
人工智能
The ShanghAI Lectures
上海授课

WELCOME

The ShanghAI Lectures
An experiment in global teaching

4 December 2014

欢迎您参与
“来自上海的人工智能系列讲座”

Lecture 8

Education and Industry session
Program (CET)

09:00 Fabio : Intro

09:10 Fabio: “Embodied AI, soft robotics and the economy: the next big thing?”

09:40 Coffee Break

09:50 Luca Ascari: “ Henesis”

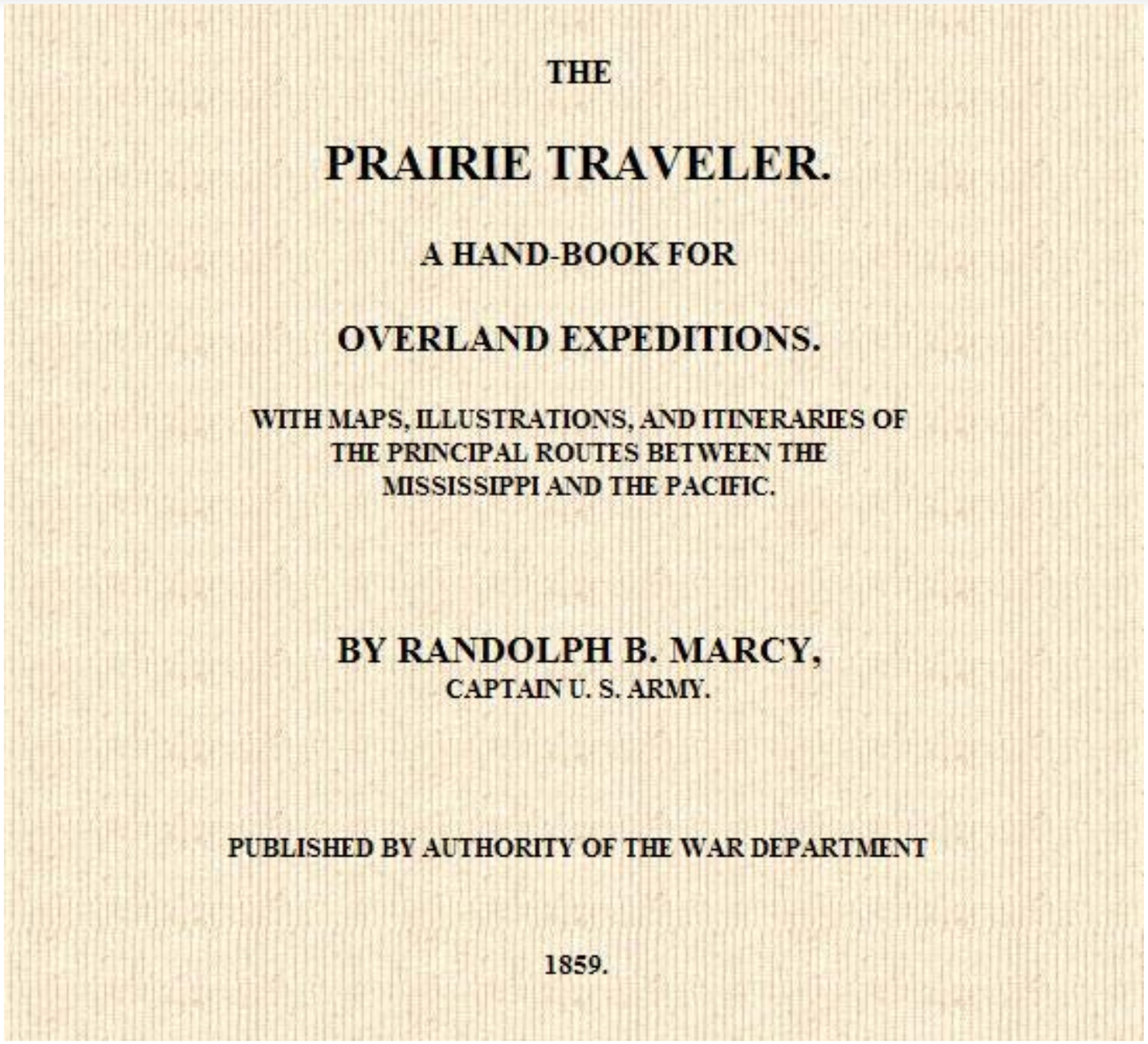
10:10 Rafael Hostettler: “Roboy and Devanthro”

10:35 Adrien Briod: “Flyability”

10:55 Fabio: Wrap up

11:00 END

‘Caveat’



THE

PRAIRIE TRAVELER.

A HAND-BOOK FOR

OVERLAND EXPEDITIONS.

WITH MAPS, ILLUSTRATIONS, AND ITINERARIES OF
THE PRINCIPAL ROUTES BETWEEN THE
MISSISSIPPI AND THE PACIFIC.

BY RANDOLPH B. MARCY,
CAPTAIN U. S. ARMY.

PUBLISHED BY AUTHORITY OF THE WAR DEPARTMENT

1859.

Old ideas

“If every tool, when ordered, or even of its own accord, could do the work that befits it, just as the creations of Daedalus moved of themselves . . . If the weavers' shuttles were to weave of themselves, then there would be no need either of apprentices for the master workers or of slaves for the lords.”

