Redefining Social Interaction

Das Netz bietet uns die Möglichkeit, neue Formen des Wissenserwerbs und Verarbeitung zu praktizieren. Anstelle der klassischen dialogischen Kommunikation treten neue synchrone und asynchrone Formen der Kommunikation, die es ermöglichen, kollaborativ Aufgaben und Projekte zu bewältigen. Synchrone Arbeitsweisen erweitern durch paralleles Prozessieren von Informationen die soziale Interaktion der Teilnehmer. Synergien von Talenten können komplexe Aufgaben bewältigen, und spornen zu mehr Vielfalt in den Arbeits- und Erkenntnismethoden an. Es gilt dabei näher zu untersuchen, was die kulturellen und sozialen Auswirkungen dieser intensiv erlebten Gleichzeitigkeit sind. Die asynchrone Kommunikation hat spezielle soziale Codes in den Umgangsformen entwickelt. Die Asynchronität entspricht der Mehrzeitigkeit der Welt - Gruppen arbeiten rund um die Welt, rund um die Uhr. Durch ein grundsätzliches Verständnis neuer Werkzeuge und Methoden digitaler Kommunikation wird es uns möglich, neue Wege des Umgangs mit Information und der Verarbeitung zu Wissen zu erschließen.

I. E-Learning

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2. Technologis for E-Learning Business
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4. Synchronus Media
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II. Locative Media

1. Location

2. Games

III. Artificial Intelligence

1. Neuronal Networks
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IV. Robotics

1. History of Robotics
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3. Robots in Art
4. Robots Today
5. Robots in the Future

V. Future Technologies

I. E-Learning

e-learning is a general term for computer aided learning, teaching and communication. It is an aproach to facilitate and enhance learning and teaching by means of personal computers, CDROMs, and the Internet. This may include email, discussion forums, and collaborative software.

Business

Todays major investments in e-learning is done by the business branch.

Education

The classical aproach to learning commes in the education branch. But e-learning creates a new look how this didactical issue can be aproached in times of the information revolution.

Military

Todays military lack the experience of war combat. Meodern armies manage to overcome the lack of combat experience buy using computer simulations to teach the soldiers how to handle stress situations and control expensive military gear.

Industry

The global competitvnes in a ever faster moving afords sophisticated and flexible means of knowledge acquisition and knowledge passing.

1. e-learning in business

Today education in business is a major factor in the career. The reasons are multiple:

- **increasing globalisation and mobility**
  - globalisation of the market
  - geographical distribution of the staff
  - customers in a global market
  - lerning technologies that are centraly developed and quickly distributed to a wide public
  - outside speakers
  - corporate intranets
- **increasing speed and need for flexebility**
  - spacial and time independence
  - employees often on the way
  - at home as tele-worker
  - while on education-leave not quite unberable
  - education concepts that are time and place independent
- **information production and the knowledge to understand it expands**
  - half-time period of knowledge is more and more shorter
  - permanent need to impart and to update knowledge
  - schooling period still needs lots of time
  - new technologies bring advantages concerning the distribution and updating of knowledge
- **cost savings and effiecency**
  - when education concepts are adapted to new media, at first the costs are relatively high. The cost for "how to use" represent sometimes 40% of the costs.
  - on the other hand with minimal additional costs one can reach more students.
  - one can always improve the quality of the output.
- **enhancement of learn quality**

    - different kind of learning types
    - consideration of different learn paces
- **gaining importance of knowledge as a strategical resource**
    - competitive factor
- **significance of employee qualification**
    - lifelong learning

2. Technologis for E-Learning Business

Advances in technology have allowed for growth of web-based collaborative learning opportunities.

3. Asynchronus Media

3.1 Electronic Mail

Advantages

- Fast
- Cheap
- Archive, Forward, Comment On
- Receiver always reachable even when the computer is off.
- Other document formats can be attached to the mail.
- Mailing Lists that can be moderated.

Disadvantages

- Spam

3.2 Asynchronuous Discussion Forums

- Computer Conferencing
- Threaded Discussions
- News Groups
- Usenet
- Bulletin Board Systems

Advantages

- Threaded Discussions
- Usenet organised by themes
- Moderated
- Registered Users

Disadvantages

- Flames
- Noise

3.3 Online Databases, News Services, Interest Profile

World Wide Web

- Hypertext
- Multimedia Documents
- Client-Server

- Integration of other Internet Appliancies in the Browser
- Ease of use

3.4 Wiki
3.5 Blog

4. Synchronus Media

4.1. Online Chat
Meeting through Chat Client Software on a Chat Server. The users that share a common topic on a online forum (message board, discussion board, discussion forum) meet in a chat room.

