

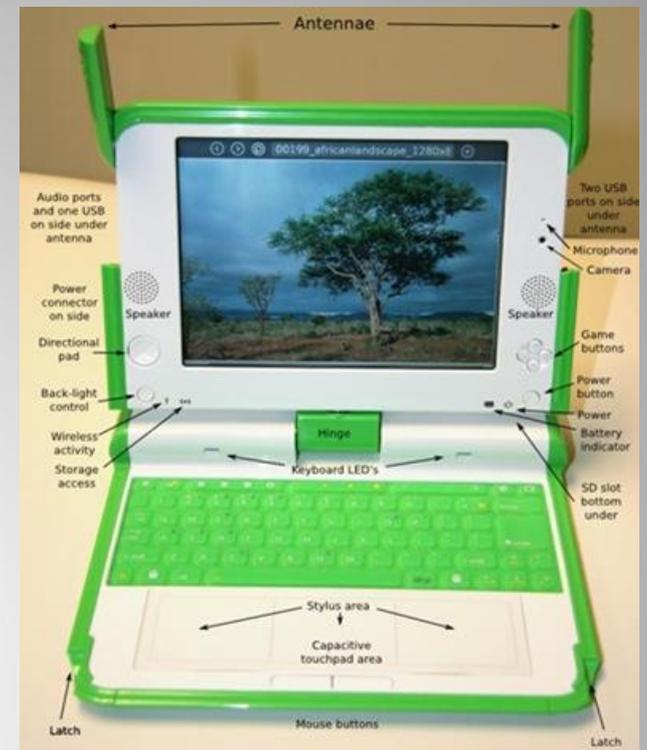
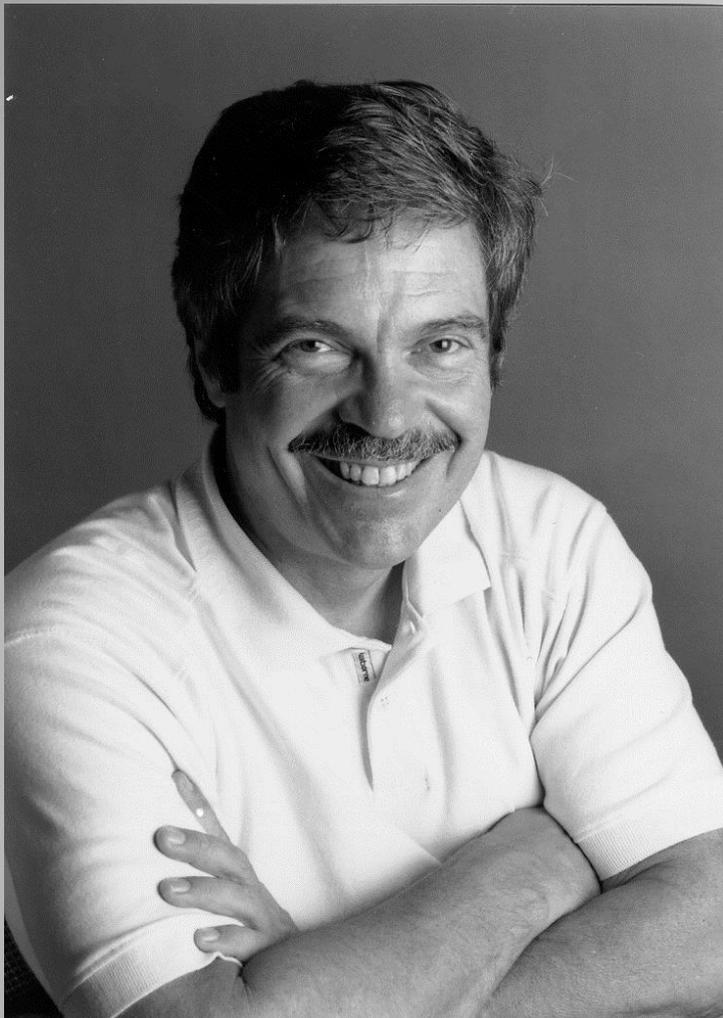
L'Intelligenza artificiale è morta, anzi, è più viva che mai

Luigia Carlucci Aiello

DIPARTIMENTO DI INGEGNERIA INFORMATICA
AUTOMATICA E GESTIONALE ANTONIO RUBERTI



SAPIENZA
UNIVERSITÀ DI ROMA



La maniera migliore per prevedere il futuro è inventarlo

Alan Kay

L'AI è morta?

Edward Hovi:

- L'AAAI ha 2600 membri --> l'AI è morta

Accurata l'osservazione del fenomeno, molto meno la diagnosi delle cause!

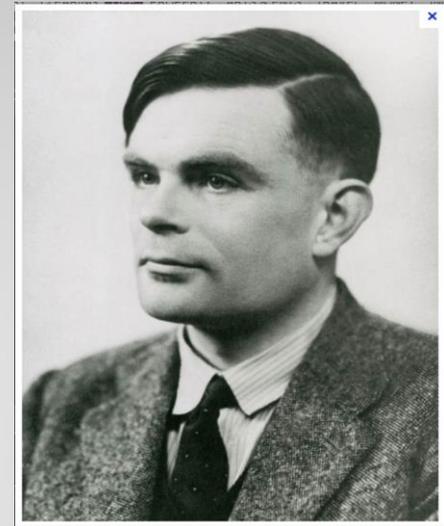
L'AI è più viva che mai!!