Aristotle

(from Politics, Book 1, 1253b, 322 BC)

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Old ideas

The part of the quote "or even of its own accord" is elsewhere translated as "or by seeing what to do in advance" etc. (you may find many translations).

I think this is an important part of the quote, so it's good to go back to the original text:

Aristotle uses the word "προαισθανόμενον" – proaisthanomenon this means literaly: pro = before, aisthanomenon = perceiving, apprehending, understanding, learning (any of these meanings in this order of frequency) in my view it is clearly a word that is attributed to intelligent, living agents....i.e. ones with cognitive abilities (!)

personal communication, Dr. Katerina Pastra
Research Fellow
Language Technology Group
Institute for Language and Speech Processing
Athens, Greece

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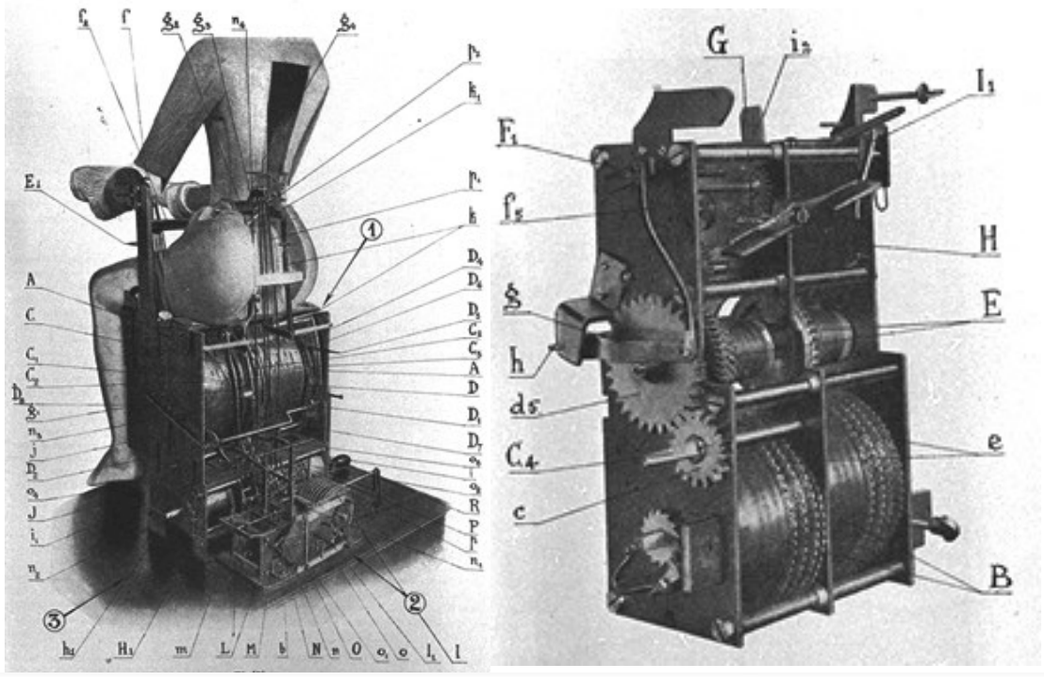
Old attempts



Jaquet-Droz Brothers (1720-1780)

Old attempts

Karakuri Dolls

Chahakobi Ningyo (Tea Serving Doll) by SHOBEI Tamaya IX, and plan from 'Karakuri Zuii' ('Karakuri - An Illustrated Anthology') published in 1796.

Older and newer attempts

Juanelo Torriano alias Gianello della Torre, (XVI century) *a craftsman from Cremona, built for Emperor Charles V a mechanical young lady who was able to walk and play music by picking the strings of a real lute.*

Hiroshi Ishiguro, early XXI century

Director of the Intelligent Robotics Laboratory, part of the Department of Adaptive Machine Systems at Osaka University, Japan

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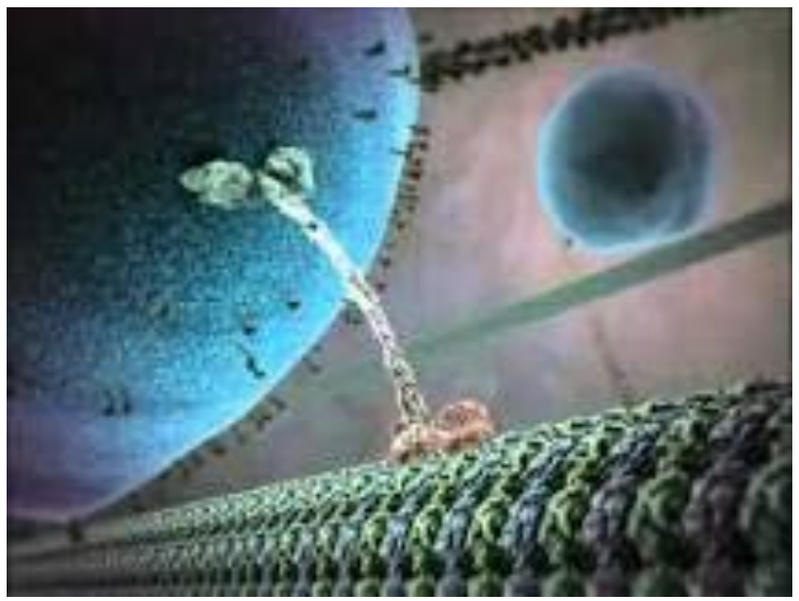
Is It Alive?