- Different Types

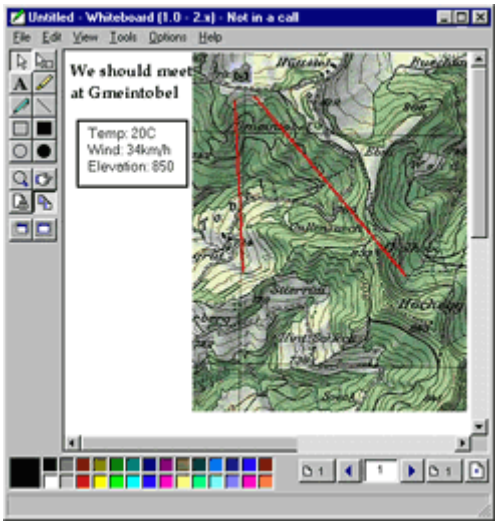
    - IRC - Internet Relay Chat where the chat rooms are called chanels.
    - Jabber

4.2 Instant Messaging
Allows intstant text communication between two or more users through a network. Most of the services allow presence awearness feature, indicating whether people on one's list of contacts are currently on the net and available to chat.

4.3. Video Conference

- Real Time Image
- Real Time Sound
- Small pictures and slow transmission speed
- Cheap

4.4. Whiteboard
Virtual Whiteboards is a software that allows several people to view and edit on a simulated canvas. Whiteboards are a common feature of many collaborative applications. They usually include basic tools for drawing and editing text. They also allow a participant to import pictures and above all save the contents of the whiteboard localy.



- Simultaneous editing of data
- Simple draw and text tools
- Support standard data formats

4.5. Application Sharing
4.6. elctronical meeting-support systems

II. Locative Media

The term 'locative media' was coined by Karlis Kalnins as a "test-category" for processes and products coming from the Locative Media Lab, an international network of people working with some of the ubiquitous and pervasive technologies.
"i have always understood the term 'locative' as pointing in both directions, the potential for enriching the experience of shared physical spaces, but also fostering the the possibility to 'locate', i.e. track down anyone wearing such a device." - andreas broeckmann

1. Location

There are many ways to establish your location.

- maps
- asking people

- analyzing the context

London  Zürich

- GPS
  Global Positioning System

- WiFi
  mapping the particular charactersitics of local Wi-Fi or other radio signals to establish location

- Mobile
  asking the nearest cell tower where you are.

- location sensing
  RFID as an example

2. Games

Pervasive gaming was first produced by a Swedish company It's Alive! With pevasive gaming they meant location-based games that surround you, 24 hours a day, everywhere. Pervasive games are built upon three core technologies: mobile devices, wireless communication, and sensing technologies that capture players contexts. It is actually the blend of technologies combined with the positioning and often public nature of game play, that gives pervasive games their distinctive identity [1].
Pervasive game pioneer Steve Benford, categories the various forms of pervasive games:

- Mapping classic computer games onto real-world setting
  (e.g. Human Pacman)

- Focus on social interaction
  (e.g. CatchBob!)

- Touring artistic games
  (e.g. Uncle Roy All Around You, Can You See Me Now?, ...)

- Educational games
  (e.g. Savannah)

Article

[1] Steve Benford, Carsten Magerkurth, Peter Ljungstrand "Bridging the Physical and Digital in Pevasive Gaming", Communications of the ACM, Volume 48, Number 3, pp. 54-57, March 2005.
cacm-games.pdf

Related Links:

Locative Media Lab - explorations of concepts around location-based media.
Locative Media
GPSter
Plazes - show your location when you're on the net

Technology

Place Lab - a project around 802.11-based location estimations
Nokia Mobile Games - Nokias introduction to mobile game development.

Glossary

- embodied space

  - the social reaction to space.

- inscribed space

  - effect the environment has on culture and space.

- ubiquitous and pervasive computing

  - comprise any number of mobile, wearable, distributed, networked and context-aware devices, applications and services.

III. Artificial Intelligence

There are different kinds of approach to programming "intelligence" on the computer. Depending on what kind of problem we confront, there are different ways to aproach intelligable programming.

1. Neuronal Networks

The most straightforward aproach is to copy the functionality of the brain and to expect intelligence to come out of such artificialy defined brain. Of course the state of knowledge around the brain is making its first big steps into understanding the processes that define our thinking. Yet if one looks at the basic elements that make up the brain, the neural cells and their interconnections, one can make beginning assumtions how processes should look like. This aproach is done with neural networks. The applications that use this technology are not (yet) capable of thinking, but are used in pattern recognition problems. The neural networks are not programmed in classical sence but are more tought to recognise sertain characteristics. This allows them to make desissions even for objects that haven't been introduced beforehand to the systems.

Artificial neural networks represent a new class of computing archtectures that can be considered as grossly simplified models of the human brain. They consist of as set of very simple processing units that are massively interconnected, and knowledge ist stored as a pattern of connections or connection strengths. Rather that sitting passively in a memory, knowldege thus directly determines how the processing elements interact. The delocalized storage of knowldge further leads to avery high fault-tolerance. Learning consists in an adjustment of the connection strengths, i.e., neural networks can learn from experinece and need no explicit programming. The dynamics of such networks, in the operation as well as in the learning mode, is governed by simple update rules which are local and uniform, and thus can be executed in parallel.