- Un po' di storia
- Recenti avanzamenti
- Grandi risultati
- Crescenti preoccupazioni

ARTIFICIAL INTELLIGENCE (1956)



John McCarthy (1927 – 2011)



Alan Turing (1912-1954)

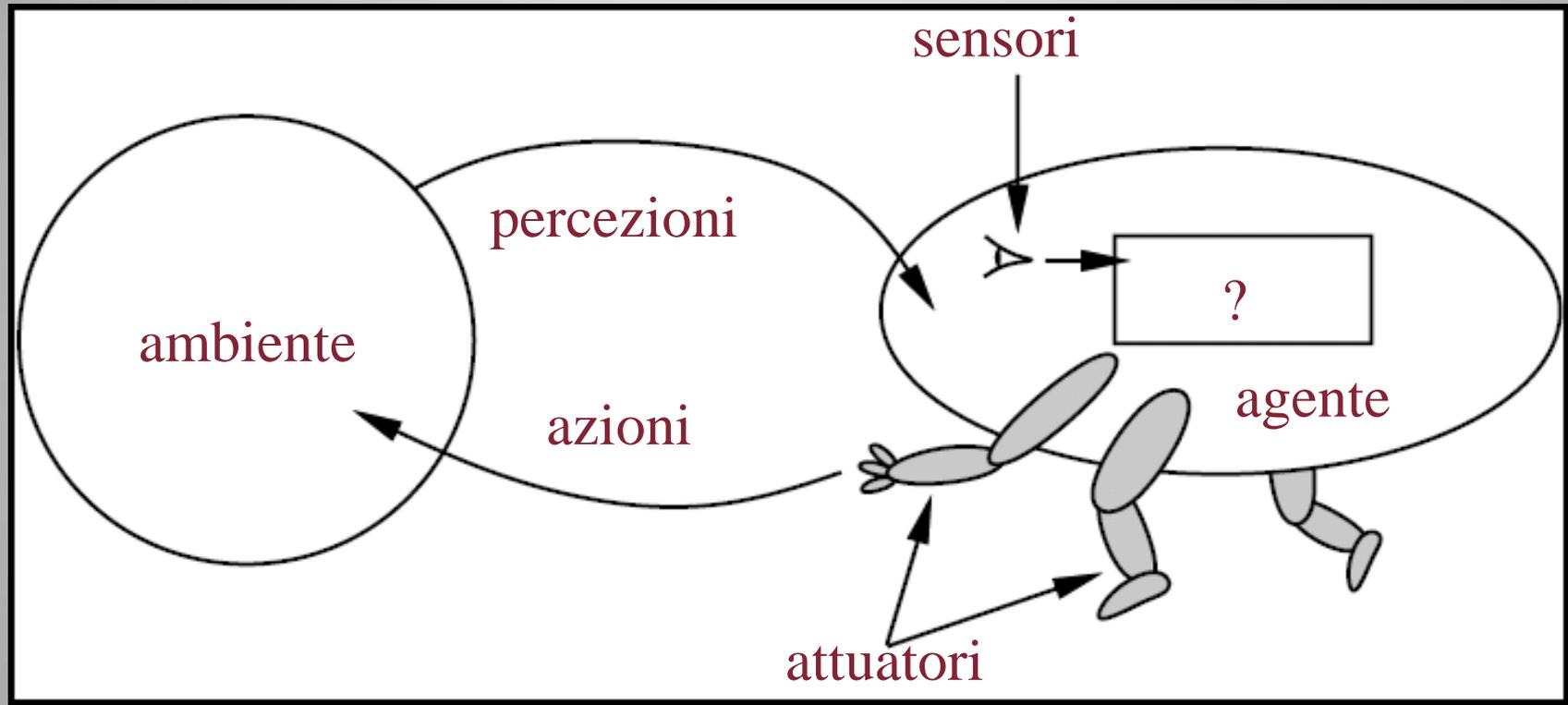
Il sogno dell'AI

- Da Turing (~1935/45) in poi:
 - Costruire un marchingegno intelligente
 - Un manufatto col quale si interagisce come se fosse un essere umano
- Robotica mobile autonoma
- Robotica Cognitiva

~ 60 anni di ricerca in AI

- Grandi dibattiti
 - Sugli obiettivi
 - Sui metodi
 - Sull'opportunità degli investimenti
- Grandi cambiamenti di stagioni
 - Inverni dell'AI
- La svolta di fine millennio: l'agente intelligente

Modello dell'agente intelligente



Quale agente?

basato su riflessi
basato su modello
guidato da obiettivi
che apprende

Per quale ambiente?

strutturato/no
deterministico/no
episodico/continuo
quanti e quali agenti

Sistema conversazionale intelligente
softbot

Sistema dotato di fisicità
robot

Rivoluzioni tecnologiche

- Seconda metà del 19° secolo
rivoluzione industriale
- Seconda metà del 20° secolo
rivoluzione elettronica e informatica