- A marvelous robot's bad day
- The inner life of a cell



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The real world is surprising

Columbus discovering America while looking for a short route to Asia (wikipedia)

Traders looking at screens during the global market crash of 2008 (seekingalpha.com)

There are unexpected events that change the F-O-R (at many levels)

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The need for an embodied perspective

- **“failures” of classical AI**
- **fundamental problems of classical approach**
- **Wolpert’s quote: Why do plants not have a brain? (stay tuned for Barbara Mazzolai’s lecture at the ShanghAI Lectures)**
- **Interaction with environment: always mediated by body**

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Two views of intelligence

classical:
cognition as computation

embodiment:
cognition emergent from sensory-motor and interaction processes

Textile industry

the first cotton mill at Cromford, Derbyshire, UK, is usually considered the first example of a modern factory

the spinning jenny is considered one of the first modern industrial machines

<u>the level of automation reached in this field of manufacturing engineering is not complete.</u>

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Textile industry

this is the current situation

Robots, artificial intelligence in the media

HAL, the "Hybrid Assistive Limb ®" Cyberdyne Inc.

Engkey, the Korean English language Teacher

Sex and marriage with robots? "It could happen" (David Levy)

Beer-serving robot

Engkey: the English language teacher

Korea to offer commercially viable English-speaking robots in 2013 한글

By Kim Tae-gyu

A total of 29 English-language education robots will be placed in 21 elementary schools in Daegu next week for a four-month feasibility study to check the commercial viability of robotic teachers, to go on sale in 2013.

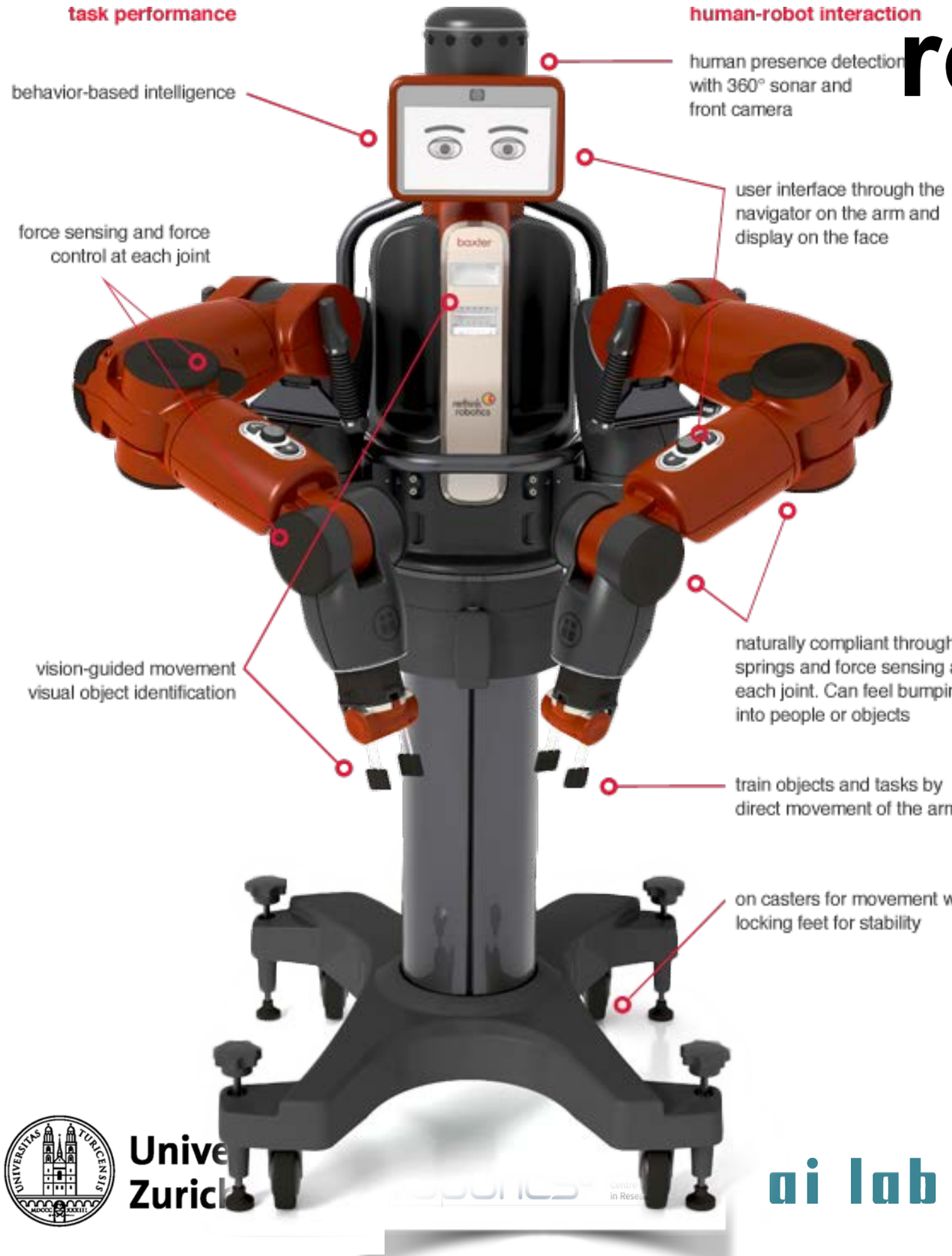
The state-run Korea Institute of Science and Technology (KIST) said Friday that the robotic assistants, dubbed "Engkey" combining "English" and "disc jockey," will help teachers during English classes.