Types of application

- Pattern Recognition
- Classification, Categorization
- Speech Recognition and Synthesis
- Signal Procesing, Prediction
- Expert Systems
- Problems
- Optimization

Examples:

The EvBots: When Evolution trains Robot Teams - a look at use of NN in the robot technology

Conclusion:

The neural network is idealy suited for patern matching tasks, such as recognition of faces or other objects, language recognition or other problems where wast number of parameters have to be mapped to certain values. An important aspect of neural networks is the notion of learning, where a system has to be trained to a set of possible answers.

Related Links:

Neural Java - a tutorial with java applets as examples.
Neural Networks - an introduction to Neural Networks
Neural Network FAQ- a comprehensive view on Neural Networks in form of FAQ
Fliegende Rattengehirne - Rattenhirne als Autopiloten.
SNNAP - Java neural network simulation.

2. Expert Systems

Wouldn't it be great to have the knowledge of experts allways at hand, even if they are not around? That's the intention of expert systems. These allow a stuctured aproach to a wide range of knowledge i.e. through posing of questions, the analysis of the answers and futher posing of questions one arrives step by step to a detailed description of the problem and its diognosis. This can be very informativ but needs a hight grade of preparation and a deep knowledge of all the possible nodes that lead to a specific solution. It depends on one side on the knowladge of the experts that is put in the system and on the other hand on the level of language used for comunication between the client and the system. If the clients come from the same field as the expert system, then the questions and answers can be more precise and concise, the way to the knowledge is shorter. if the clients know less

3. Agents

Small intelligent programs that handle problems autonomusly for users and interact with the environment.

An agent is usually a person acting or doing business for another person." - Websters Dictionary

The term agent is in computer science one of the most used. At the same time the meaning cannot be pinpointed with a simple definition because it has different meanings in different contexts. A carefull and general definition would be:

"Software program that can do some defined action for a user, which has some kind of intelligence to give the ability to do part of its function autonomously and which can interact with its environment."

Other definition of Agents

The MuBot Agent

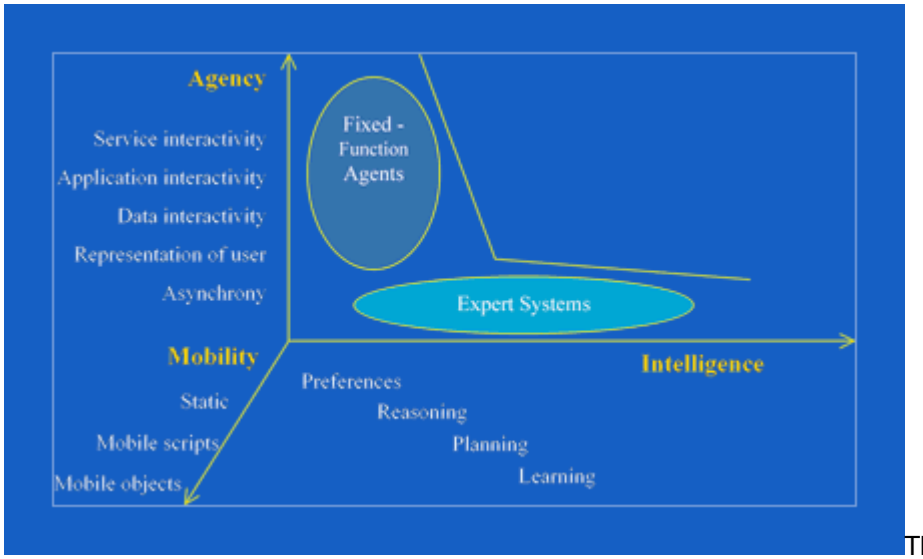
> "The term agent is used to represent two orthogonal concepts. The first is the agent's ability for autonomous execution. The second is the ability to perform domain oriented reasoning."

The Maes Agent:

> "Autonomous agents are computational systems that inhabit some complex dynamic environment, sense and act autonomously in this environment, and by doing so realise a set of goals or tasks for which they are designed."

The IBM Agent:

> "Intelligent agents are software entities that carry out some set of operations on behalf of a user or another program with some degree of independence or autonomy, and in doing so, employ some knowledge or representation of the user's goals or desires."



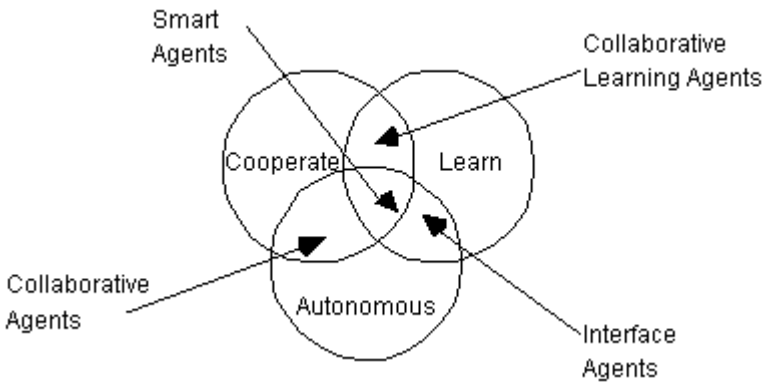
The Gilbert Taxinomy

Agent Characteristics

Consistent with the requirements of a particular problem, each agent might possess to a greater or lesser degree attributes like the ones enumerated in Etzioni and Weld(1995) and Franklin and Graesser (1996)

