UC Berkeley
EECS Lecturer SOE
Dan Garcia

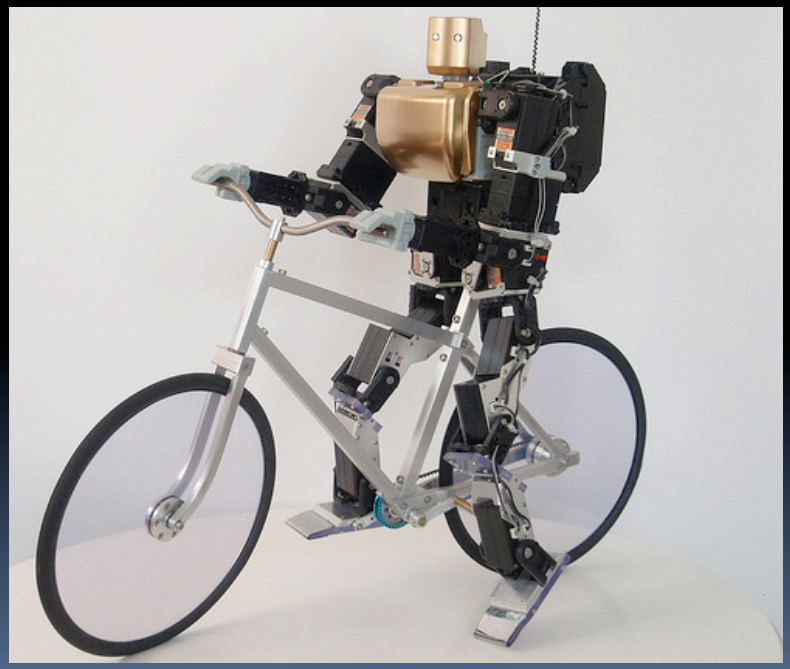
CS10
The Beauty and Joy of Computing

Lecture #15
Artificial Intelligence

2011-10-24

ROBOT RIDES BIKE!

The PRIMER-V2 robot is capable of starting from a stopped position, start riding, follows a path specified by a controller, and can stop without falling!