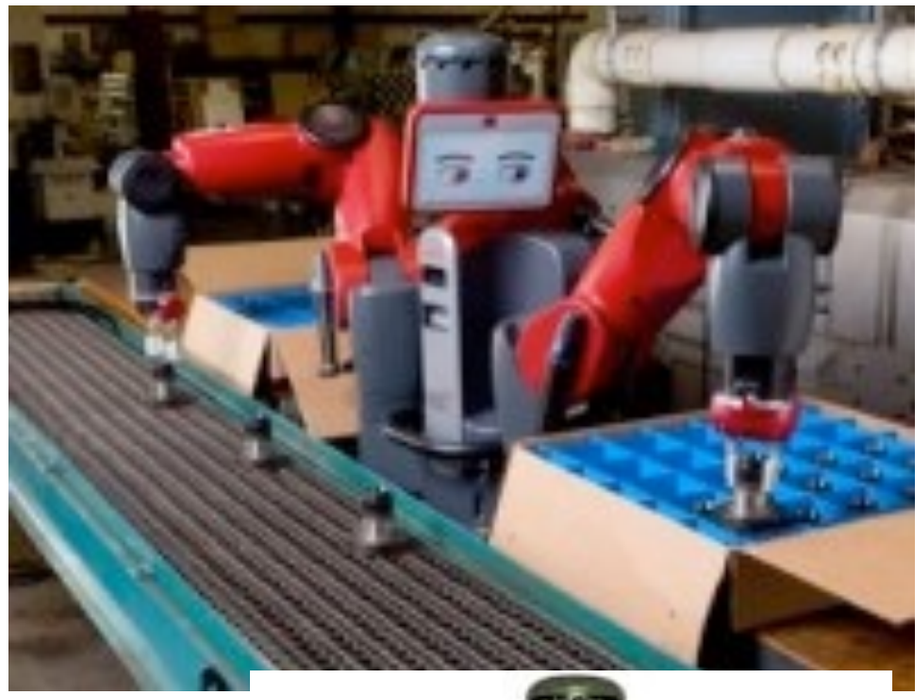
``We will carry out the second-phase pilot program with Engkey until next March after wrapping up the first project over the past year in Masan, South Gyeongsang Province," KIST spokesman Park Young-ho said.

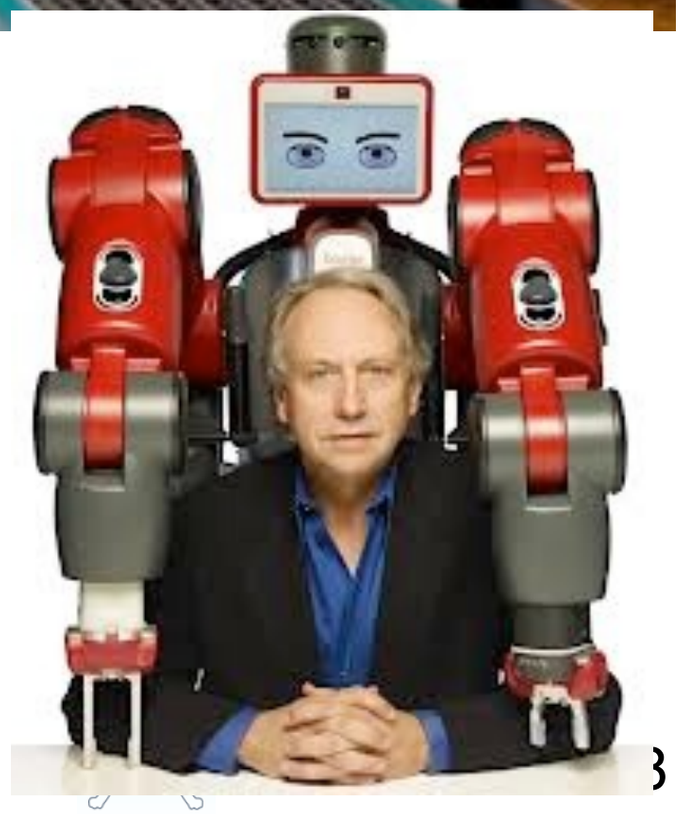
An English-language education robot named Engkey

