

smart products
smart products

a documentation

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✓ SPECIAL PROJECT
IDC IIT BOMBAY

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I am very grateful to all the faculty members for their guidance at various stages of the project

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UJAY

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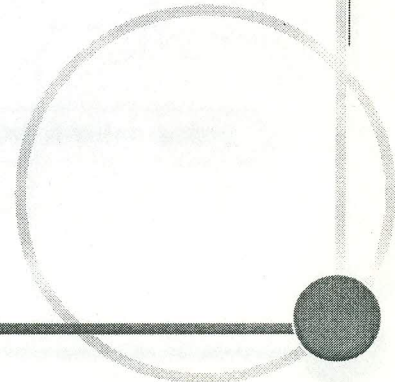
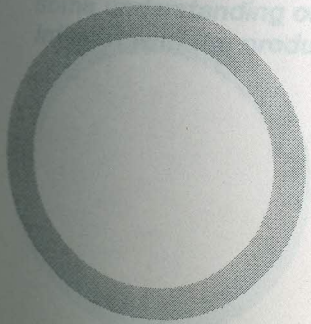
Electrolux screen fridge
THALIA thinking and linking appliances
Margherita 2000 washing machine
e-Coffee Machine
Rotor 2000 Webphone
Jalda online payment option
Web pad
Wrist watch gadgets
Chat pen

Smart material \tech products

Smart shoes
Infrared thermometer
K2 Smart Ski
Smart surgical scalpel
All-fabric capacitive keyboard.
20th Anniversary Macintosh

Interface issue for smart products

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SMARTNESS IN PRODUCTS



What is smartness in products ?

According to the dictionary meaning of smart

Smart--

***clever, ingenious, quick-witted**

It indicates the embedded intelligence in to the product which contributes in decision making, self learning and quick advance communication either product to product or human to product. For instances -personal robots and robotic pets etc.

*** well groomed ,stylish fashionable**

It means the use of materials in a innovative way ,the outstanding achievement into conventional function of a perticular product and also the simple and sophisticated product detailing.

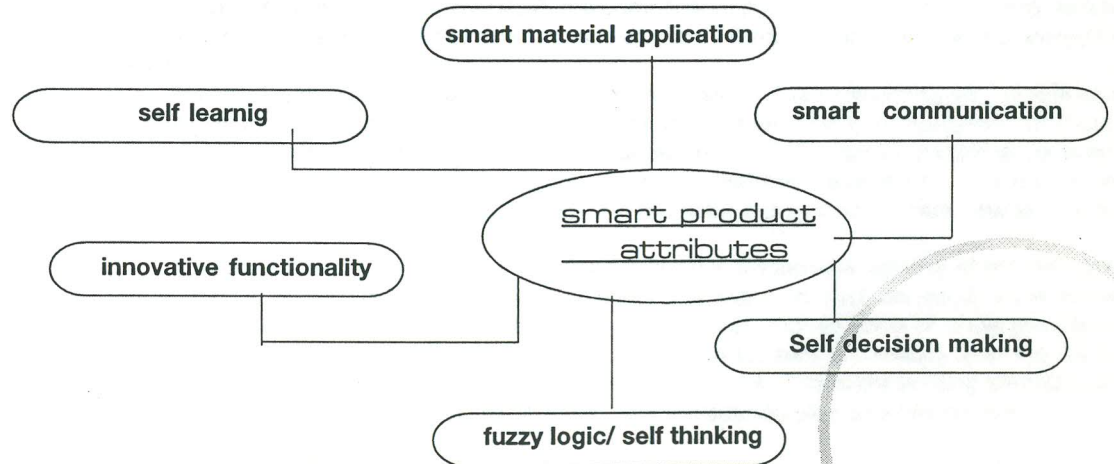
for example. onhand gadgets ,smart clothing,

***quick**

Self decision making by fuzzy logic and advance web connectivity ie. smart home, THALIA[®] products and fuzzy traffic controller etc.

*** Technology embedded** ie. smart weapons, smart domestic appliances .

"The technology and techniques of making things smart is variable. Sometimes 'smart' products have the aim of extending or even simplifying the complex functionality of things , such as auto-focus on cameras providing the novice photographer with professional results. Regardless of the technical approach taken, there must be some understanding of how people will interact with the product."



! INTRODUCTION ..

Why don't people talk to each other in cyber cafes unlike other places where young and restless congregate- rock concerts, cricket match grounds etc. A person absorbed in a cell phone conversation the changing expression at his face is symbol of emotional connection .

The digital connection not only brings us much closer but also it has started playing its role in connecting human to object. The web enabled and self talking appliances are going to become a vital part of our day to day life.

As digital media devices gradually become even more enmeshed in our life , it is really challenging and growing field which needs serious attention of designers to be an active participant of a novel interaction among human and objects.