http://robosavvy.com/forum/viewtopic.php?p=32542

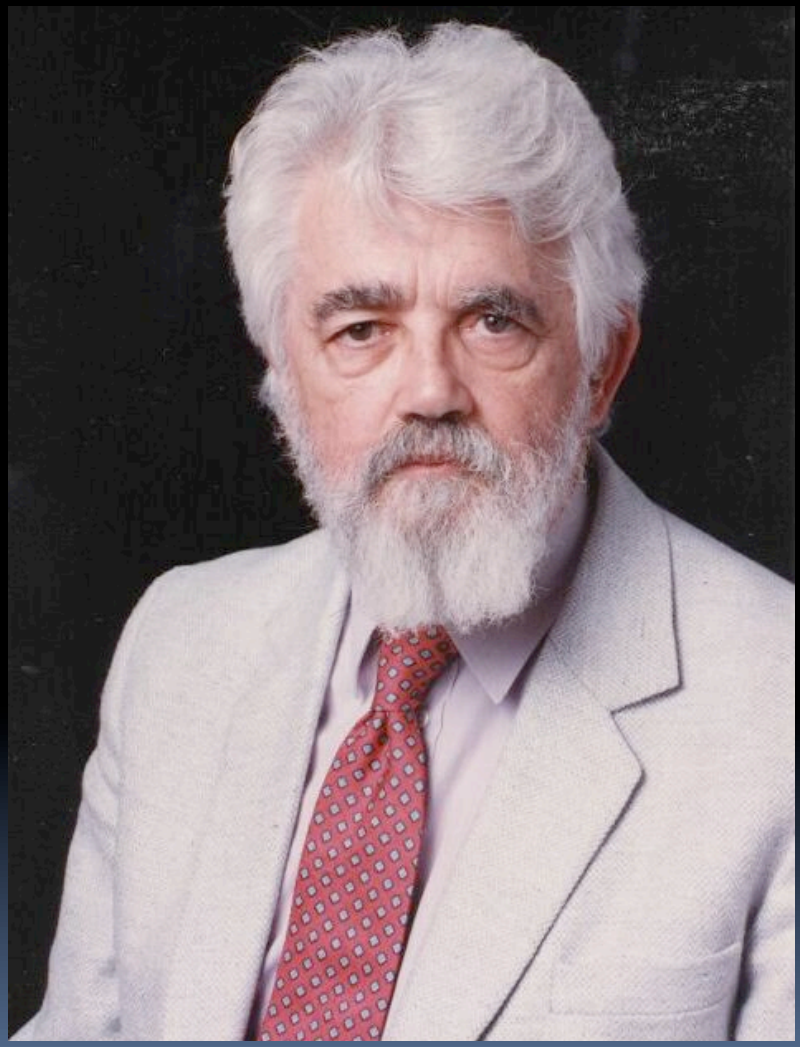
Lecture Overview

- Definition
- What intelligent things do people do?
- Videos of awesome examples of AI
- Turing Test

AI Definition by John McCarthy

- "Getting a computer to do things which, when done by people, are said to involve intelligence"

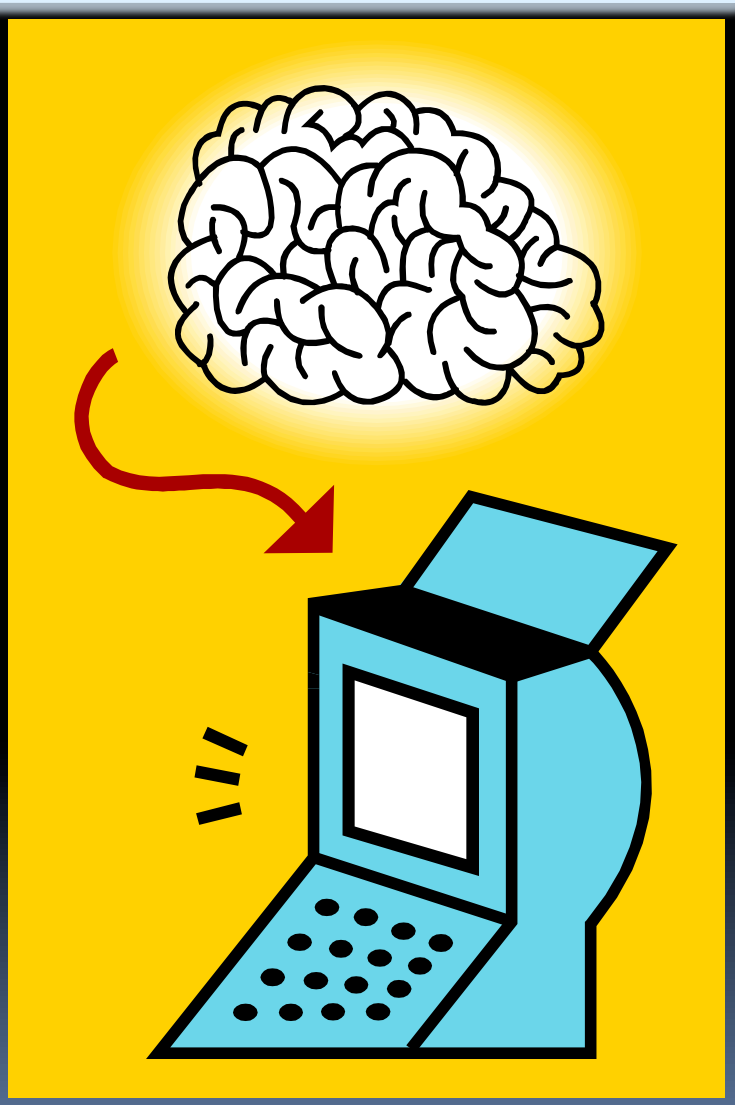
- Finesses the idea of whether a computer has consciousness, whether they have rights, etc