rethink robotics

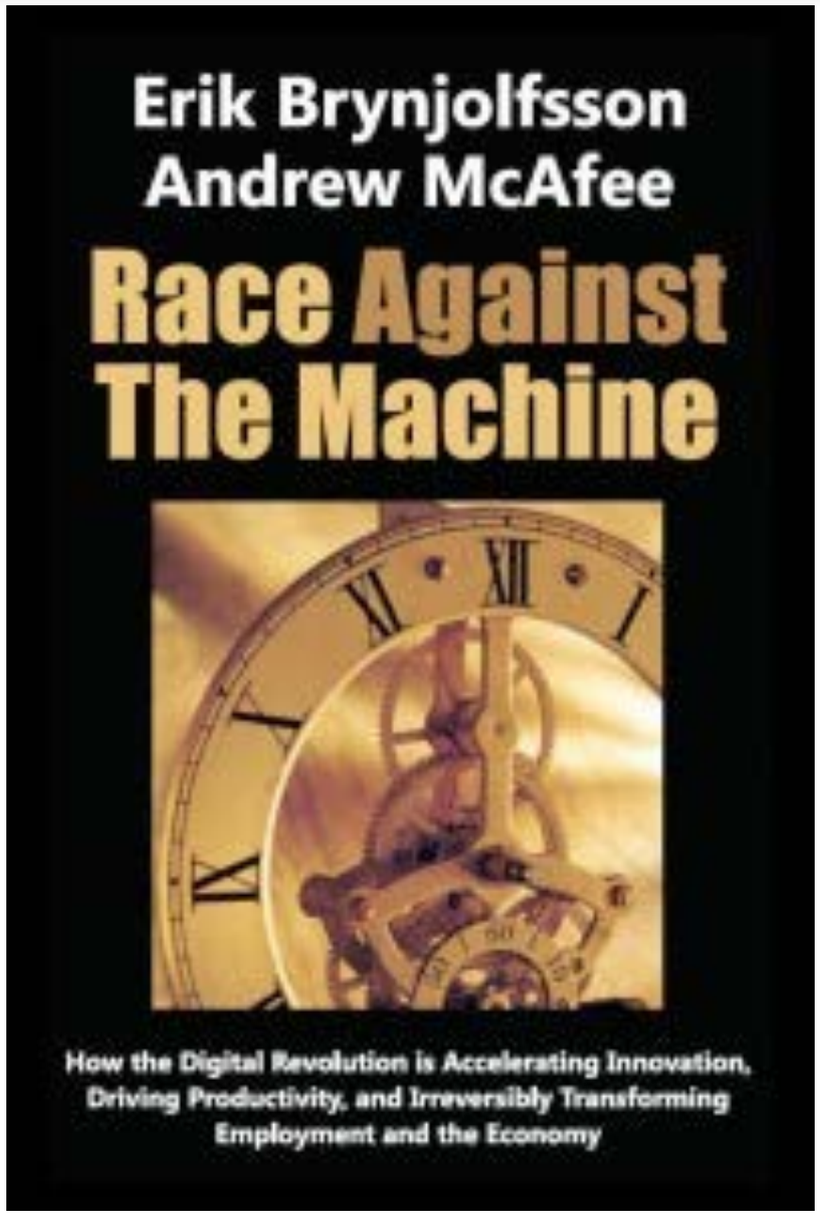
The factory “humanoid” robot “Baxter”







Someone is worried....



But maybe we should not be....

Erik Brynjolfsson (first author of the book above):

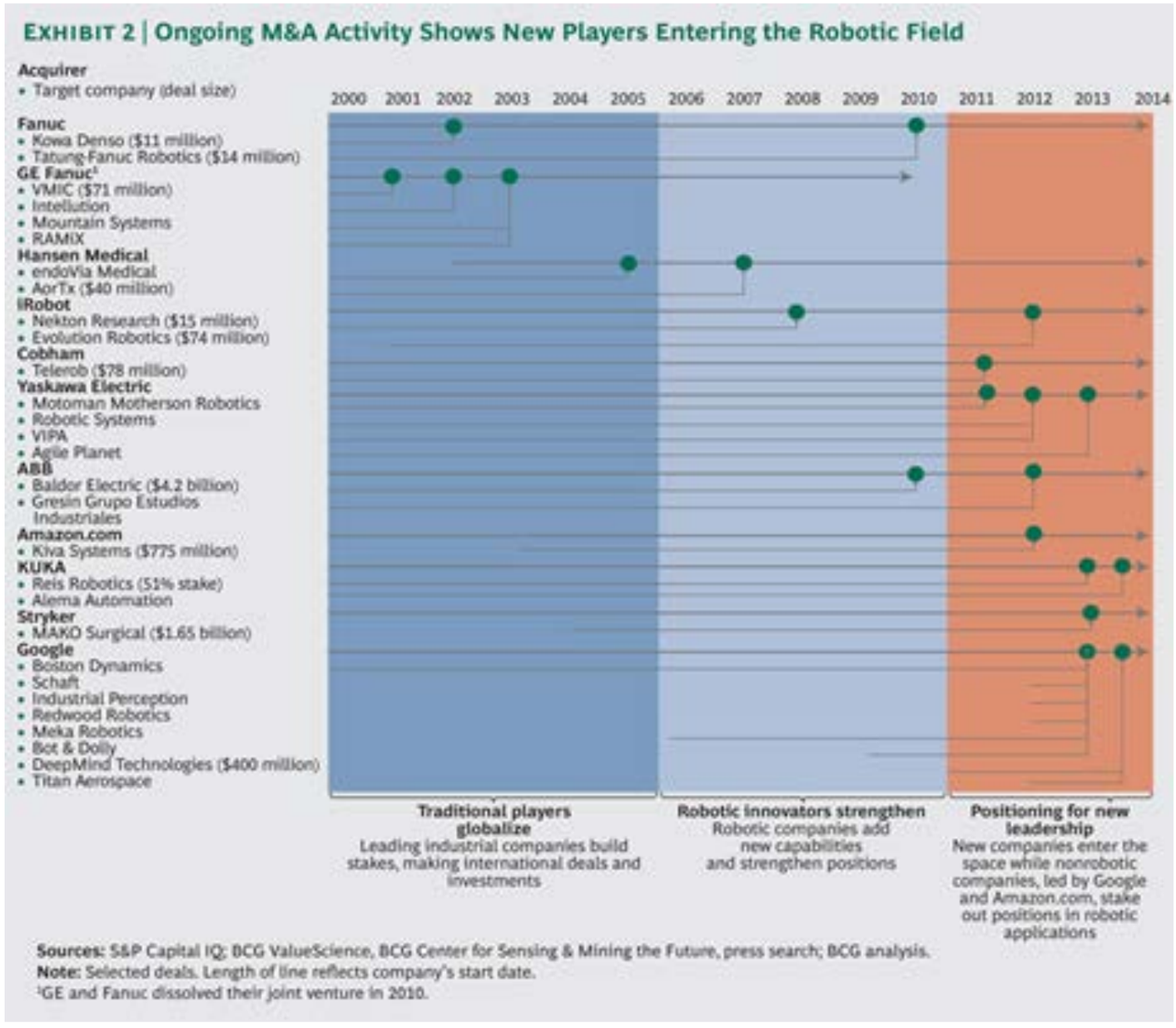
“The key to growth?