Reactivity:
the ability to selectivels sense and act
Autonomy:
goal-directedness, proactive and self-starting behavior
Collaborative behavior:
can work in concert with other agents to achieve a common goal
Inferential capability:
can act on abstract task specification using prior knowledge of general goals and preferred methods to achieve flexibility; goes beyond the information given, and may have explicit models of self, user, situation, and/or other agents.
"Knowledge-level" communication ability:
the ability to communicate with persons and other agents with language more resembling human like "speech acts" than typical symbol-level program-to-program protocols
Temporal continuity:
persistence of identity and state over long periods of time
Personality:
the capability of manifesting the attributes of a "belivable" character such as emotion
Adaptivity:
being able to learn and improve with experience
Mobility:
being able to migrate in a self-directed way from one host platform ot another.

Agent Classification



- Mobility, as static or mobile
- Presence of a symbolic reasoning model, as deliberative or reactive
- Exhibition of ideal and primary attributes, such as autonomy, cooperation, learning. From these characteristics, Nwana derives four agent types: collaborative, collaborative learning, interface, and smart
- Roles, as information or Internet
- Hybrid philosophies, which combine two or more approaches in asingle agent
- Secondary attributes, such as verstilty, benevolence, veracity, trustworthiness, temporal continuity, ability to fail gracefully, and mentalistic and emotional qualities.

[Nwana (1996)]

Agent Types

- Collaborative agents
- Interface agents
- Mobile agents
- Information/Internet agents
- Reactive agents
- Hybrid agents
- Smart Agents

Intelligent Agents

To create truly powerful and generalized agents, you must have a level of Artificial Intelligence programming that is dificult to attain. For instance a typical agent would look for a series of keywords in a predefined list of sites. An inteligent agent could learn to distinguish what kind of information was usefull for the master and what not. Using AI pattern recognition algorithms, the agen can then attemt to recognize future articles that are closer to what the master user desires.

Futher readings:

J.M. Bradshaw, "Software Agents" MIT Press, ISBN 0-262-52234-9, 1997.
R. Murch and T. Johnson, "Intelligent Software Agents" Prentice Hall, ISBN 0-13-011021-3, 1999.
Hyacinth S. Nwana, "Software Agents: an Overview" Knowledge Engineering Review, Vol. 11, No 3, pp.1-40, Sept 1996. , Cambridge University Press, 1996.

Related Links:

Introduction to Agents - a gentle introduction to agents
UMBC Agent-

4. Evolutionary Software

Examples:

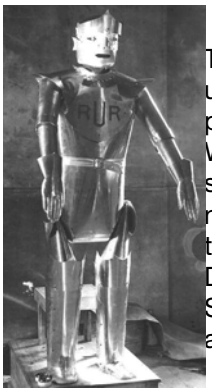
Aaron - a program that draws pictures using knowledge it attained in composition, perspective, coloring and drawing
Cybernetic Poet - a poem producing program that works on basis of poems it analysed beforehand

Related Links Artificial Intelligence

AI on the Web - a list of links to the subjects of AI.
KurzweilAI - Ray Kurzweil on AI

IV. Robotics

Robot - "*An automatic device that performs functions normally ascribed to humans or a machine in the form of a human.*" (Webster, 1993).
A robot, from the practical point of view, is a mechanical device that performs automated tasks which are controlled by a human, a pre-defined program, throgh learned steps or using AI techniques. These tasks replace or enhance human work in fileds such as manufacturing in fabrics, construction or hazardous places.



The word *robot* comes from the Czech robota meaning "labor." The word was first used in Karel Capek's play R.U.R. (Rossum's Universal Robots) (written in 1920; first performed 1921; performed in New York 1922; English edition published 1923). 1 . While Karel is frequently acknowledged as the originator of the word, he wrote a short letter in reference to the Oxford English Dictionary etymology in which he named his brother, painter and writer Josef Capek as its true inventor. Some claim that the word "robot" was first used in Josef Capek's short story Opilec (the Drunkard) published in the collection Lelio in 1917. According to the Capek brother's Society in Prague, this is not correct. The word used in Opilec is "automat." "Robot" appeared in RUR for the first time.

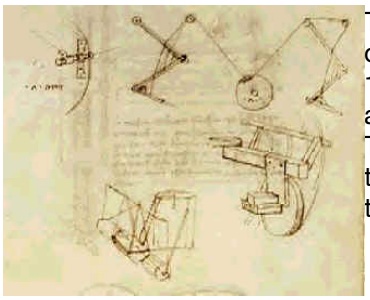
The word *robotics* was first mentioned in Isaac Asimov's short story "Runaround" (1942). This story was later included in Asimov's famous book "I, Robot." The robot stories of Isaac Asimov also introduced the idea of a "positronic brain" (used by the character "Data" in Star Trek) and the "three laws of robotics."

