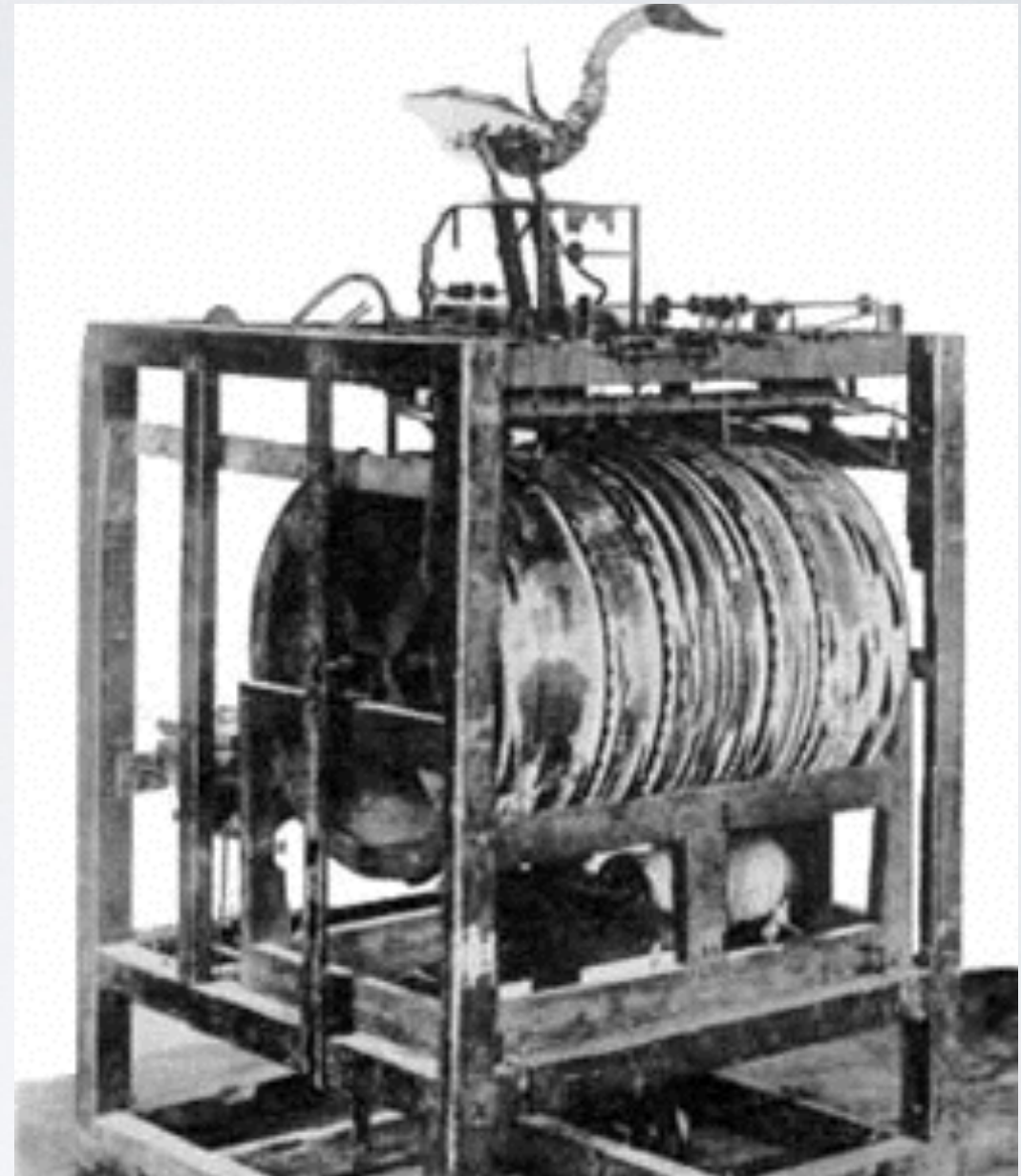# INTRODUCTION

CS 3630 Introduction to Robotics and Perception

Frank Dellaert
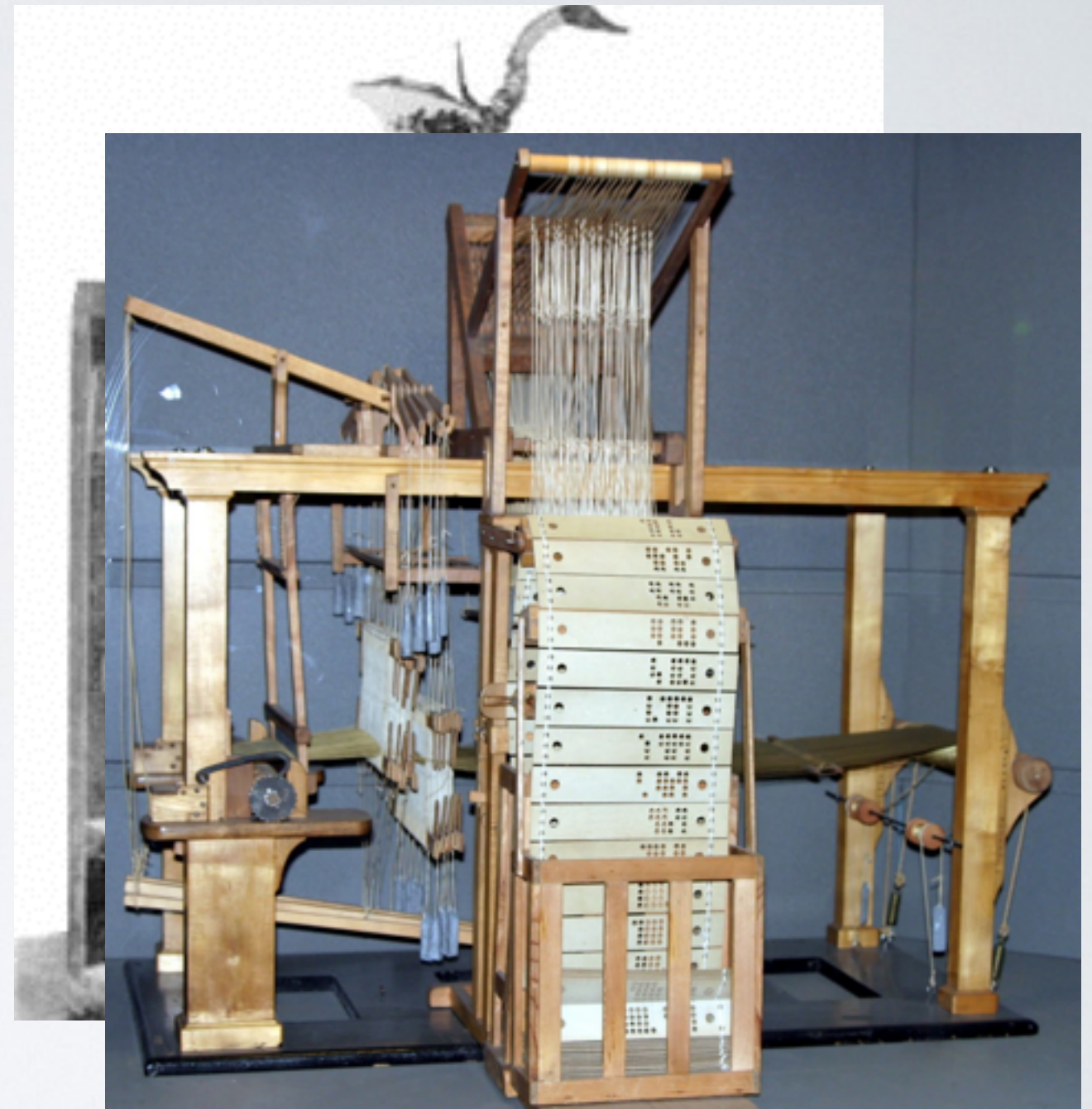
