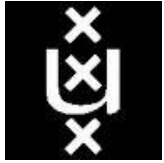# Search, Navigate, and Actuate
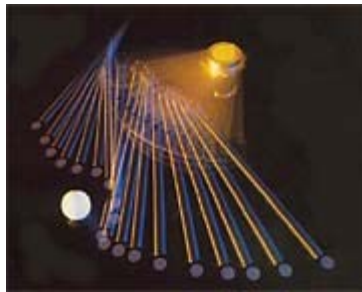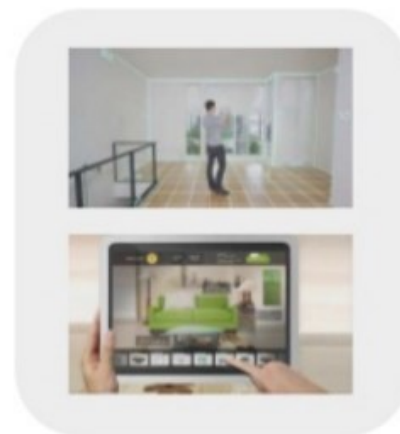
Overview

University of Amsterdam

Leo Dorst

Master & PhD in Applied Physics

Nick de Wolf

Junior Lecturer in Artificial Intelligence
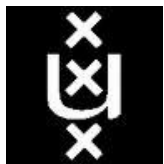e.g. 3D room reconstruction and object detection

Boas Kluiving

Tutor in Bachelor Artificial Intelligence

e.g. Two Static Program Analyses for EDiFy

Thomas Groot

Assistant in Bachelor Artificial Intelligence

e.g. Natural Conversation with the Pepper robot

Arnoud Visser

PhD in Computer Science,
Master in Physics, Minor in BioChemistry

Objectives

- Integrate the knowledge and skills acquired in the 1th year

- Initiate skills to plan, manage, execute and report
  a development project

- Introduce the knowledge needed for robotics

Search, Navigate, and Actuate - Overview

Program

1th Week: Search
   Find the next move for a chess playing robot

2nd Week: Actuate
   Translate the piece movements to arm movements

3rd Week: Plan
   Make your own research proposal

4th Week: Act
   Do something nobody has done before

Robots, Sensor & Simulators

Full lists: see
[Network Institute](#)

Schedule

2 hours: Lecture
     Knowledge needed for the task

3 hours: Practicum with assistance
     (i.e. Thomas, Boas, Pieter, Simon, Tim
     Douwe & Nick).

3 hours: Practicum without assistance
     Work together on the assignment

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Grade

1th Week: Programming skills
   TAs will grade your implementation of the chess endgame

2nd Week: Mathematical skills
   Leo Dorst will grade your homework
   TAs will grade your implementation of the chess playing robot (in simulation)