1. A robot may not injure a human being, or, through inaction, allow a human being to come to harm, unless this would violate a higher order law.
2. A robot must obey orders given it by human beings, except where such orders would confict with a higher order law.
3. A robot must protect its own existence as long as such protection does not conflict with a higher order law.

Isaac Asimov, "I, Robot" Bantam, ISBN 055329438, 1991.Amazon

1. History of Robotics

1495

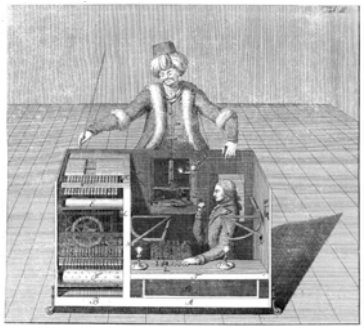


The first recorded design of a humanoid robot was made by Leonardo da Vinci around the 1495. Da Vinci's notebooks, rediscovered in the 1950s, contained detailed drawings for a mechanical knight that was apparently able to sit up, wave its arms, and move its head and jaw. The design was likely based on his anatomical research recorded in the Vitruvian Man. It is not known whether or not he attempted to build the robot.

1738

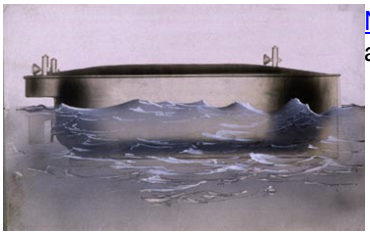
Jacques de Vaucanson begins building automata in Grenoble, France. He builds three in all. His first was the flute player that could play twelve songs. This was closely followed by his second automaton that played a flute and a drum or tambourine, but by far his third was the most famous of them all. The duck was an example of Vaucanson's attempt at what he called "moving anatomy", or modeling human or animal anatomy with mechanics. The duck moved, quacked, flapped it's wings and even ate and digested food.

1769



The Turk was a famous chess-playing automaton first constructed and unveiled by Wolfgang von Kempelen (1734-1804). It consisted of a mannequin dressed as Turk sitting on a cabinet that had doors that opened to reveal interal clockwork mechanisms, and when activated the mechanism appeared to be able to play a strong game of chess against a human opponent. However, the Turk was really a hoax; the cabinet was a cleverly constructed illusion that allowed a man to hide inside and operate the mannequin.

1898



Nikola Tesla builds and demonstrates a remote controlled robot boat at Madison Square Garden.

1961

Heinrich Ernst develops the MH-1, a computer operated mechanical hand at MIT.

1962

The first industrial arm robot - the Unimate - is introduced. It is designed to complete repetitive or dangerous tasks on a General Motors assembly line.

1966

The Stanford Research Institute (later to be known as SRI Technology) creates Shakey the first mobile robot to know and react to its own actions. Amongst other achievements SRI was also the research institute that helped bring us modern day laundry detergent in the development of Tide.

1969

Victor Scheinman, a Mechanical Engineering student working in the Stanford Artificial Intelligence Lab (SAIL) creates the Stanford Arm. The arm's design becomes a standard and is still influencing the design of robot arms today.

1970

Stanford University produces the Stanford Cart. It is designed to be a line follower but can also be controlled from a computer via radio link.

1974

Victor Scheinman forms his own company and starts marketing the Silver Arm. It is capable of assembling small parts together using touch sensors.

1976

Shigeo Hirose designs the Soft Gripper at the Tokyo Institute of Technology. It is designed to wrap around an object in snake like fashion.

1981

Takeo Kanade builds the direct drive arm. It is the first to have motors installed directly into the joints of the arm. This change makes it faster and much more accurate than previous robotic arms.

1986

Honda begins a robot research program thats starts with the premise that the robot "should coexist and cooperate with human beings, by doing what a person cannot do and by cultivating a new dimension in mobility to ultimately benefit society."

1989

A walking robot named Genghis is unveiled by the Mobile Robots Group at MIT. It becomes known for the way it walks, popularly referred to as the "Genghis gait".

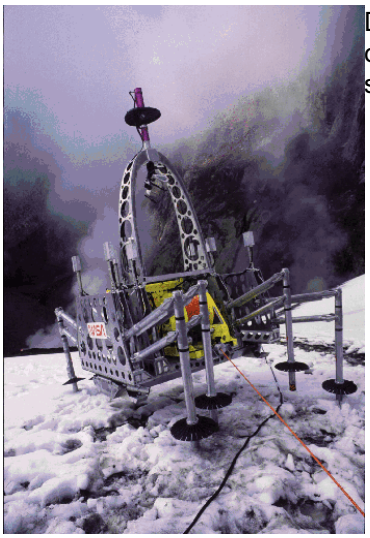
1992

In an attempt to build a radio controlled vaccuum cleaner Marc Thorpe has the idea to start a robot combat event. The contest was finally organised in 1994 under the title *Robot Wars*, after an article appeared in Wired.