SOME HISTORY

- 18th century: automata

- Jacquard loom

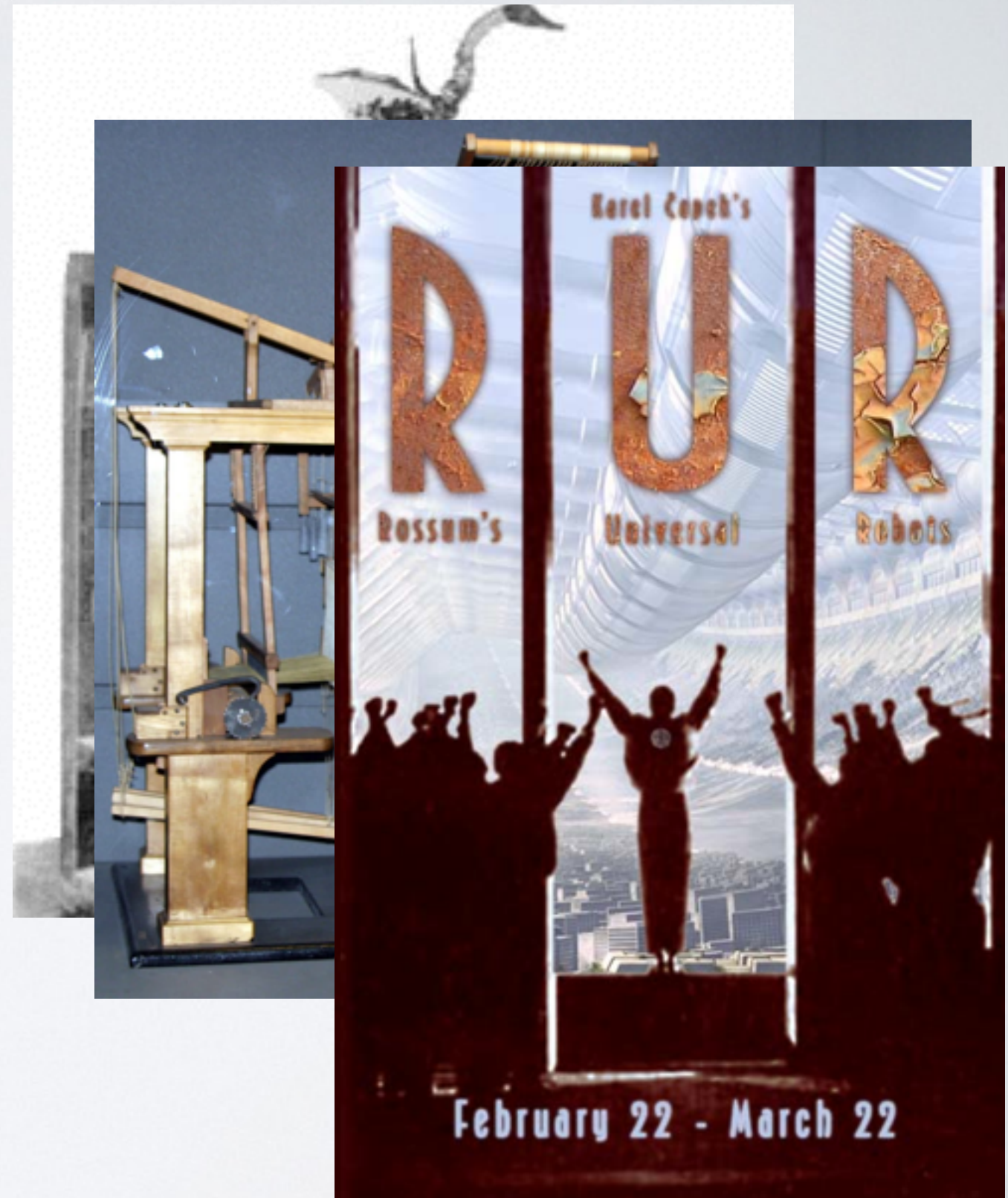- 1921: word Robot coined in Czech SF play "Rossum's Universal Robots"