3rd Week: Development skills
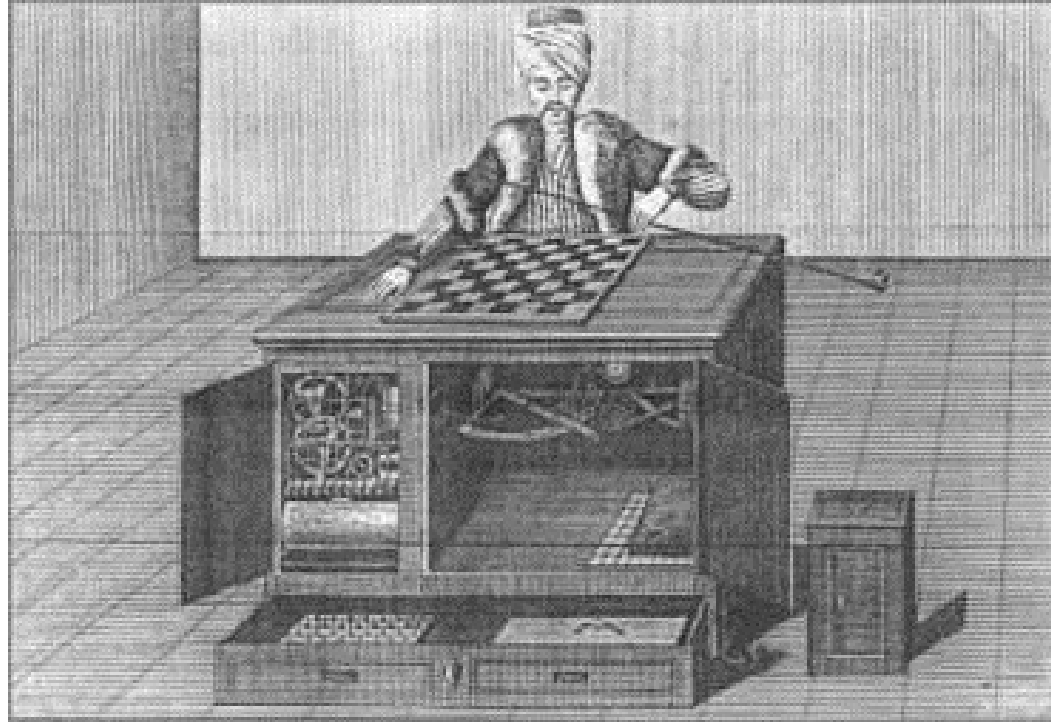   TAs will help with the content of the proposal
   Tutors will give feedback on the proposal

4th Week: Development skills
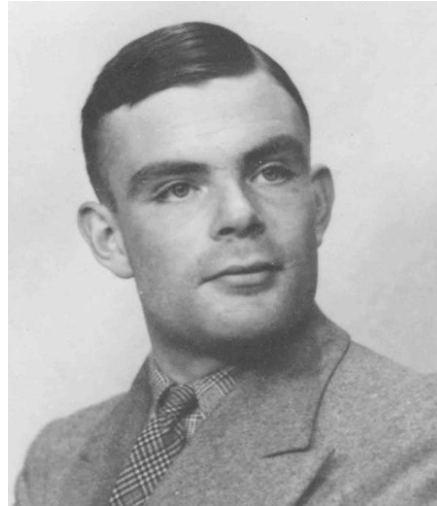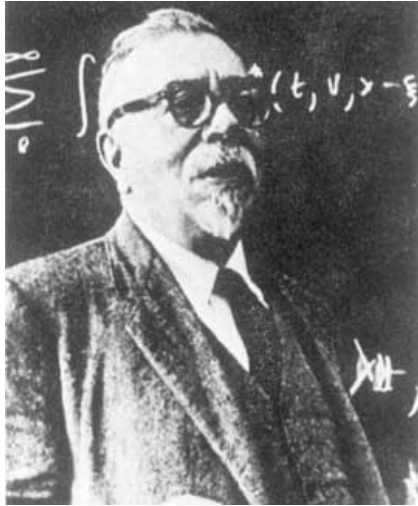   TAs will help with the execution of the proposal
   Arnoud Visser will grade your demonstration