Le chiavi del successo

- Miniaturizzazione
- Distribuzione
- Connessione

Le chiavi del successo

- Miniaturizzazione
- Distribuzione
- Connessione

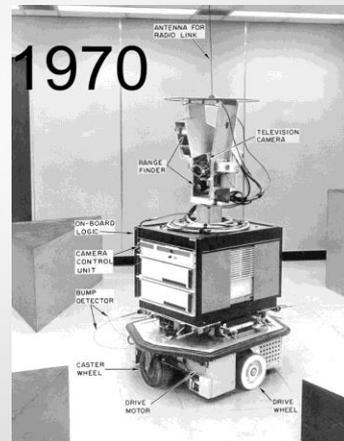
- Automazione
- Autonomia

Intelligenza Artificiale e Robotica

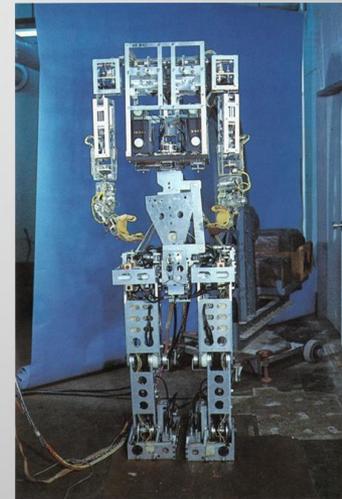
SAIL



SRI



WASEDA



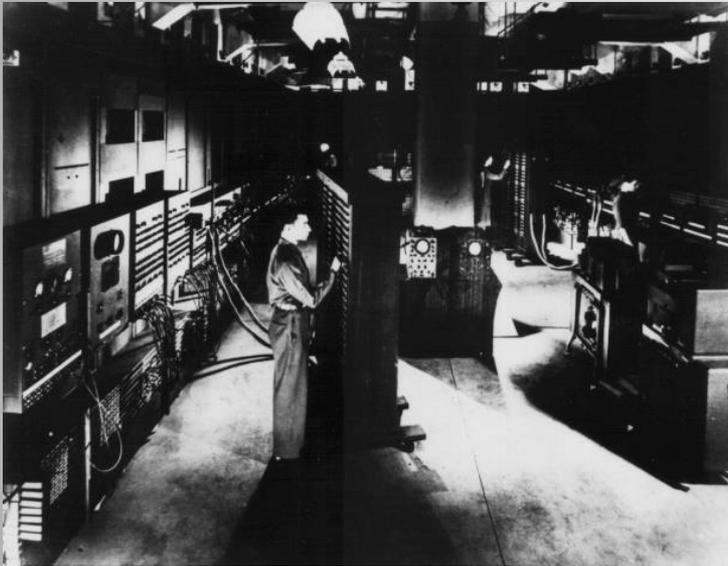
Tappe significative

- 1997 - **Deep Blue** (IBM) batte il campione mondiale di scacchi

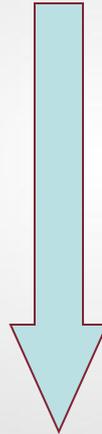
DARPA Grand Challenges:

- 2005 - Un camion senza pilota (Stanford) attraversa in autonomia il deserto del Mojave da Los Angeles a Las Vegas
- 2007 - Una macchina senza pilota (CMU) gira per le strade di una cittadina americana
- 2011 – **Watson Blue** (IBM) batte due campioni di Jeopardy

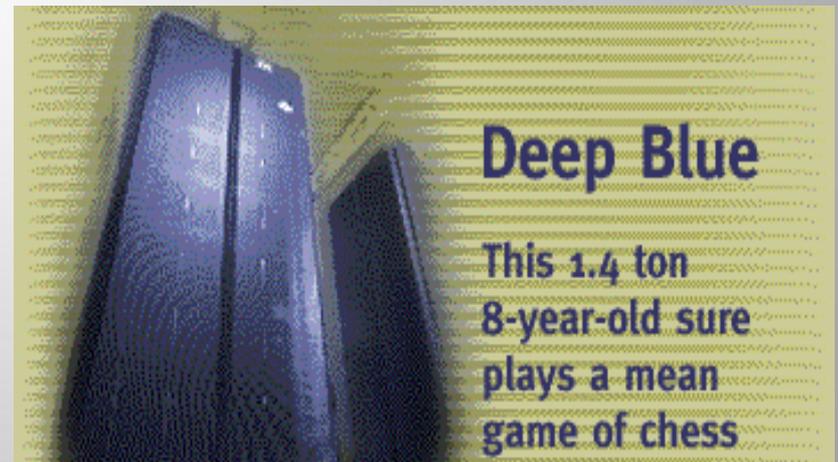
Scacchi



ENIAC
1946



Deep Blue
1997



© IBM

Kasparov vs Deep Blue 1997



DARPA Grand Challenge 2005-2007





Sistemi di domanda/risposta

- 2011 – **Watson** (IBM) batte due campioni di Jeopardy
- Elaborazione del linguaggio naturale
- Reperimento di informazione
- Rappresentazione della conoscenza e Ragionamento automatico
- Apprendimento automatico

applicati al

Question Answering *su domini aperti*

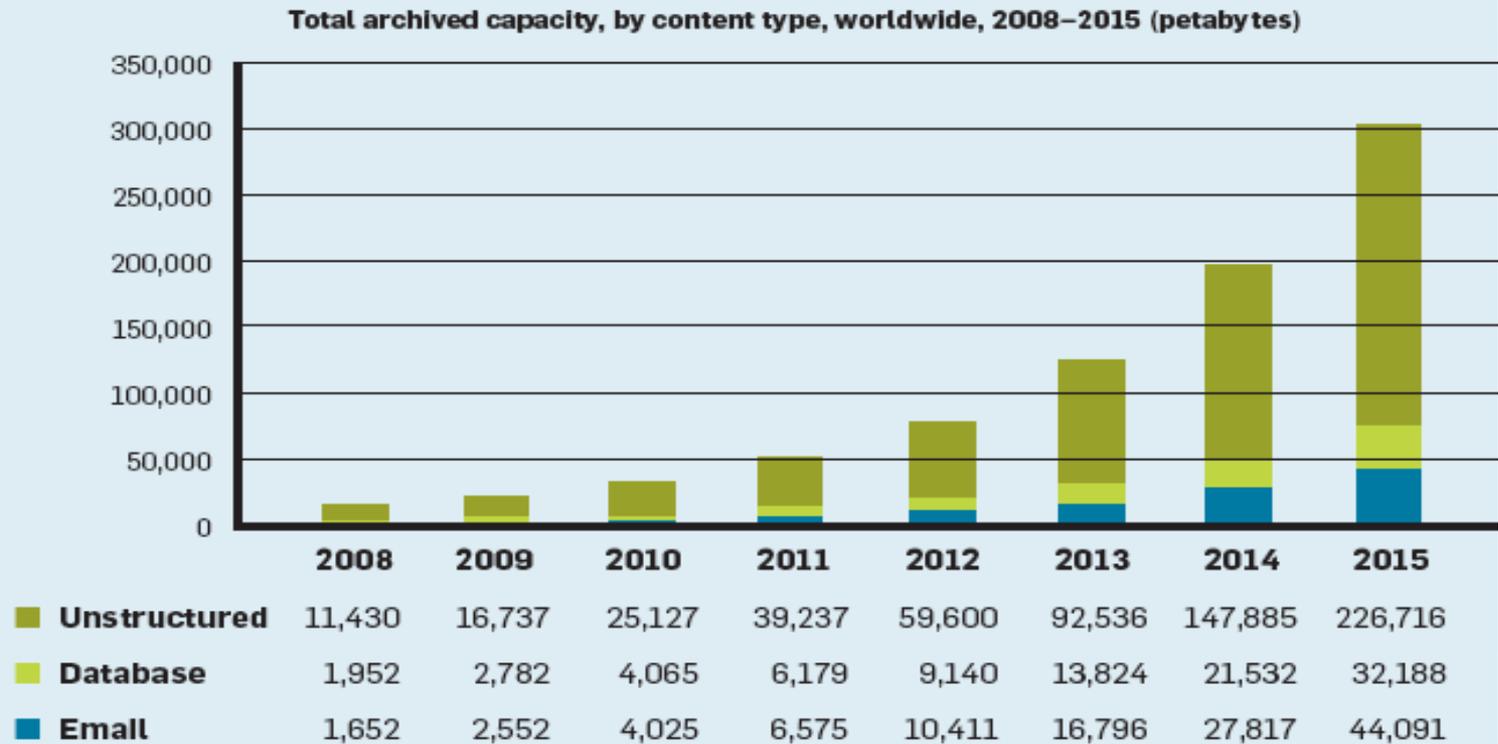
costruito su tecnologia DeepQA IBM in quanto a generazione di ipotesi, raccolta di dati massiva, analisi e valutazione dei dati.