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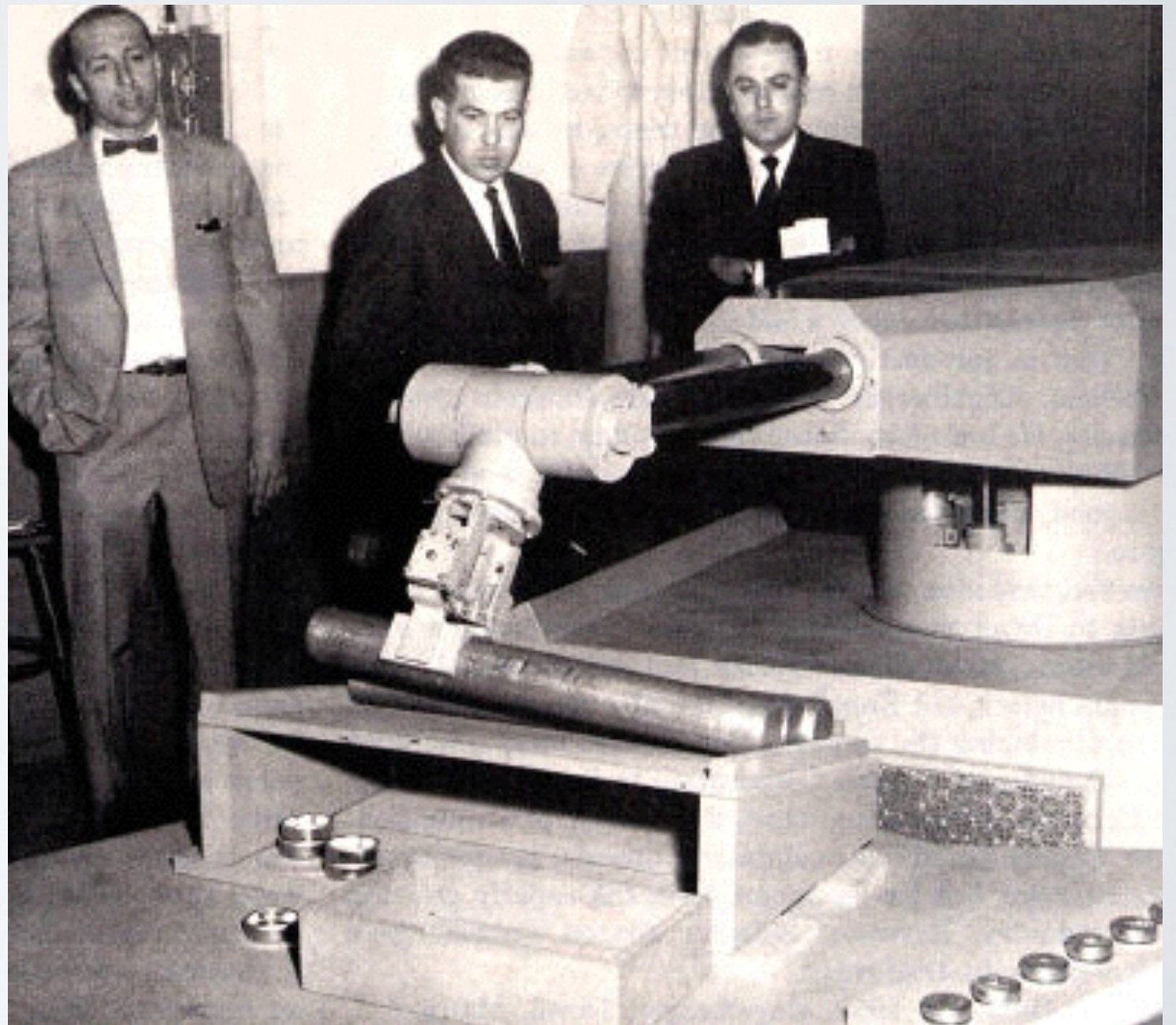- 1921: word Robot coined in Czech SF play "Rossum's Universal Robots"

