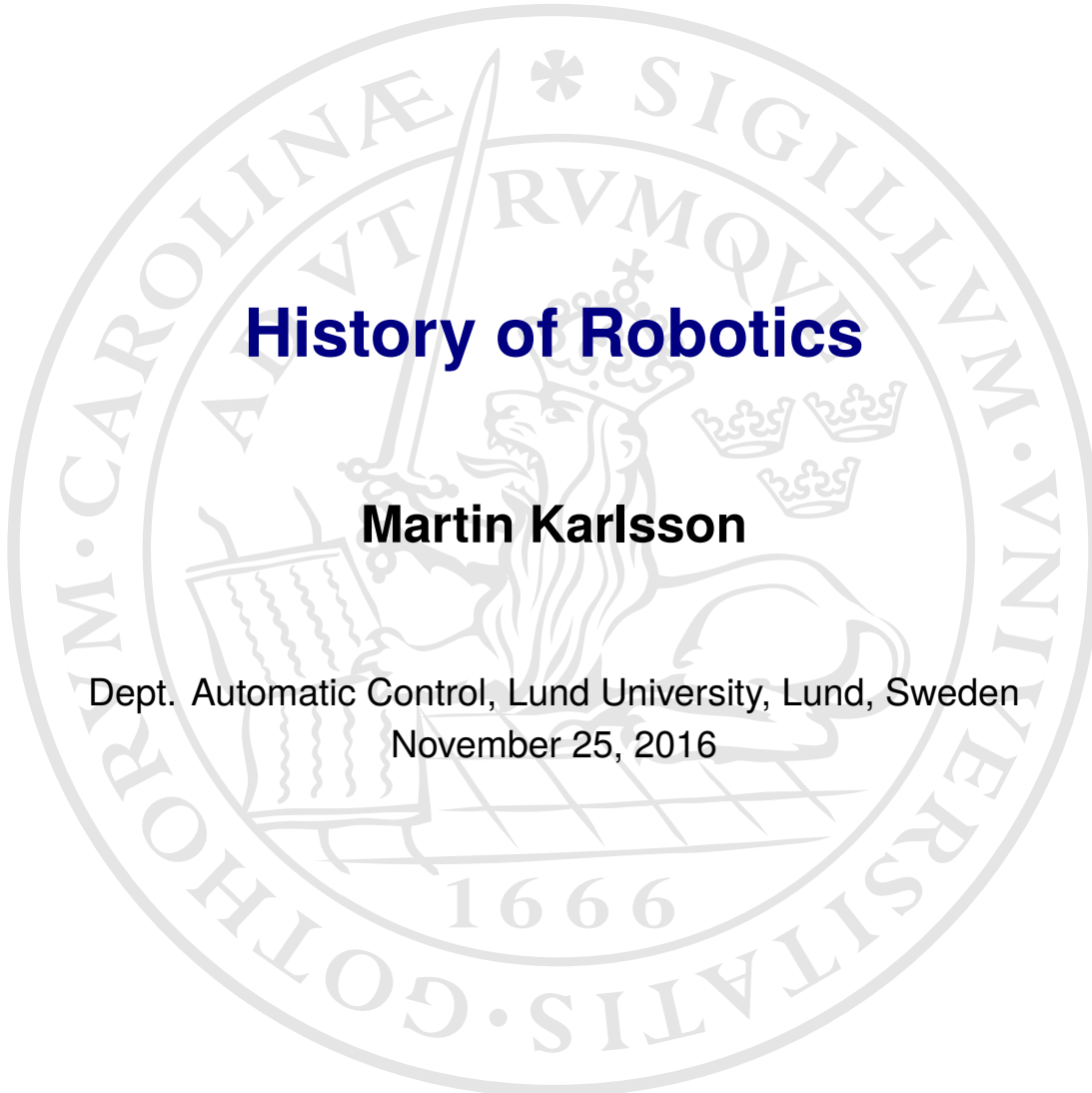

History of Robotics

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Outline

- Introduction
  - What is a robot?
- Early ideas
- The first robots
- Modern robots
- Major organizations
- Ubiquity of robots
- Future challenges

Introduction

- The presenter performs research in robotics.
- Interdisciplinary field. All the way from theory to physical interaction with the real world.
- Several research areas, *e.g.*, control, learning, human-robot interaction, mechanics, etc.

What is a robot?

- "Robot" first introduced by the Czech playwright Karel Capek
- "Robota" is Czech for work
- In practice, any device that operates with some level of autonomy, is called robot
- **Definition from the Robot Institute of America (RIA):** A robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through variable programmed motions for the performance of a variety of tasks.
- This definition is not very distinct
- Robots are machines, but not all machines are robots

Early ideas

- Many ancient mythologies include artificial humans
  - Mechanical servants built by the Greek god of blacksmiths, Hephaestus
  - Galatea, the mythical statue of Pygmalion that came to life
- Leonardo da Vinci sketched plans for a humanoid robot around 1495. Able to sit up, move its arms, head, and jaw. It is called Leonardo's robot.

The first robots

- Not clear which robot was the first. This is a matter of definition of robot. Neither is there a certain inventor of the robot.
- Eric. Built in 1928. Could move hands and head.
- Electro. Presented in 1939. Could speak 700 words, "walk", smoke cigarettes, blow up baloons, and move head and arms.

Electro

- Height: 2.1 m
- Weight: 120 kg

Modern robots

- Position controlled robot arms
  - Internal encoders for motor positions => joint positions => tool pose
- Force control
- Other sensors, mainly in research
  - Vision
  - Laser seam tracker
  - Microphone
- Mobile robots
- Service robots

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Major organizations

- IEEE Robotics and Automation Society (RAS)
- IFAC Technical Committee 4.3 – Robotics, Mechatronics and Components
- International Federation of Robotics (IFR)
- ASME Mechanisms and Robotics Committee

Ubiquity of robots

- Robot sales: 253,748 units 2015 (15% increase since 2014, and more than 100% increase since 2010!).
- China is the biggest market with a share of 27% of the total supply in 2015.

Future challenges

- Sensor fusion
- Machine learning / Deep learning
- General intelligence (Close to nothing is achieved)
- Physical human-robot interaction. From caged animals to human-like co-workers.
- Since the history of robots has been so exiting, I have high expectations on the future!

Thank you!

Questions / comments?