en.wikipedia.org/wiki/Artificial_intelligence

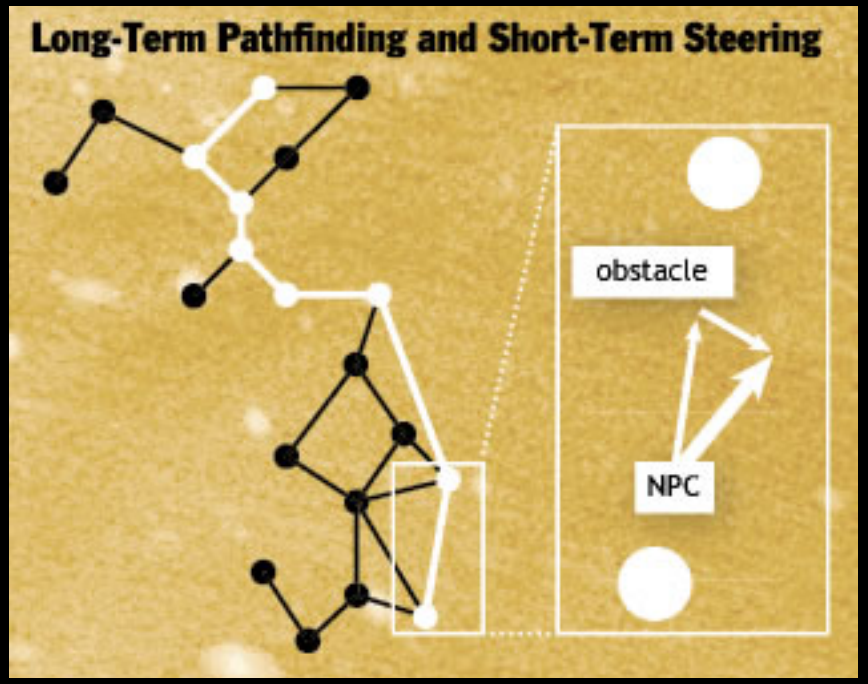
What intelligent things do people do?

- Planning
- (Machine) Learning
- Natural Language Processing
- Motion and manipulation
- Perception
- Creativity
- General Intelligence



Planning (from Video Games lecture)

- **Range of intelligence**
  - Low: simple heuristics
  - Medium: pathfinding
  - High: Learns from player
- **Dynamic difficulty**
  - Must hold interest
  - "Simple to learn, difficult to master is the holy grail of game design."
  - Cheating AI (e.g.,racing)



www.businessweek.com/innovate/content/aug2008/id20080820_123140.htm
en.wikipedia.org/wiki/Dynamic_game_difficulty_balancing
en.wikipedia.org/wiki/Game_artificial_intelligence
queue.acm.org/detail.cfm?id=971593

Peer Instruction

The WORLD'S BEST AI StarCraft player is from:

a) Google
b) IBM (folks who did Watson)
c) Stanford
d) Berkeley
e) MIT

en.wikipedia.org/wiki/Machine_learning

Machine Learning

- "A program learns if, after an experience, it performs better"
- Algorithm Types
  - Supervised learning
    - Give a system input & output training data, and it produces a classifier
  - Unsupervised learning
    - Goal: determine how data is organized, or clustered
  - Reinforcement learning
    - No training data, real-time corrections adjust behavior