SOME HISTORY

- 18th century: automata

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- 1921: word Robot coined in Czech SF play "Rossum's Universal Robots"

FIRST "REAL" ROBOT

- Unimate

- Patent by George Devol filed in 1954

- Unimation started by Devol and Engelberger in 1956

- First one installed at GM in 1961

ROBOT TAXONOMY

- **Manufacturing**

- Service Robots

- Field Robots

- Humanoid Robots

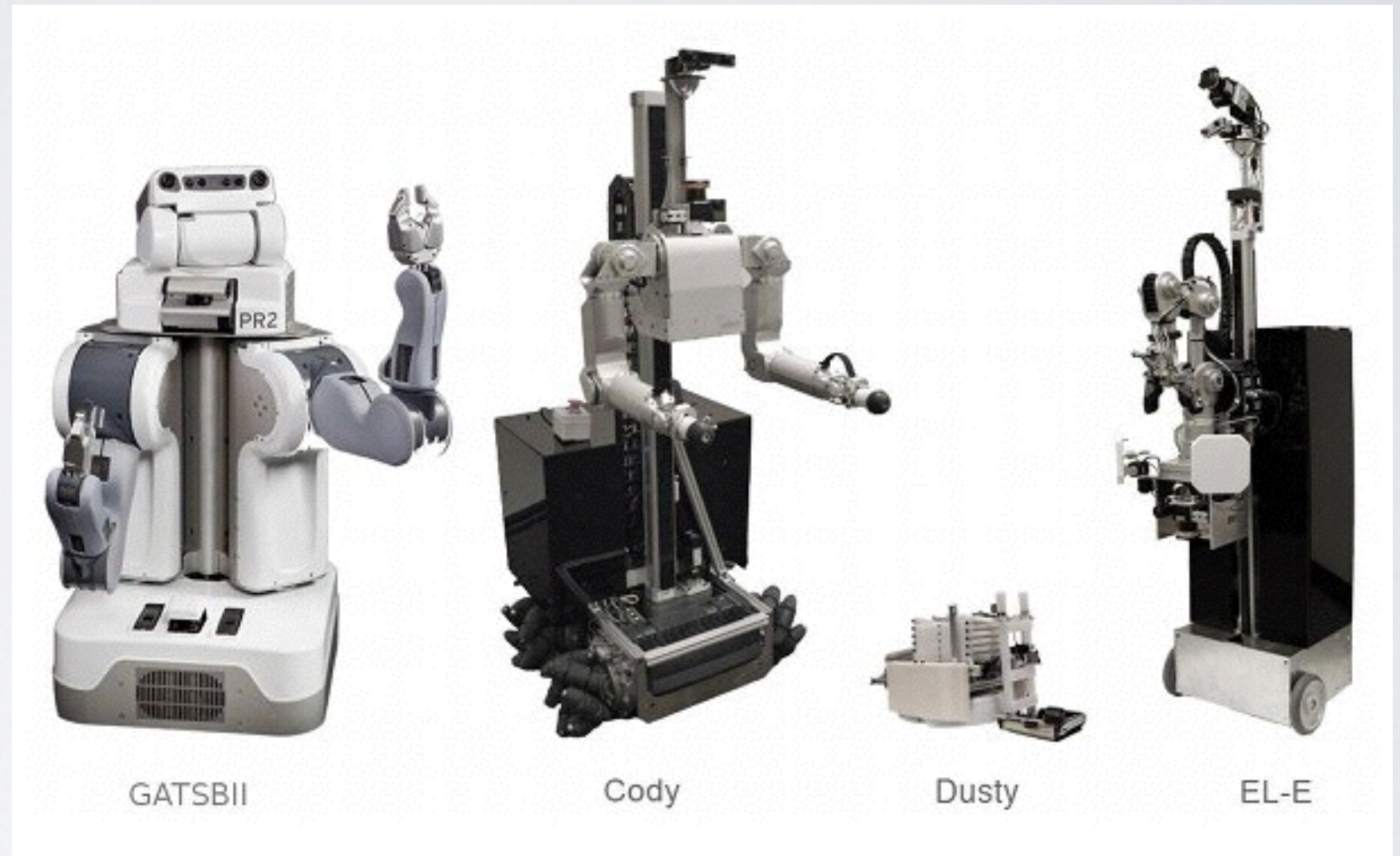- Autonomous Vehicles

http://www.kuka.com

ROBOT TAXONOMY

http://www.hsi.gatech.edu/hrl/

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GATSBII Cody Dusty EL-E

http://www.davincisurgery.com

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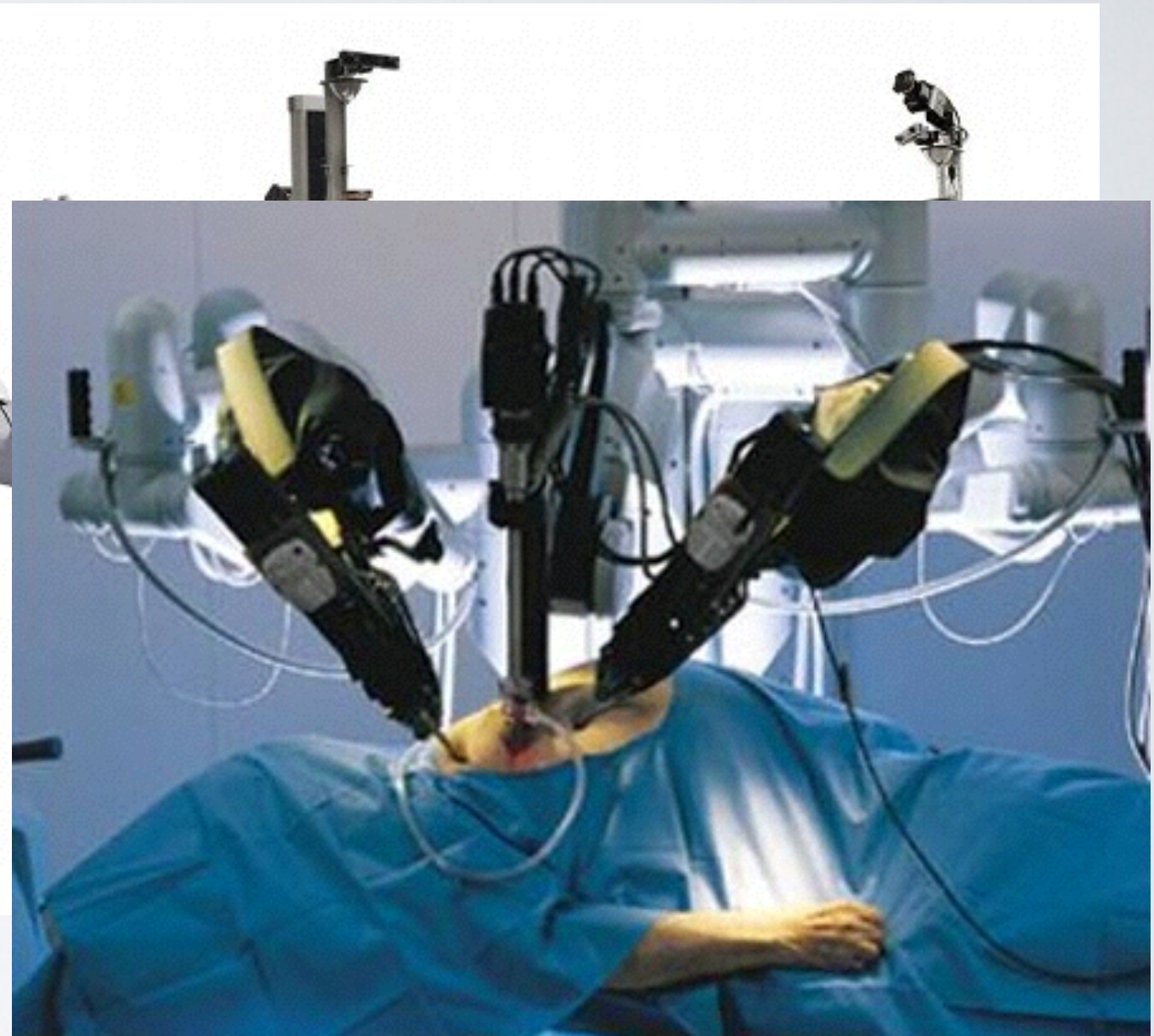