Classical problem in AI

The chess-playing Turk defeated Napoleon in 1769

Search, Navigate, and Actuate - Overview

Many famous researchers contributed

- Norbert Wiener (1948) introduced a design for a chess program including minimax
- Alan Turing (1951) wrote first full chess program
- John McCarthy (1956) conceived alpha-beta search
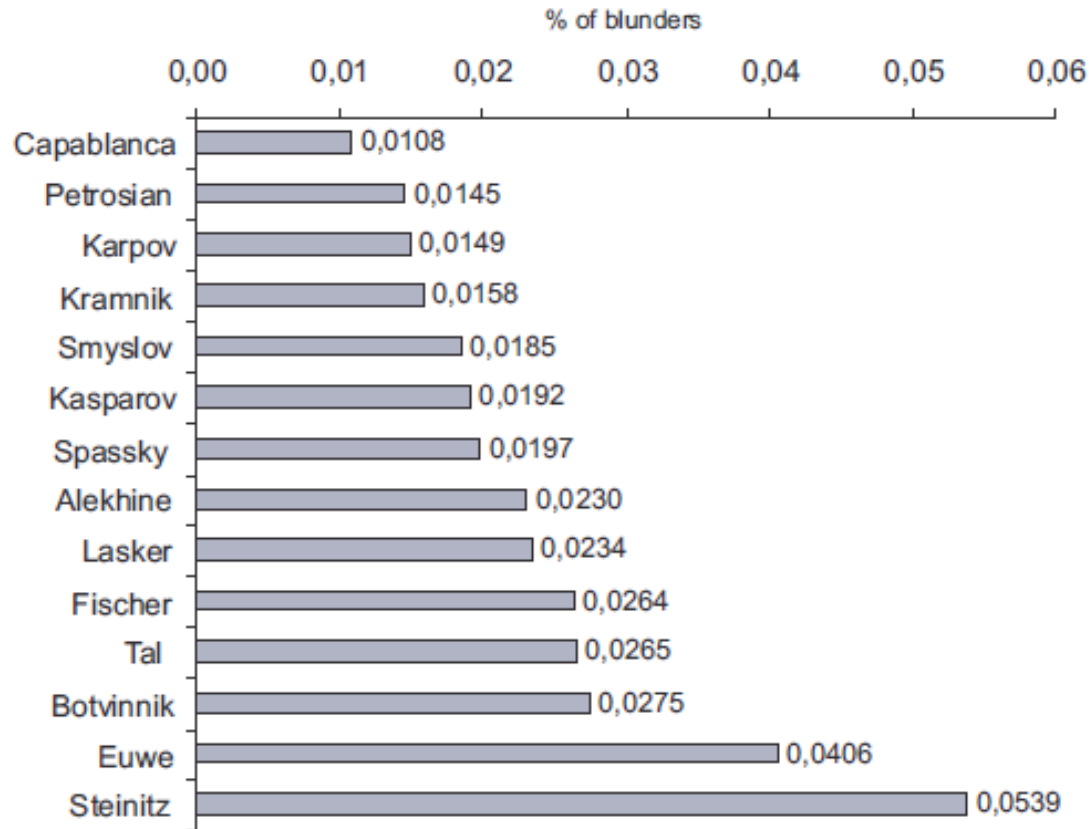
AI has 'solved' the problem

Deep Blue

This 1.4 ton 8-year-old sure plays a mean game of chess

Garry Kasparov

The best player in the world shows no signs of slowing down
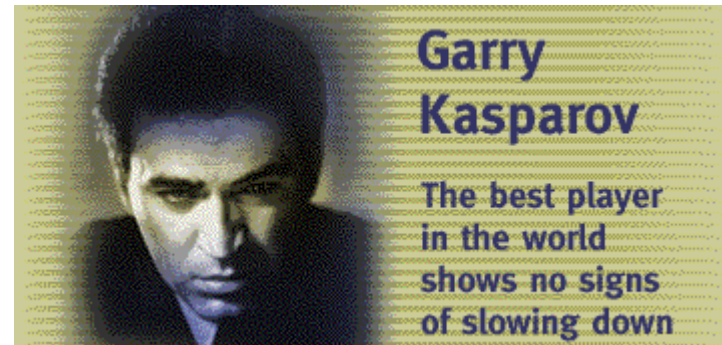
Deep Blue wins with 3½-2½ in 1997

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Computer used to analyze human chess champions

% of blunders

Champion	% of blunders
Capablanca	0,0108
Petrosian	0,0145
Karpov	0,0149
Kramnik	0,0158
Smyslov	0,0185
Kasparov	0,0192
Spassky	0,0197
Alekhine	0,0230
Lasker	0,0234
Fischer	0,0264
Tal	0,0265
Botvinnik	0,0275
Euwe	0,0406
Steinitz	0,0539

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Matej Guid and Ivan Bratko
Computer analysis of world chess champions
ICGA Journal, 29 (2) (2006), pp. 65-73
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Now it is your turn:

Have fun!

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Arnoud Visser