Peer Instruction

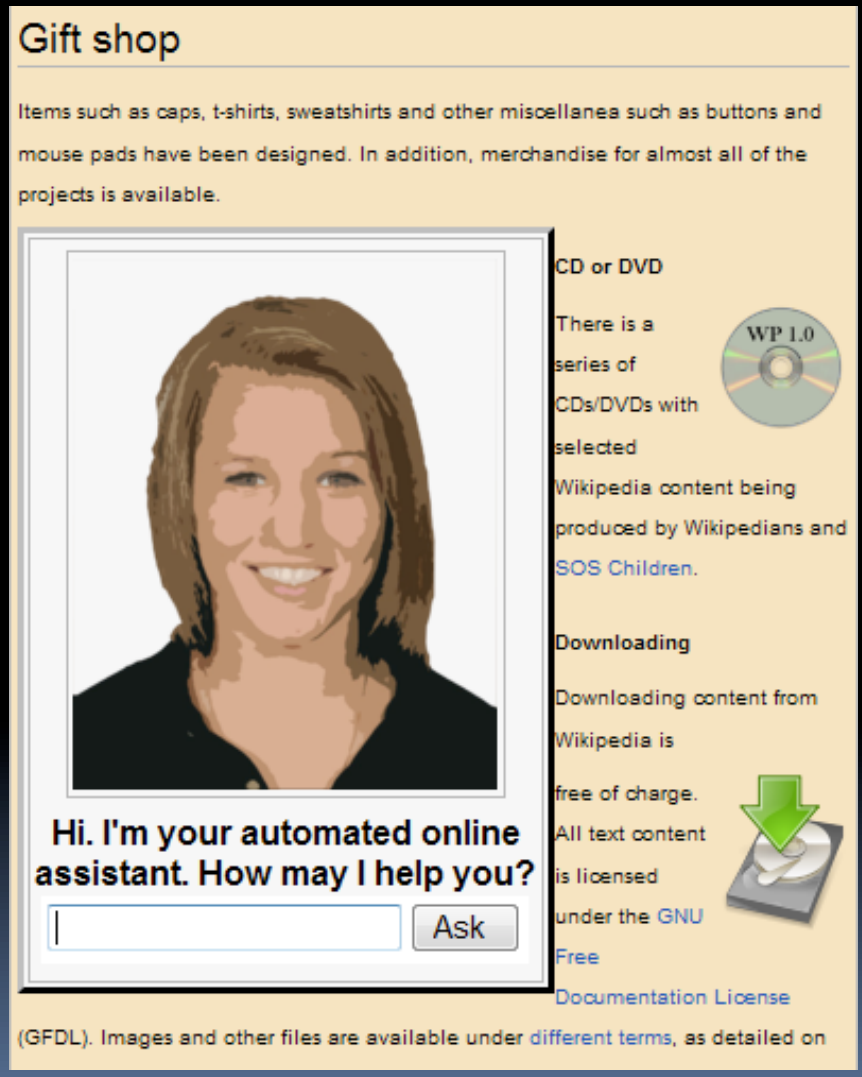
The BEST interaction I've had with phone-based natural language AI systems was:

a) Awesome
b) Good
c) Fair
d) Poor
e) Terrible

en.wikipedia.org/wiki/Natural_language_processing

Natural Language Processing

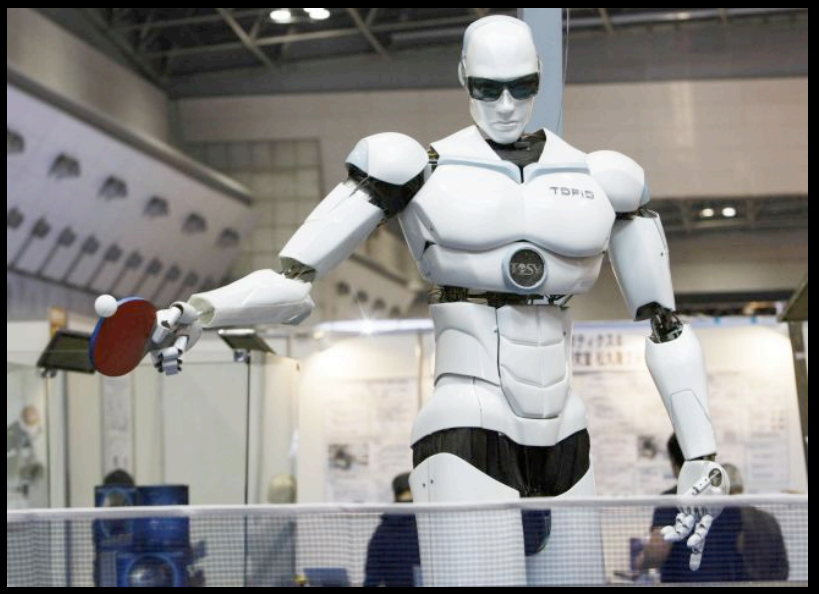
- Form of HCI
- Known as "AI-complete" problem
  - Requires extensive knowledge of world
- Statistical NLP
  - Imagine a supervised learning system trained on all text of Web
  - It could easily correct your text (and guess what you'd say) by seeing what's common



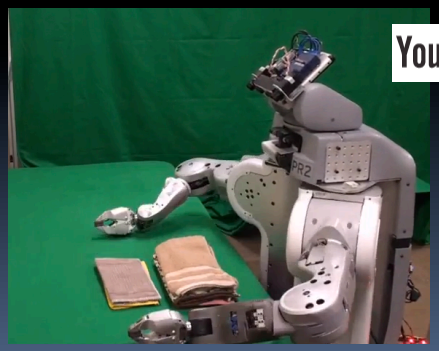
en.wikipedia.org/wiki/Robotics

Robotics

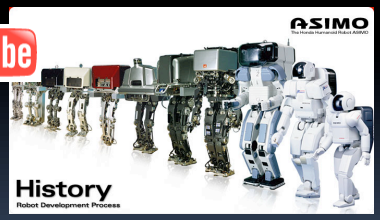
- For many, the coolest and scariest part of AI
- Also involves HCI
- Combines fields of AI
  - Speech recognition
  - Synthetic voice
  - Machine vision
  - Planning
- IPRE believes every one should have their own personal robot!