Watson Jeopardy 2011



Dati, dati, dati....

Figure 1. Projected growth of unstructured and structured data.



CACM Dec 2013

1997

Si chiude la sfida degli scacchi

Parte la sfida della RoboCup



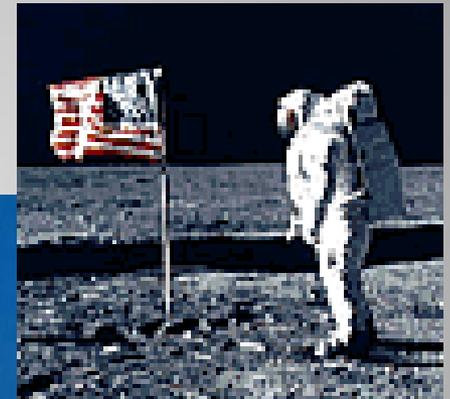
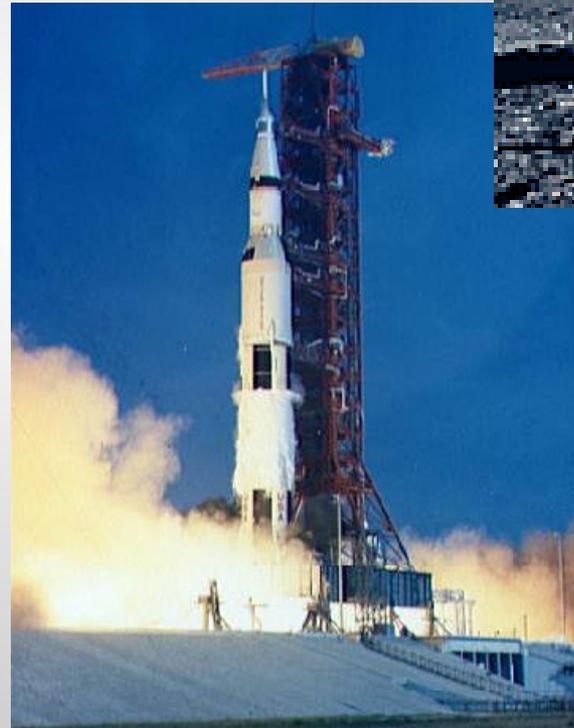
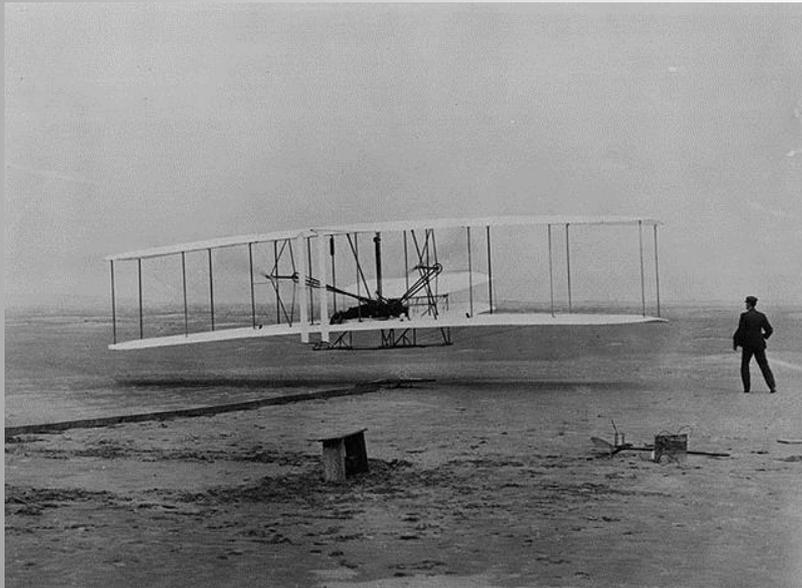
Il sogno: (entro il 2050) costruire una squadra di robot umanoidi completamente autonomi in grado di battere la squadra campione del mondo (FIFA)

Obiettivo raggiungibile?