Race _with_ the machines”

(check his nice TED talk here:

http://www.youtube.com/watch?v=sod-eJBf9Y0)

The evolution of robotics



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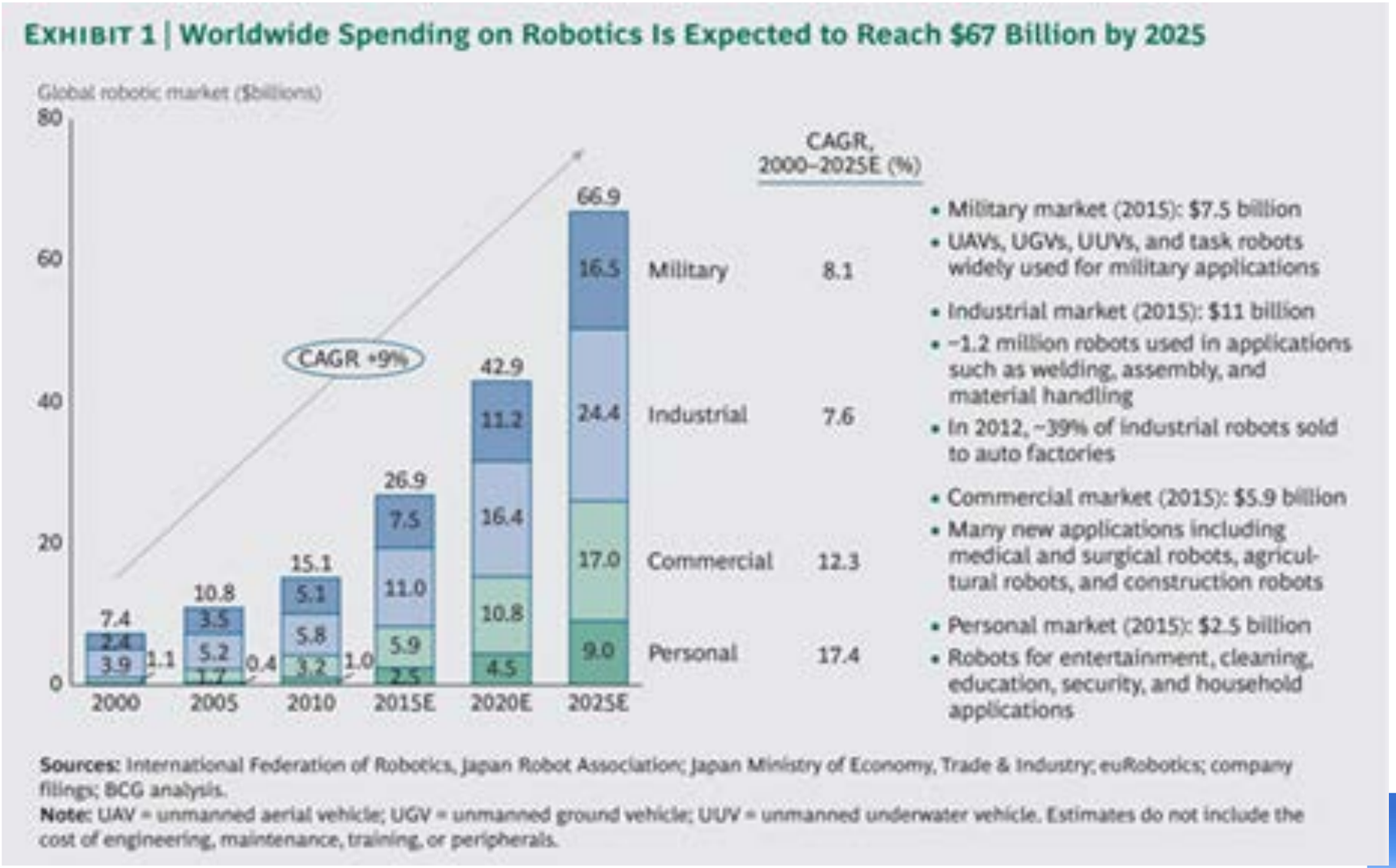
The evolution of robotics