1993

Dante an 8-legged walking robot developed at Carnegie Mellon University descends into Mt. Erebrus, Antarctica. Its mission is to collect data from a harsh environment similar to what we might find on another planet. The mission fails when, after a short 20 foot decent, Dante's tether snaps dropping it into the crater.

1994



Dante II, a more robust version of its predicessor, descends into the crater of Alaskan volcano Mt. Spurr. The mission is considered a success.

1997

The Pathfinder Mission lands on Mars. Its robotic rover Sojourner, rolls down a ramp and onto Martian soil in early July. It continues to broadcast data from the Martian surface until September.

1999

SONY releases the AIBO robotic pet.

2000

Honda debuts new humanoid robot ASIMO.

The Battlebots event is held in Las Vegas, Nevada.

2004

After six minutes of holding our breath (during EDL) as it burned and bounced its way to the red planet the robot rover Spirit lands on Mars. A few weeks later the second Mars Exploration Rover - "Opportunity" safely lands on the Meridium Planum.

Related Links:

Adam's Robot Page - A history of Robotics
Robot History - A timeline of Robotics
Robot Evolution Talk - Han Moravec's projection of future developments.
BBC News:Timeline:Robots

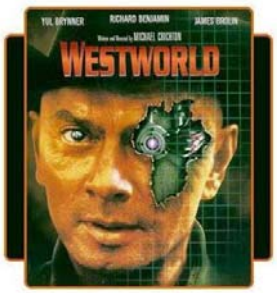
2. Robots in Film

Once technology advanced to the point where people foresaw mechanical creatures as more than toys, literary responses to the concept of robots reflected fears that humans would be replaced by their own creations. Frankenstein (1818), sometimes called the first science fiction novel, has become synonymous with this theme. When Capek's play RUR introduced the concept of an assembly line run by robots who try to build still more robots, the theme took on economic and philosophical overtones.

1924 - Metropolis

Metropolis is a black and white silent science fiction film by Fritz Lang. It is widely regarded as a masterpiece.Trailer

1973 - Westworld



A amusement park for rich vacationers. The park provides its customers a way to live out their fantasies through the use of robots that provide anything they want. Two of the vacationers choose a wild west adventure. However, after a computer breakdown, they find that they are now being stalked by a rogue robot gun-slinger.

1975 - Stepford Wives

The premise involves a group of men from the fictional town of Stepford, Connecticut who all seem to have eager-to-please, overly submissive, beautiful wives. Joanne, the main character, arrives in Stepford from the city with her husband and children, eager to start a new life. As time goes on, she becomes increasingly puzzled by the zombie-like Stepford wives, especially when she begins to see her once indpendent-minded friends turn into mindless domicile housewives overnight. By the end of the story she becomes convinced the wives of Stepford are actually look-a-like androids created by an elite group of men. The book ends before she can find the truth.

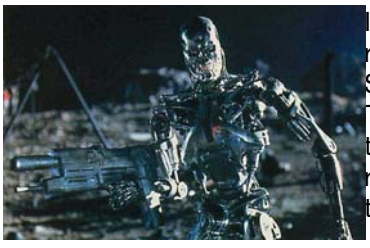
1976 - Star Wars

George Lucas' movie about a universe governed by the force introduces watchers to R2-D2 and C-3PO. The movie creates the strongest image of a human future with robots since the 1960's and inspires a generation of researchers.

1982 - Blade Runner

This Ridley Scott film is based on the Philip K. Dick story "Do Androids Dream of Electric Sheep?" and starred Harrison Ford as Rick Deckard a retired Blade Runner that hunted Replicants (or illegal mutinous androids).

1984 - Terminator



In the year 2029, a computer called Skynet is fighting against a human resistance, after having nearly destroyed the rest of humanity in 1997. Skynet has found a way to send some of it's warriors, called Terminators, back in time. This is the story of the Terminator sent to kill the resistance leader's mother in 1984, before she gives birth. The resistance sends a warrior named Kyle Reese back to 1984 to protect the young woman.Trailor (24MB)

1985 - Max Headroom

Coca Cola Trailer

Related Links:

List of fictional Robots and androids - Wikipedia's list of Theater, Literature, Film and Television occurances of robots

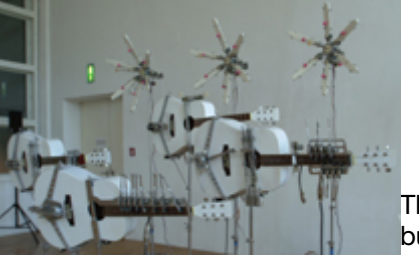
3. Robots in Art

Telegarden

This tele-robotic installation allows WWW users to view and interact with a remote garden filled with living plants. Members can plant, water, and monitor the progress of seedlings via the tender movements of an industrial robot arm. Internet behavior might be characterized as ``hunting and gathering''; our purpose is to consider the ``post-nomadic'' community, where survival favors those who work together. The Telegarden was developed at the University of Southern California and went online in June 1995. In its first year, over 9000 members helped cultivate. In September 1996, the Telegarden was moved to the Ars Electronica Center in Austria.Telegarden Demo