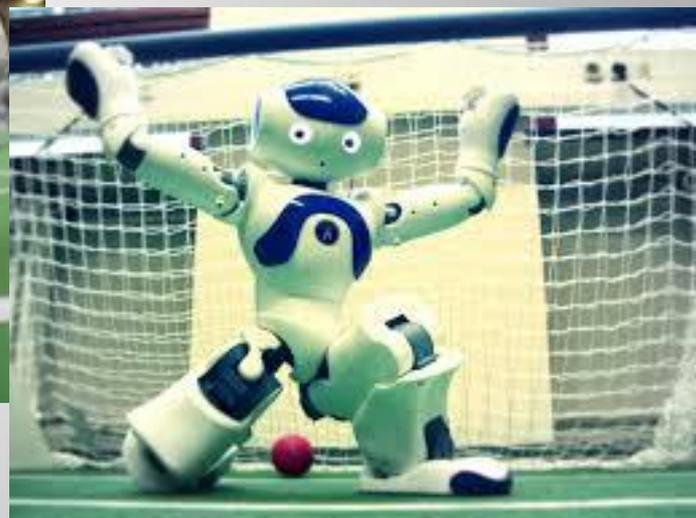
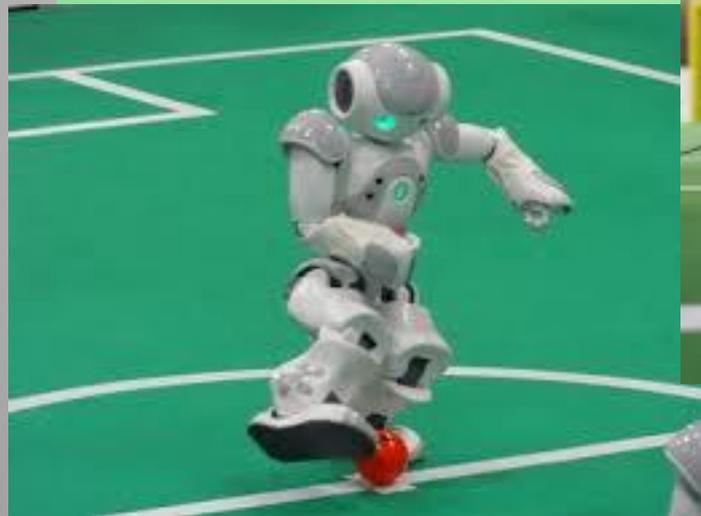
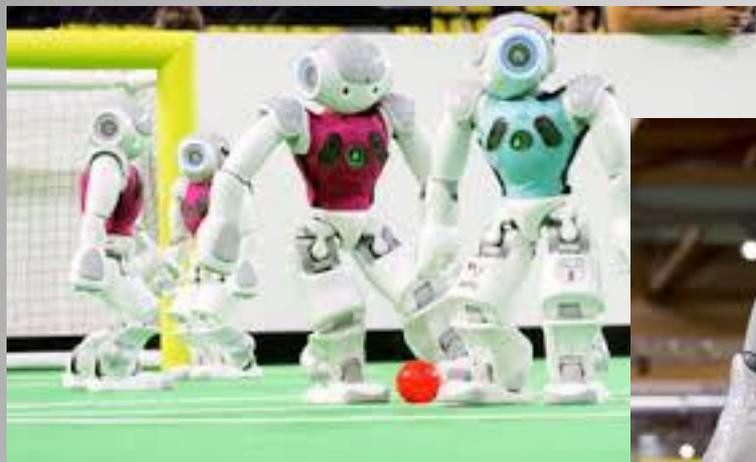
1903