Sources: International Federation of Robotics, Japan Robot Association; Japan Ministry of Economy, Trade & Industry; euRobotics; company filings; BCG analysis.
Note: UAV = unmanned aerial vehicle; UGV = unmanned ground vehicle; UUV = unmanned underwater vehicle. Estimates do not include the cost of engineering, maintenance, training, or peripherals.

The evolution of robotics

‘‘Robots can fundamentally change how work gets done. They can match human performance and even improve upon it in many areas. To prepare for and profit from the robotic megatrend, companies can start by identifying the following:

***Areas of Operations with High Labor Costs**. Robotics can provide cost-saving alternatives in many areas and complement human workers in others.*

***Tasks That People Can’t, Won’t, or Shouldn’t Do**. Some jobs are too hazardous, unpleasant, or difficult for human beings—no matter how high the pay. Other tasks are just too mindless, repetitive, and boring. Robots can liberate workers from hazardous or unappealing jobs.*

***Human Skill Gaps.** In Japan, developers are exploring ways robots might provide nursing and elder care. Other scarce and needed skills and capabilities that robots can offer—such as data mining, rapid analysis, and super speed or strength—exist at levels not present in human beings.*

***Mission-Critical Applications.** Tasks that demand exceptional precision, flexibility, or speed —such as electronic-chip production—or that require maneuvering in small spaces lend themselves to robotics.*

***High Complexity.** The global nature of business has given rise to convoluted supply chains and vast supplier networks. Robotics offers a way to centrally manage and execute complex logistics and to customize products for different markets and even for individual customers. The evolution of robotics (fabio:i.e., textile and shoes)”*

Alison Sander, Meldon Felgong, Boston Consulting Group, BCG’s Center for Sensing & Mining the Future

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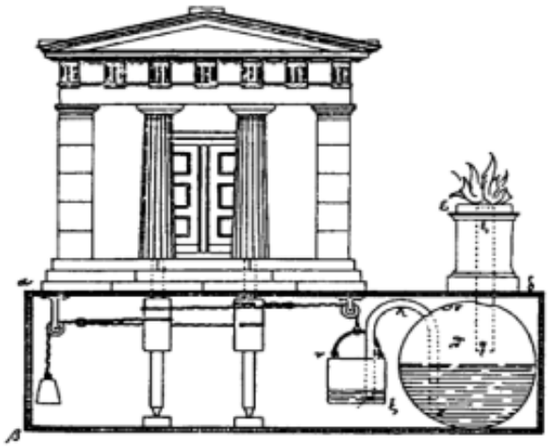
Don’t take anything for granted

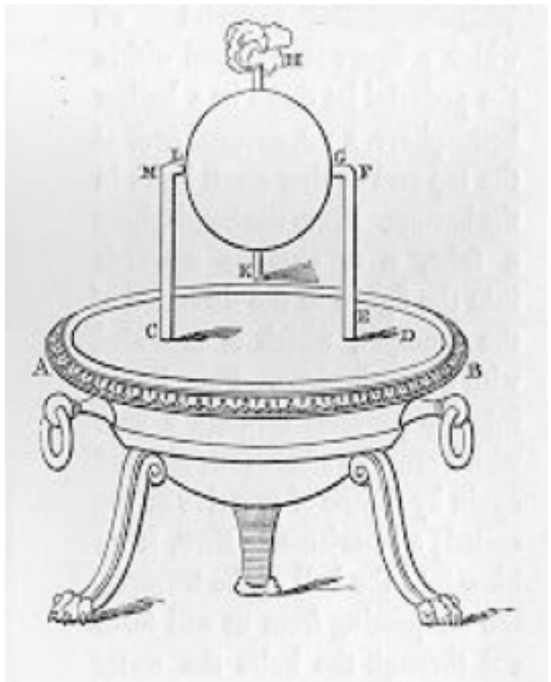
Hero or (Heron of Alexandria), who lived in the first century BC, invented the aeolipile, an early example of steam engine, almost two thousand of years before Watt