***Ornitorrinco*, the Webbot, travels around the world in eighty nanoseconds, going from Turkey to Peru and back - Eduardo Kac**

Eduardo Kac worked on several projects where he experimented with the notion of telepresence. After experimenting with different robots, the project Onitorrinco, started since 1989, allows user to remotly access a fully mobile and wireless robot throgh different media, at first through a phone network and from 1994 also on the Internet. In 1996 at the Otso Gallery in Espoo, Finland, Kac installed the project shown left. On the first floor the viewers could control Ornitorrinco's body through a web browser with embeded 30 fps color feedback, extremly fast for the time. Via the browser the users could control the movements. Later on in the gallery the visitor would find himself facing the robot which a nest with two turkeys.


The robot wasn't interconnected throgh the internet, as the browser would sujest, but throgh simple telecomands.

Eduardo Kac is reknown for his contribution in transgenic art like the project Genesis (1999), which included an "artist's gene" he invented, and then with his fluorescent rabbit called Alba (2000).

Tsukuba Series - Maywa Denki

Tsukuba Music is designed to stir people's attention to notice the fact that "the live musical sound is created from a substance" - which the music once used to be in years past and they have totally forgotten. Tsukuba Series is played by the movement of motors and / or electromagnets at 100V and makes a sound by physically beating/knocking a substance. It is a challenge to revive a live music sound with the power of machines. Tsukuba was named after Tsukuba City, a technological city in the Ibaragi prefecture in Japan.

Related Links:

List of fictional Robots and androids - Wikipedia's list of Theater, Literature, Film and Television occurances of robots

4. Robots Today

Robots are being used today to do the tasks that are either too dirty, dangerous, difficult, repetitive or dull for humans. This usually takes the form of industrial robots used in manufacturing lines. Other applications include toxic waste cleanup, space exploration, mining, search and rescue, and mine finding. Manufacturing remains the primary market where robots are utilized. In particular, articulated robots, similar in motion capability to the human arm, are the most widely used. Applications include welding, painting and machine loading. The automotive industry has taken full advantage of this new technology where robots have been programmed to replace human labor in many simple repetitive tasks. There is much hope, especially in Japan, that home care for an aging (and long-lived) population can be better achieved through robotics. While robotic technology has achieved a certain amount of maturity, the social impact of these robots is largely unknown. The field of social robots is now emerging and investigates the relationship between robots and humans. A ludobot is an instance of a social robot dedicated to entertainment and companionship.

Humanoid Robots

ASIMO


ASIMO (•••) is a humanoid robot created in 2000 by Honda Giken Kogyo Kabushiki Kaisha. ASIMO is considered the first humanoid robot that can walk on two feet in a matter resembling human locomotion. Weighing 43 kilograms, the external design of the robot resembles a small astronaut wearing a backpack. Three prototypes preceded the current ASIMO 2000 model: prototype P1 in 1986, P2 in 1996 and P3 in 1997. The robot's name is a backronym in honor of science fiction writer Isaac Asimov, maker of the Three Laws of Robotics. Officially, the name stands for "Advanced Step in Innovative Mobility". In Japanese, the name is pronounced ashimo and, not coincidentally, means "legs also".

Kismet


Kismet is a robot intended to demonstrate simulated emotion. Some critics consider it an Eliza-style device which relies on clever pattern recognition and output to fool users into thinking the machine possesses intelligence that isn't really there.Explanation Expressions

Related Links:

JPL Robotics - A NASA page on jet, propulsion Laboratory and Robotics
Lynxmotion - a comersial site for robot-kits.
Red Rover - The LEGO Mars rover
Xavier - a robot romotly controled over the Internet. Carnegie-Mellon

5. Robots in the Future

When roboticists first attempted to mimic human and animal gaits, they discovered that it was incredibly difficult; requiring more computational power than what was available at the time. So, emphasis was shifted to other areas of research. Simple wheeled robots were used to conduct experiments in behavior, navigation, and path planning. When engineers were ready to attempt walking robots again, they started small with hexapods and other multi-legged platforms. These robots mimicked insects and arthropods in both form and function. The trend towards these body types offer immense flexibility and proven adaptability to any environment. With more than four legs, these robots are statically stable which makes them easier to work with. Only recently has progress been made towards bipedal locomotion in robots.

Recently, tremendous progress has been made in medical robotics, with two companies in particular, Computer Motion and Intuitive Surgical, receiving regulatory approval in North America, Europe and Asia for their robots to be used in minimal invasive surgical procedures. Laboratory automation is also a growing area. Here, benchtop robots are used to transport biological or chemical samples between instruments such as incubators, liquid handlers and readers. Other places where robots are likely to replace human labour are in deep-sea exploration and space exploration. For these tasks, arthropod body types are generally preferred. Mark W. Tilden formerly of Los Alamos National Laboratories specializes in cheap robots with bent but unjointed legs, while others seek to replicate the full jointed motion of crabs' legs.