1969



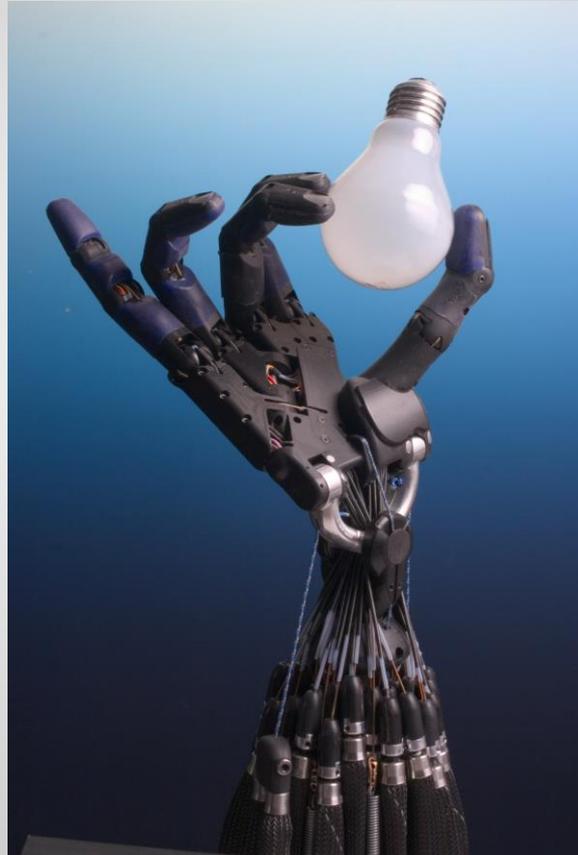
Robocup con robot umanoidi



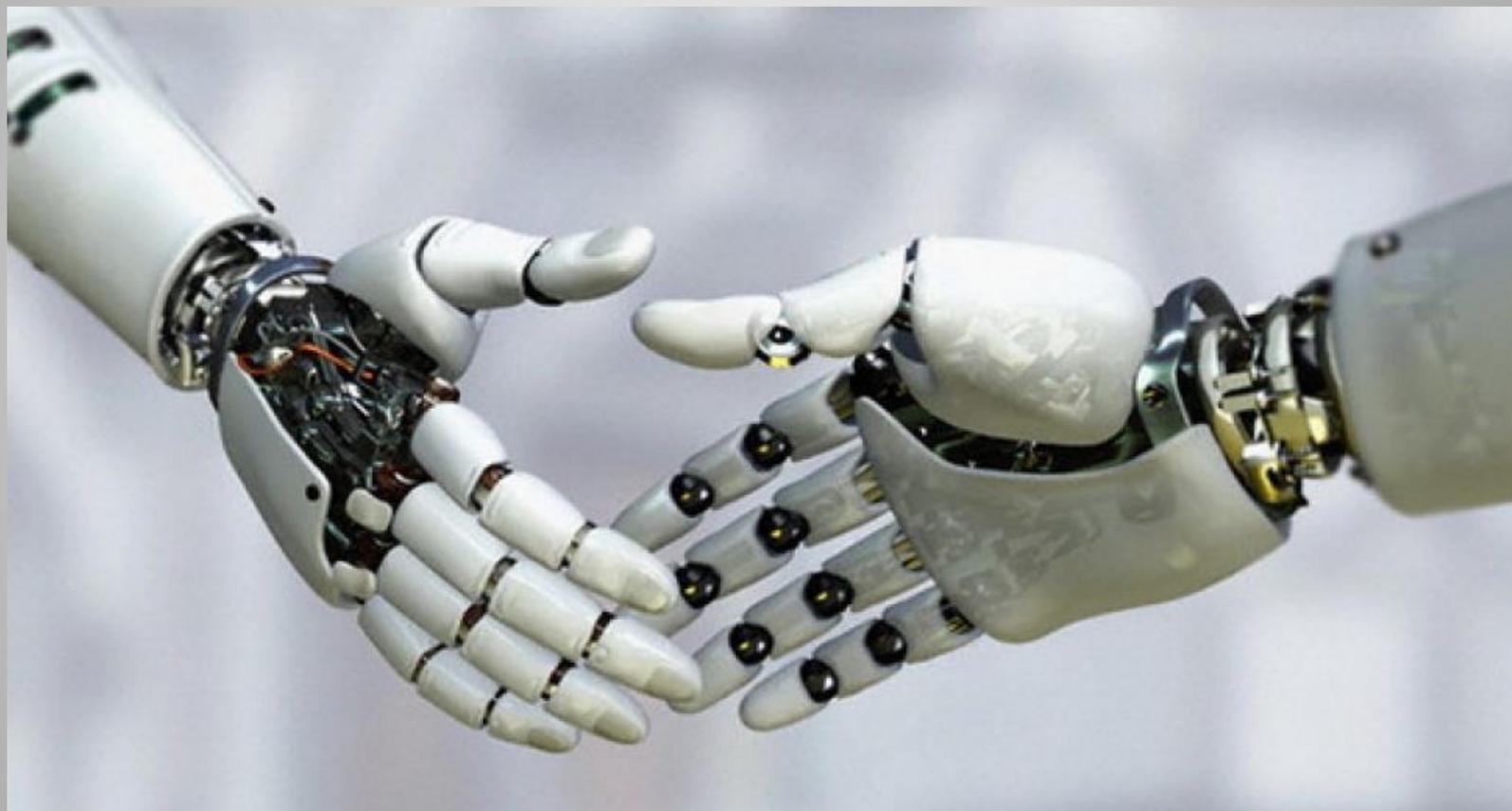
Robot umanoidi



Manipolazione con destrezza



Manipolazione con destrezza



Interfacce cervello robot



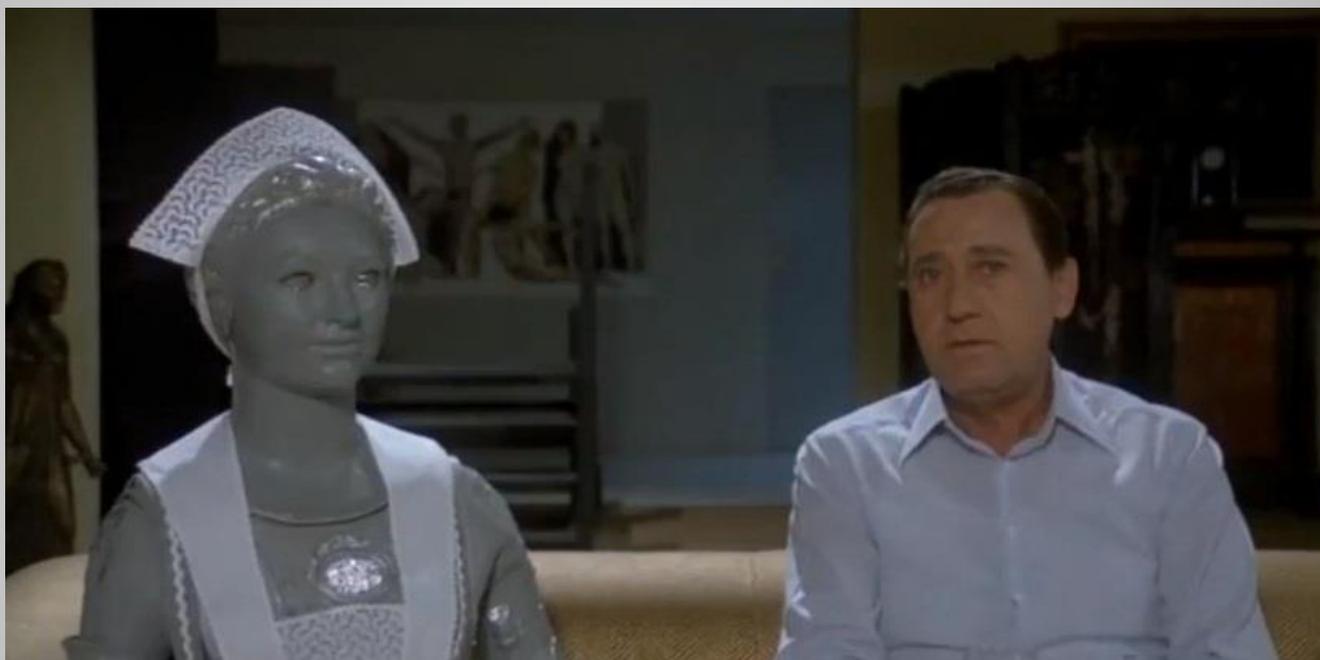
Interfacce cervello computer



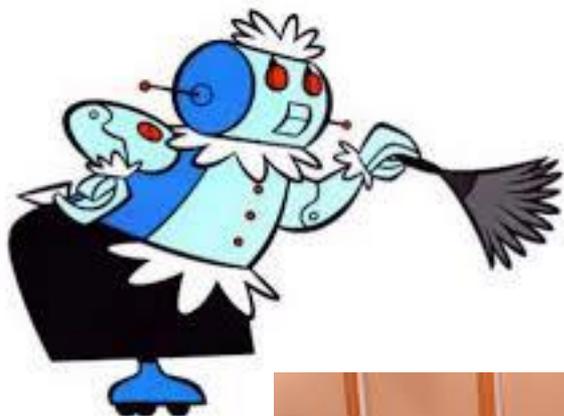
Robot in ambiente medico



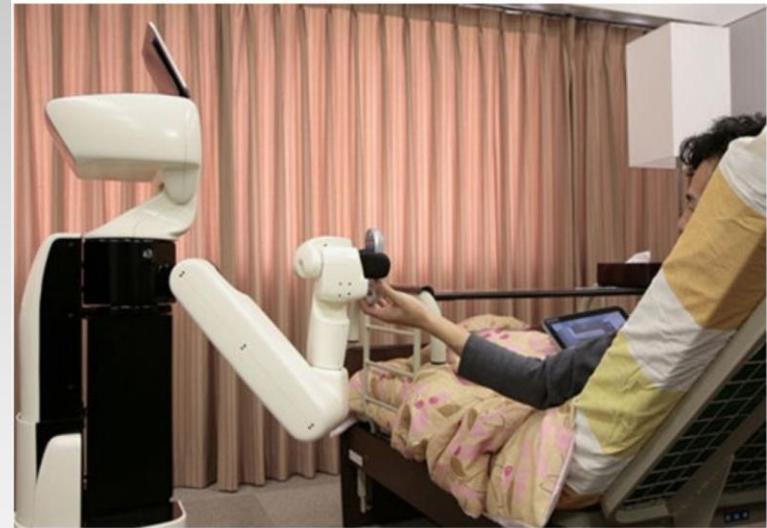
Robot assistenti domestici



Robot assistenti domestici



Teleassistenza Compagnia



Costruire il futuro

- Studi sul cervello: Brain on Chip
- Big Data
- Robot assistente personale

Costruire il futuro

- Studi sul cervello: Brain on Chip
- Big Data
- Robot assistente personale
- Strumenti sw per il lavoro cooperativo
- Strumenti sw per la formazione del consenso