http://www.frc.ri.cmu.edu/robots/

ROBOT TAXONOMY

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ROBOT TAXONOMY

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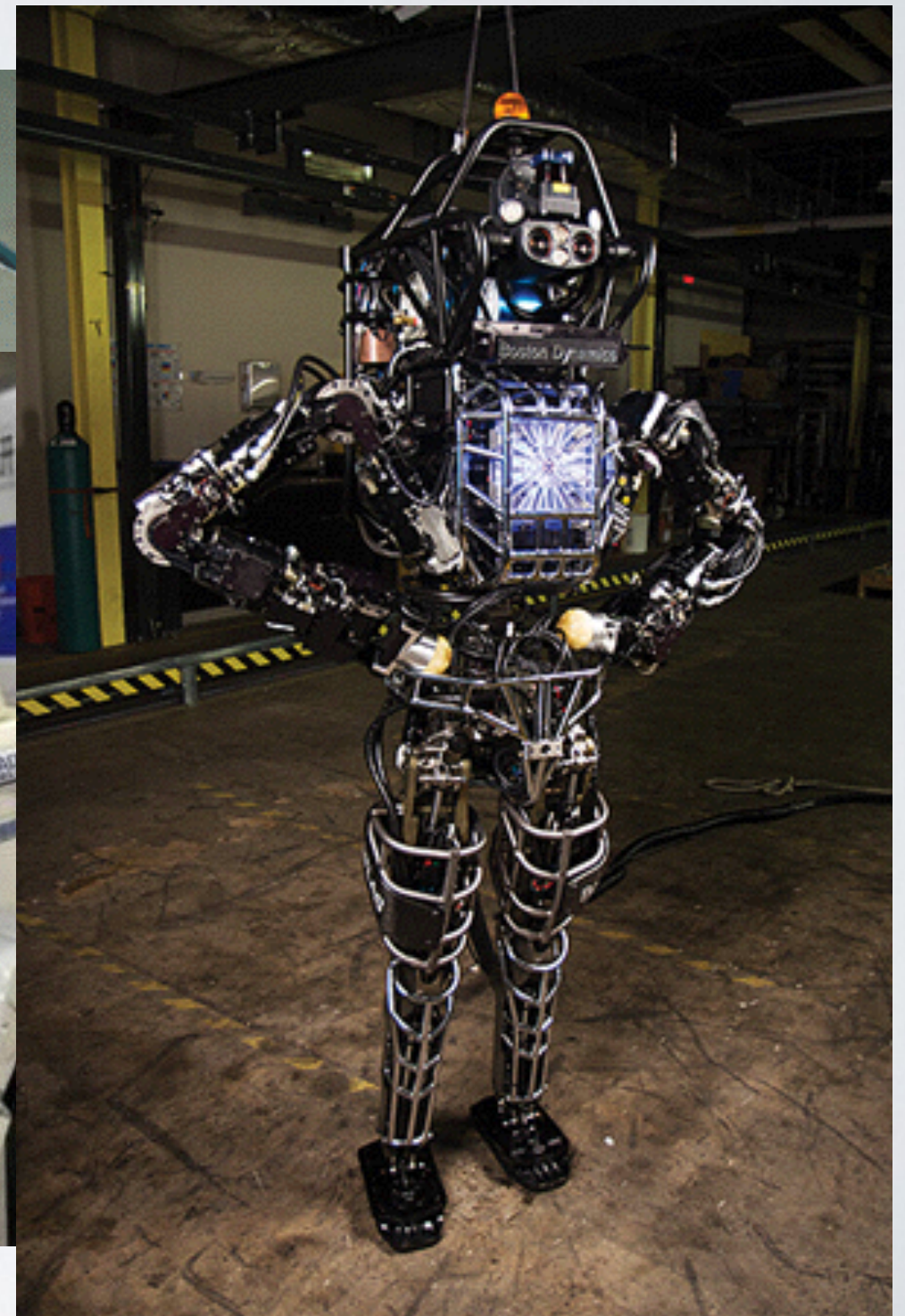- **Humanoid Robots**