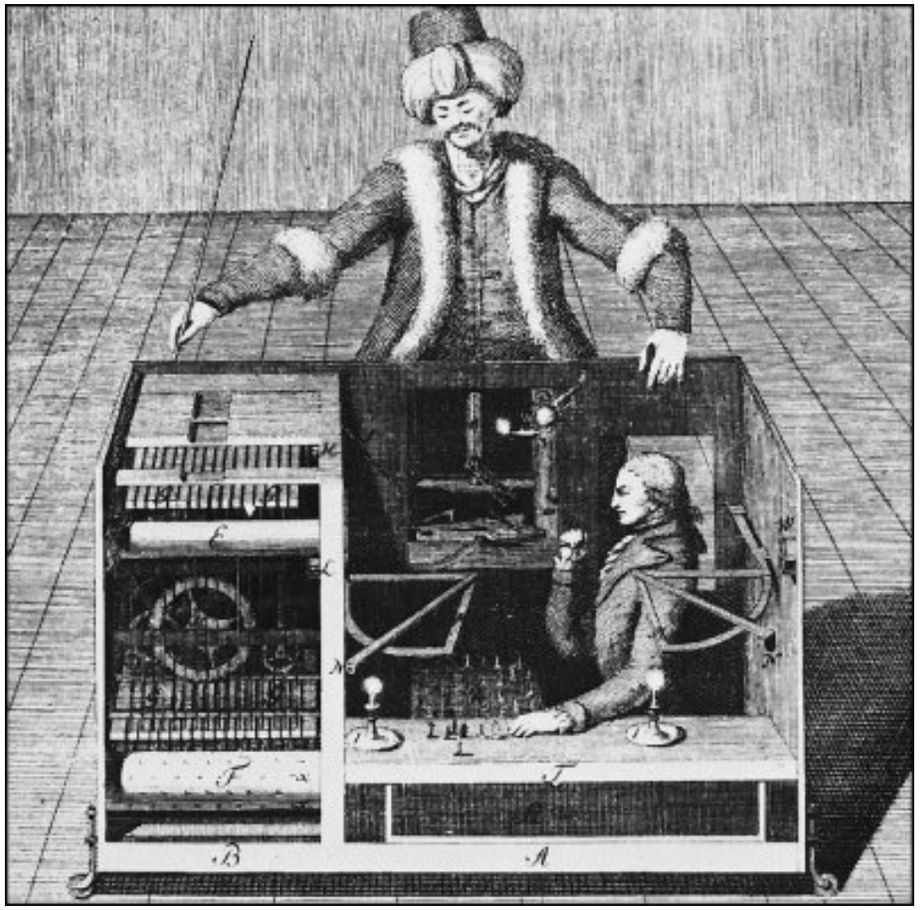
„Tempeltüren öffnender Automat“ des *Heron v. Alexandria*
(aus *Περι Αυτοματοποιητικης* um 50 n. Chr.)

He designed many automas and automatisms, mostly for leisure and entertainment, or religious purpose, in the ellenistic age.

The ancients never used steam engine (or automaton) for practical purposes. Why?



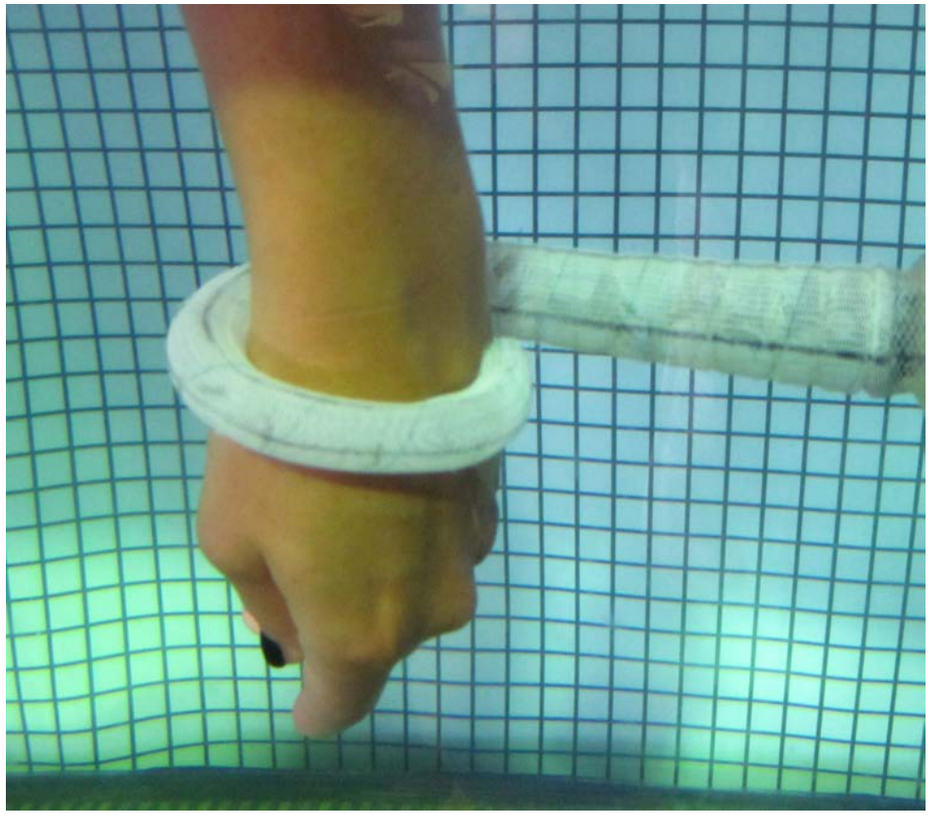
The first wave



1769: Wolfgang von Kempelen: chess player

>1600: A bunraku puppet

The second wave



Thank you for your attention!

www.shanghailectures.org