Rapporto del McKinsey Global Institute

Disruptive technologies: Advances that will transform life, business, and the global economy

Maggio 2013

12 “Disruptive Technologies”

1. Mobile Internet
2. Software intelligenti
3. Internet delle cose
4. Cloud
5. Robotica avanzata
6. Veicoli automatici o semi automatici
7. Genomica di nuova generazione
8. Accumulo di energia
9. Stampanti in 3d
10. Materiali avanzati
11. Esplorazioni avanzate per gas e petrolio
12. Energie rinnovabili

“Disruptive Technologies”



Mobile Internet

Increasingly inexpensive and capable mobile computing devices and Internet connectivity



Automation of knowledge work

Intelligent software systems that can perform knowledge work tasks involving unstructured commands and subtle judgments



The Internet of Things

Networks of low-cost sensors and actuators for data collection, monitoring, decision making, and process optimization

“Disruptive Technologies”



Cloud technology

Use of computer hardware and software resources delivered over a network or the Internet, often as a service



Advanced robotics

Increasingly capable robots with enhanced senses, dexterity, and intelligence used to automate tasks or augment humans



Autonomous and near-autonomous vehicles

Vehicles that can navigate and operate with reduced or no human intervention

“Disruptive Technologies”



3D printing

Additive manufacturing techniques to create objects by printing layers of material based on digital models

Ancora dal rapporto McKinsey GI

- L'Information Technology è pervasiva
- La combinazione di tecnologie può moltiplicarne l'impatto
- I consumatori potrebbero “win big,” in particolare nel lungo periodo
- La natura del lavoro cambierà, milioni di persone avranno bisogno di nuovi skill
- Il futuro per gli innovatori è gli imprenditori appare brillante
-

Quali metodologie?

- Statistica statistica statistica
- Apprendimento apprendimento apprendimento
- Big Data Big Data Big Data.....

- Logica? Noooo
- Ragionamento No.....
- Rappresentazione della conoscenza No.....

- GOFAI passa via.....

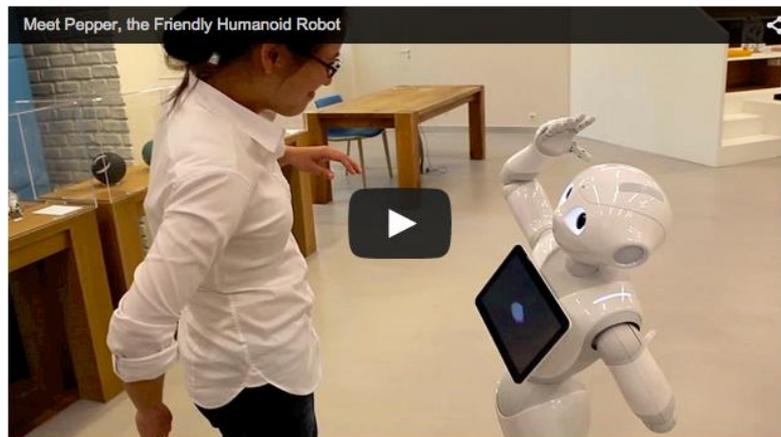
How Aldebaran Robotics Built Its Friendly Humanoid Robot, Pepper

The French company worked in secret for two years to create Pepper. Now Japanese telecom giant SoftBank is ready to sell it to consumers

By Erico Guizzo

Posted 26 Dec 2014 | 20:00 GMT

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Video: Erico Guizzo

Apollo 8000 System for
winning an R&D 100 award
Learn more and watch the video



2014 Robot Gift Guide

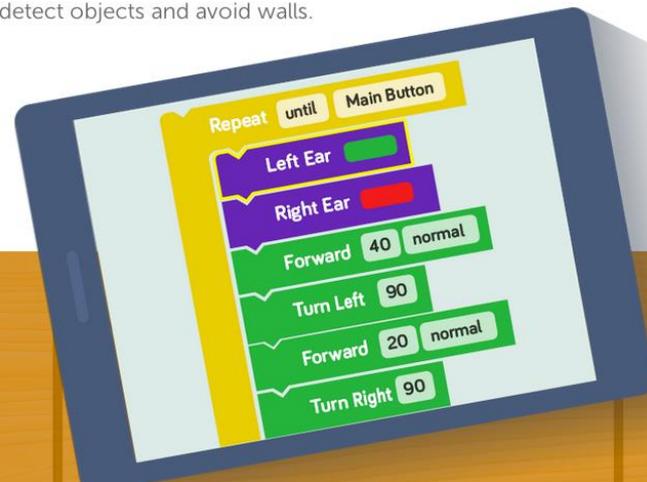
15 robots that we promise will make fantastic holiday gifts. And some of them you might even be able to afford

6 Dec 2014

Dash and Dots



Front and back distance sensors allow Dash to detect objects and avoid walls.



Designed for kids aged 5 to infinity

There's a Dash & Dot app for every age group, learning level, and play style.





TECNOLOGIA

Tokyo, in arrivo Robi: il robot da compagnia

Prodotto dalla De Agostini risponde a 250 comandi, è dotato di riconoscimento vocale, balla e si relaziona con le persone | *CorriereTv*



Suitable Technologies Opens Store Staffed Only by Robots

By Tekla Perry
Posted 10 Dec 2014 | 18:00 GMT

Share | Email | Print



Photo: Tekla Perry

The salespeople are robots in this downtown Palo Alto store.

Most of us have gone into a store or restaurant in which the nametags worn by employees identified their hometowns. It's a friendly touch.