- Autonomous Vehicles

ROBOT TAXONOMY

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- **Humanoid Robots**

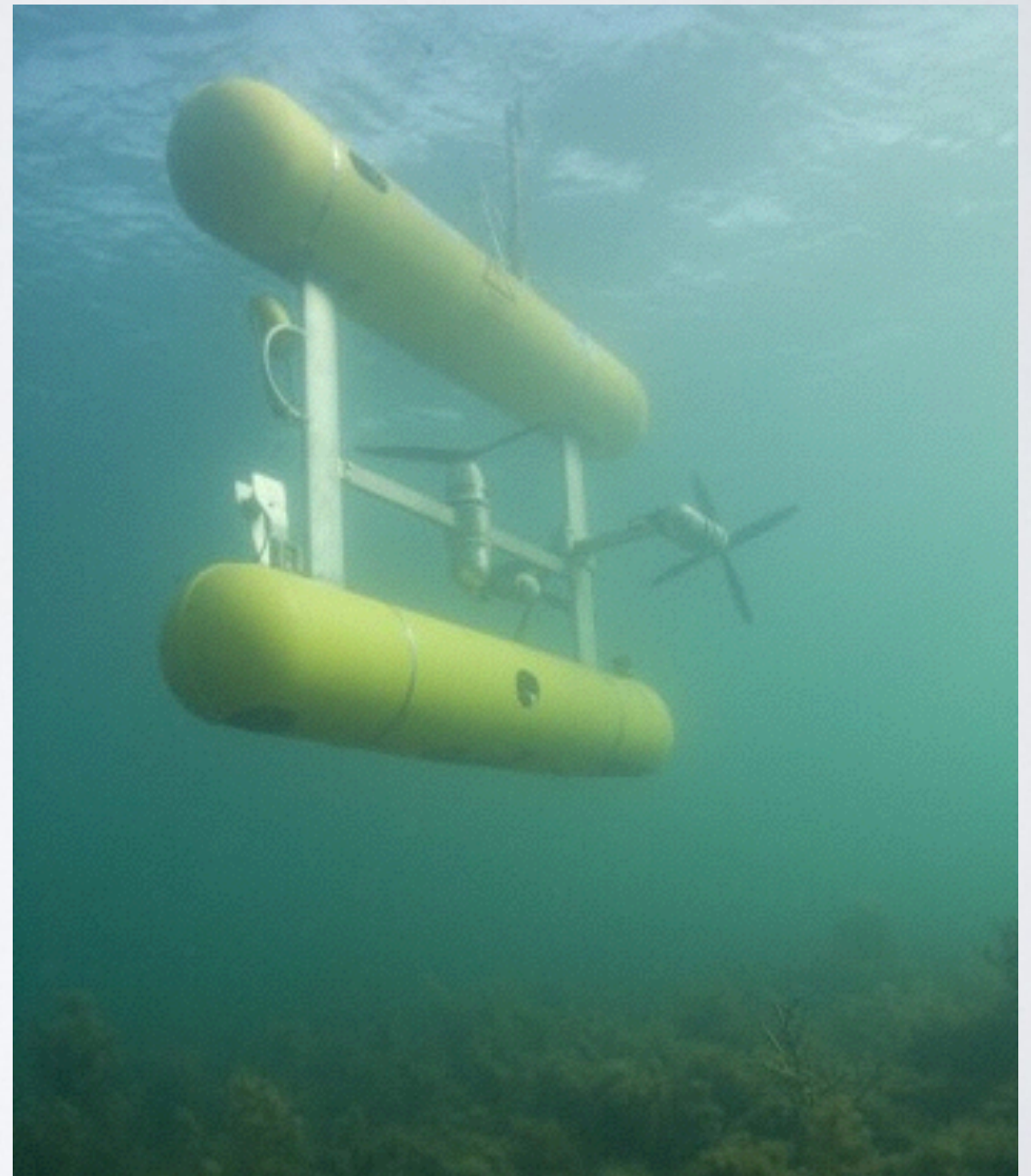- Autonomous Vehicles

ROBOT TAXONOMY

- Manufacturing

- Service Robots

- Field Robots

- Humanoid Robots

- **Autonomous Vehicles**

WHAT DEFINES A ROBOT?