TOPIO, the ping-pong playing robot



UC Berkeley's towel-folder

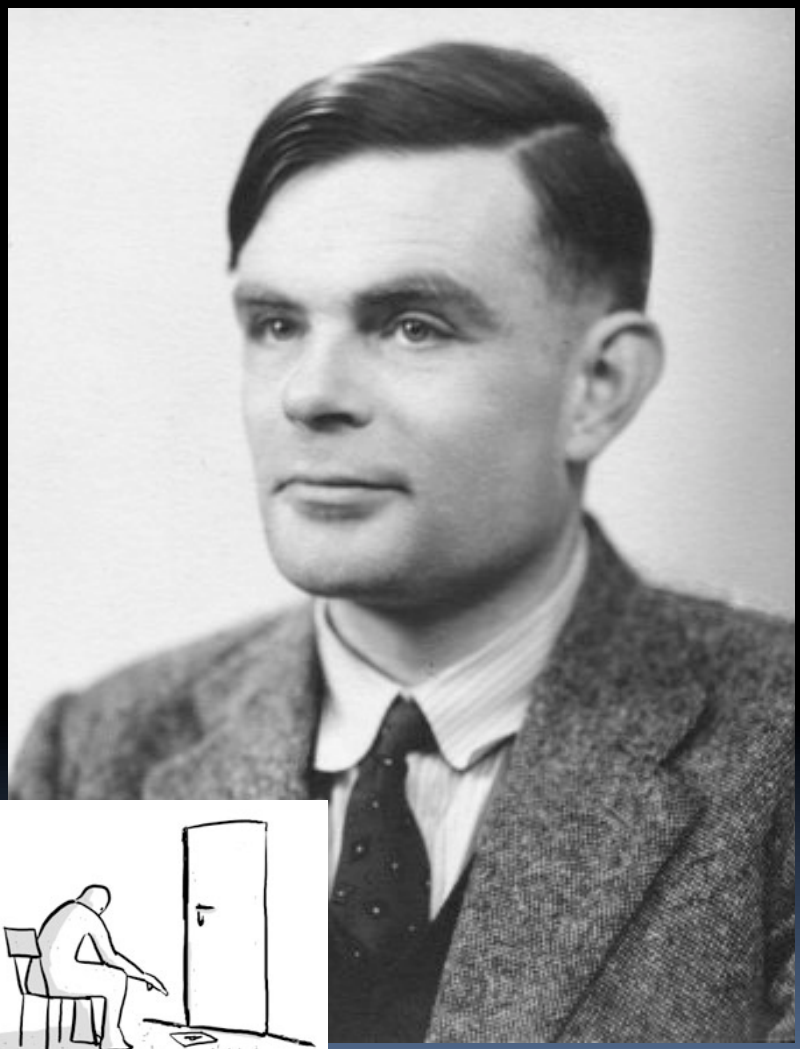


ASIMO Humanoid robot from Honda

en.wikipedia.org/wiki/Turing_test

Turing Test for Intelligence

- In 1950, Turing defined a test of whether a machine could "think"
- "A human judge engages in a natural language conversation with one human and one machine, each of which tries to appear human. If judge can't tell, machine passes the Turing test"
- John Searle argued against the test via the Chinese room experiment, in which someone carries on a conversation by looking up phrases in a book. Does that person understand Chinese?



Summary

- Common Sense knowledge important
- Despite early hype, AI has shown recent success
- AI systems excel in things computers are good at
  - big data (using web to parse language)
  - constrained worlds (chess, math)
- It's getting better at…
  - Speech recognition (albeit slowly)
  - Real-time robotics
- CS188 : Artificial Intelligence
  - One of the most popular courses on campus!