Experimental winged robots and other examples exploiting biomimicry are also in early development. So-called "nanomotors" and "smart wires" are expected to drastically simplify motive power, while in-flight stabilization seems likely to be improved by extremely small gyroscopes. A significant driver of this work is military research into spy technologies.

Related Links:

Nanotechnology

6. Notes

Imact

- Epistomologie - the science of cognition
- Tele-Identity

Related Links:

robots.net - robot news and robotics info
Arrik Robotics - robot informational center
Android World

V. Future Techonology

Nanometer is 10-9 m or one milliardth of a meter. Under the term nanotechnology we understand technology on the level nanometre tolerances i.e. construction on molecular level. Constructing machines by putting molecules together.

History

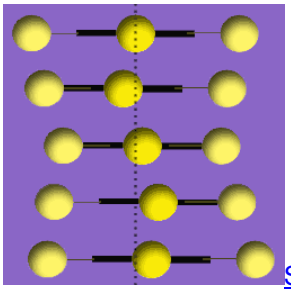
The first to talk about such technologies was Richard Feynman who talked in his lecture "There's Plenty of Room at the Bottom". The term Nanotechnology was created by Tokyo Science University professor Norio Taniguchi in 1974 to describe the precision manufacture of materials with nanometre tolerances. Eric Drexler handled the subject in a broader way in his 1987 published book "Engines of Creation" [1]. He introduced the idea of using molecular machinery for large-scale fabrication. The book influenced a whole generation of scientists.

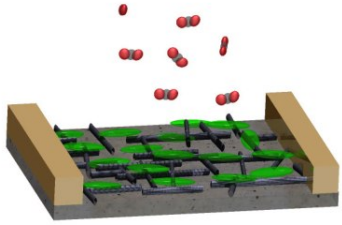
To develop in nanotechnology one has to "see" the elements. This is achieved today with the scanning tunneling microscope which alows to see the individual position of the atoms. The microscope was developped Gerd Binning and Heinrich Rohrer of the IBM's Research Lab in Rüschlikon by Zürich in 1981. The microscope can not only scan the surface of atomic structures, it can also place atomic sized elements on a surface.In 1989 IBM constructed the IBM-Logo with 35 xenox-atoms.

There is already an industry with 500 companies dedicated to nanotechnology with a total anual sum of four billion dollars invested in research and development. The research includes many different fields such as

- Materials
  - superlens for nanowriting
  - massive productions of nanowires
- Medecine
  - nanocarrieres to combat tumors
- Computertechnology
- Chemistry
- Energy


Swallowable bot with camera.


Showing nanotechnology how to swim.


Nanosensors for monitoring CO2


Selfcleaning nanohouse


Nanoflowers

The current problems around nanotechnolgy is on one side defining production processes and the cost of such production. Yet the advantages that could be achieved with such materials, propel research. The best known example is Carbon Nanotubes, which can be grown in lenght, and then cut. The material is very light yet stronger than steel and has perfect electronic and heat transmiting properties.

The technology lead to many visions. Next to Hans Moravec and Ray Kurzweil, that speculate on little nanobots that scan our concsiosness allowing to transmit ideas to computers. Eric Drexler imagines already in his early works that nanobots can reproduce themselves by adding the attoms needed together. These assembles would reproduce new assemblers.

 A 2mm long submarine like gadget that should look for damage in human bodies.

There are ofcourse doomsday visions. Already Eric Drexler mentionend nanobots that reproduce themselves, called assemblers, that get out of control and don't stop to reproduce. The scenario that is named the greay goo.

More realistic are scenarios that warn of the dangour of nanotechnology that could proove itself of toxic nature, something we already seen with asbest. Time has yet to prove what dangours loore from this technology.

Further readings:

Drexler K. Eric, "Engines of Creation" Anchor Books, ISBN 0-385-19973-2, 1987. online (full text) Amazon
Drexler K. Eric, "Nanosystems: molecular machinery, manufacturing, and computation" John Wiley & Sons, ISBN 0-471-57518-6, 1992. Amazon
Drexler K. Eric, Peterson Chris, Pergamit Gayle "Unbounding the Future" William Morrow and Company, ISBN 0-688-09124-5, 1991. online (full text)
Robert A. Freitas, "Nanomedicine" Landes Bioscience, ISBN 1-57059-700-6, 2003. online (full text) Amazon
Bill Joy, "Why the future doesn't need us" Wired, April 2000 online

Deutsch

Markus Hofmann, "Die Zukunft klar im Blick - die Gegenwart im Nebel verbogen" NZZ, 21.5.2005 online
Joachim Laukenmann, "Der Gott der kleinen Dinge" Weltwoche, 03/03 online
Dorothe Benoit-Browaeys, "Zukunftstechnologie Winzigkeit" Le Monde Diplomatique, 10.03.2006 online

Related Links:

Foresight Institution - the institution created by Drexler to promote the ideas around nanotechnology
There's Plenty of Room Down there - the text of the original speech of Feynman
Nanotechnology - a brief introduction to Nanotechnology by Dr. Ralph Merkle