- Corke:
  *A goal oriented machine that can **sense**, **plan**, and **act**.*

TELE-OPERATION AND LEVELS OF AUTONOMY

- Fully Autonomous

- Traded Control

- Tele-operated

COURSE OUTLINE / TEXT

- **Position and Orientation**
- **Time and Motion**
- **Mobile Robots**
- **Navigation**
- **Localization**
- **Arm-like Robots**
- **Velocity Relationships**
- **Pose-SLAM**
- **Image Processing**
- **SLAM in 3D**
- **Projective Geometry**
- **Multiview Geometry**
- **Visual Servoing**
- **Dense Stereo**
- **Object Recognition**

Peter Corke

Robotics, Vision and Control

FUNDAMENTAL ALGORITHMS IN MATLAB®
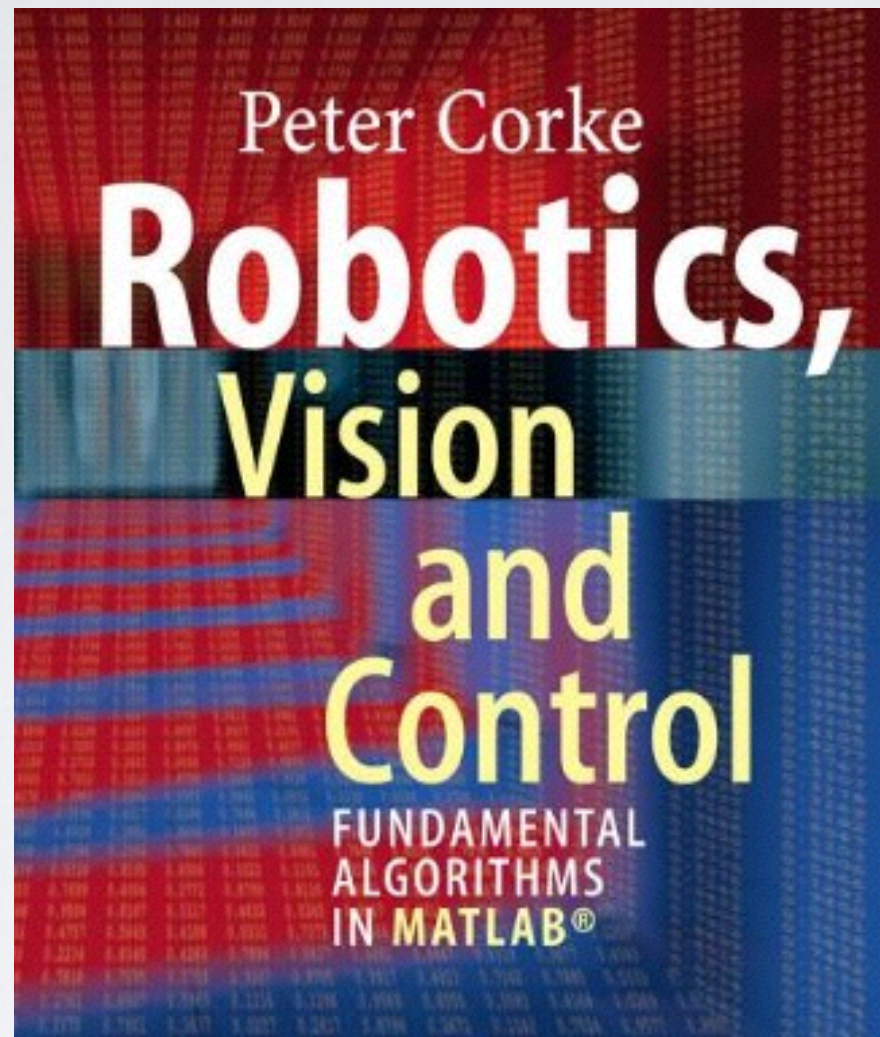
Robotics, Vision & Control

The practice of robotics and computer vision each involve the application of computational algorithms to data. The research community has developed a very large body of algorithms but for a newcomer to the field this can be quite daunting. For more than 10 years the author has maintained two open-source MATLAB® Toolboxes, one for robotics and one for vision. They provide implementations of many important algorithms and allow users to work with real problems, not just trivial examples.

This new book makes the fundamental algorithms of robotics, vision and control accessible to all. It weaves together theory, algorithms and examples in a narrative that covers robotics and computer vision separately and together. Using the latest versions of the Toolboxes the author shows how complex problems can be decomposed and solved using just a few simple lines of code. The topics covered are guided by real problems observed by the author over many years as a practitioner of both robotics and computer vision. It is written in a light but informative style, it is easy to read and absorb, and includes over 1000 MATLAB® and Simulink® examples and figures. The book is a real walk through the fundamentals of mobile robots, navigation, localization, arm-robot kinematics, dynamics and joint level control, then camera models, image processing, feature extraction and multi-view geometry, and finally bringing it all together with an extensive discussion of visual servo systems.

"An authoritative book, reaching across fields, thoughtfully conceived, and brilliantly accomplished!"
OUSSAMA KHATIB, Stanford

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Toolboxes

Peter Corke
Add to circles