But this week, for the first time, I went into a store in which the members of the sales staff weren't only identified by their hometowns, they were actually working from their hometowns, via telepresence robots. Their names and locations appeared on their screens, and on the day I visited there were employees based in at least three different states.



MAGAZINE | EUREKA

Death by Robot

By ROBIN MARANTZ HENIG JAN. 9, 2015



Illustration by Oliver Munday

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Imagine it's a Sunday in the not-too-distant future. An elderly woman named Sylvia is confined to bed and in pain after breaking two ribs in a fall. She is being tended by a

Home > Enterprise Applications > Data Analytics

NEWS

Computers may soon know you better than your spouse



Credit: Thinkstock



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Robots Learn by Watching Videos

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Contacts: [Matthew Wright](#) 301-405-9267

[Tom Ventsias](#) 301-405-5933

Autonomous robots can learn and perform complex actions via observation

Imagine having a personal robot prepare your breakfast every morning. Now, imagine that this robot didn't need any help figuring out how to make the perfect omelet, because it learned all the necessary steps by watching videos on YouTube. It might sound like science fiction, but a team at the University of Maryland has just made a significant breakthrough that will bring this scenario one step closer to reality.

Researchers at the [University of Maryland Institute for Advanced Computer Studies \(UMIACS\)](#) partnered with a scientist at the [National Information Communications Technology Research Centre of Excellence in Australia \(NICTA\)](#) to develop robotic systems that are able to teach themselves. Specifically, these robots are able to learn the intricate grasping and manipulation movements



required for cooking by watching online cooking videos. The key breakthrough is that the robots can "think" for themselves, determining the best combination of observed motions that will allow them to efficiently accomplish a given task.



Untitled - Edited

January 12, 2015 12:14 am

Scientists and investors warn on AI

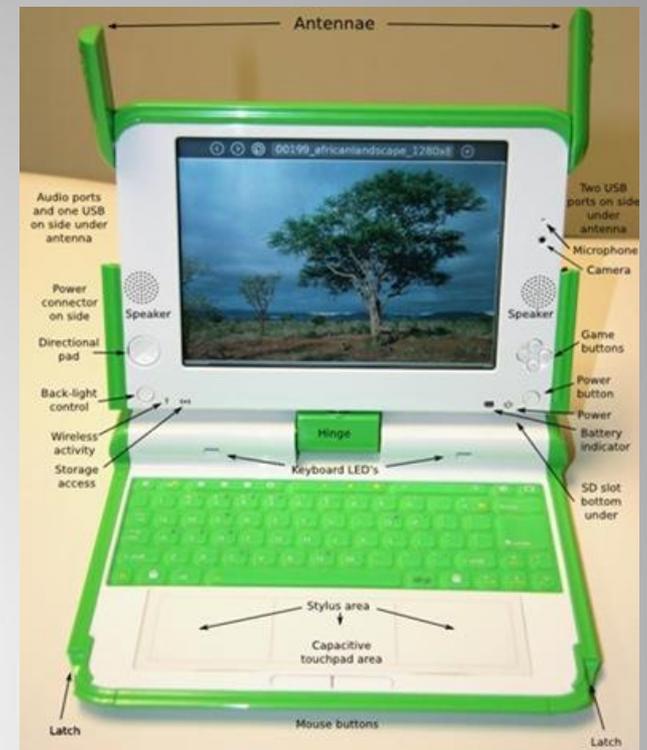
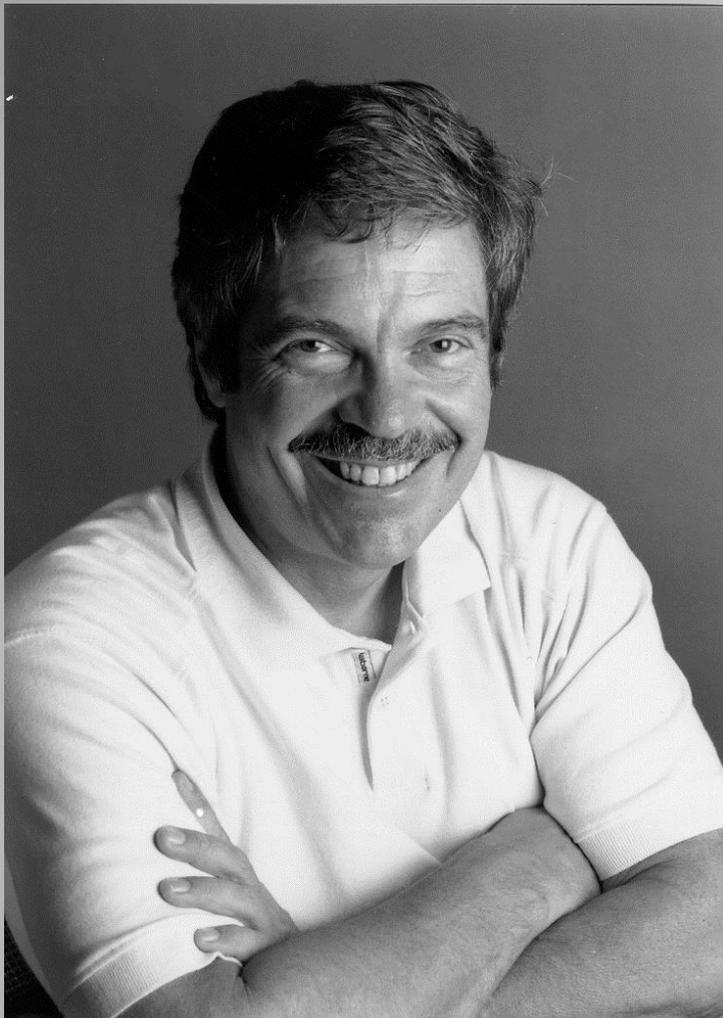
Tim Bradshaw in San Francisco [Author alerts](#)



Dozens of scientists, entrepreneurs and investors involved in the field of artificial intelligence, including Stephen Hawking and Elon Musk, have signed an open letter warning that AI is needed on its safety and social benefits.

Le grandi preoccupazioni

- Perderemo tutti il lavoro?
- Saremo dominati dai robot?
- Il genere umano sarà distrutto?



La maniera migliore per prevedere il futuro è inventarlo

Alan Kay