*The project is aimed at a serious investigation into above mentioned environment and retrospecting the attributes of such products so called **smart products**.*

Smart products are smart because they are capable of "thinking" - of learning to anticipate and meet the needs of the user. The "brain" that does this thinking is a microprocessor, or a chip, the basic unit of all computers.


Smart products are "mechatronic" systems, or innovations that integrate mechanical, electrical, and software subsystems in order to make a product behave intelligently With microchips increasingly making their way into even the most mundane of objects such as, it concedes that for it to become as synonymous in consumers' minds with "smart" appliances as Intel is with PCs will be no easy task.

Previously, products were made simple so that anyone could use them or too complex with multiple uses like computer ,or VCR .the complicated products requires a learning which inhibits many people and satisfies only to those who are willing to invest the time and energy to learn how to use it.

The intelligent appliance adapts to the characteristics of user becoming very simple and relatively foolproof for the casual user and providing more features and capabilities for those who need or wish to utilize more .Adaptation includes functional changes as the user progresses from the basic functions to requiring more advanced features later stage . The appliance recognizes which buttons are being pushed and the habit patterns of the user, and adapts to suit.

A significant and useful intelligence characteristic is diagnostics not only after failure but also predictive and advisory . It's not sufficient to know that a product has failed ; if the failure occurs at an inconvenient time that may result great trouble . Indeed some time this pre signal allows user to arrange alternatives for example if a button appears to be sticky ,then the appliance can perhaps continue to operate with some precautions . This is like sensing the rattling in an automobile engine , to correct the problem before a catastrophic problem occurs.

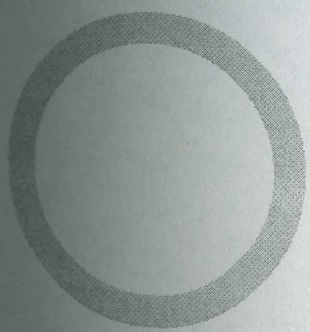
SMART PRODUCTS



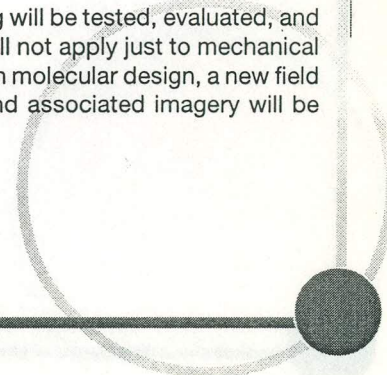
Every engineered artifact will become "smart" as it acquires its own sensors, microprocessors, and actuators. As things become smart through the integration of information technology, they will be able to do three things: evaluate their internal performance; evaluate their external performance; and, if either is suboptimal, initiate repair or call for help. The next logical step will be to link these smart things into systems for more effective and often remote management. It will be common place to evaluate, manage, and control systems from a few to a few thousand miles away. The engineers who design food packaging will get together with the engineers who design kitchen appliances to create interactive, smart food packages. The resulting products are likely to cut meal preparation time to a few minutes, lead to systems programmed for the various tastes of the people who are going to enjoy the meal, and drastically shorten cleanup and maintenance time.

The technology and techniques of making things smart also vary. It may be the inclusion of smart material, such as window glass that tints dependent on the position of the sun; or smart electronics included into familiar products such as the 'intelligent' microwave which ensures that frozen food is cooked thoroughly.

Smartness will show up in many other ways. Homes and buildings have been widely viewed as good targets for smart features to sense air leaks, water leaks, break-ins, and a score of other things. But smartness in structures will go beyond that. If we consider the developments in materials and those in information technology, we see the emergence of an entirely new engineering paradigm for buildings.



Emerging rapidly to parity in importance with telecommunications and computational capabilities are various forms of imaging, from the barcode to virtual reality. In the extreme, virtual reality, with or without an assist from other artificial intelligence (AI), will have dramatic engineering consequences, first and foremost in education and training. Virtual reality and AI systems will permit and encourage 100-percent mastery of academic material, which should dramatically affect the lives and careers of those who are so educated. Tasks that would normally take years to master will be absorbed in weeks or at most months, and tasks that would normally take months to learn will be mastered in days or weeks. That kind of teaching will, for the first time, boost learning for everyone, whatever their preferred learning strategy - visual, acoustic, okinesthetic.



Designs of all sorts are now being done in cyberspace. Soon, everything will be tested, evaluated, and modified on-line before any physical, solid thing is constructed. This will not apply just to mechanical things, it will apply to other areas such as chemical engineering and even molecular design, a new field driven by the emergence of the molecular engineer. The computer and associated imagery will be dynamic, three-dimensional,

PRODUCT CATEGORISATION ...

Robotic pets

self learning

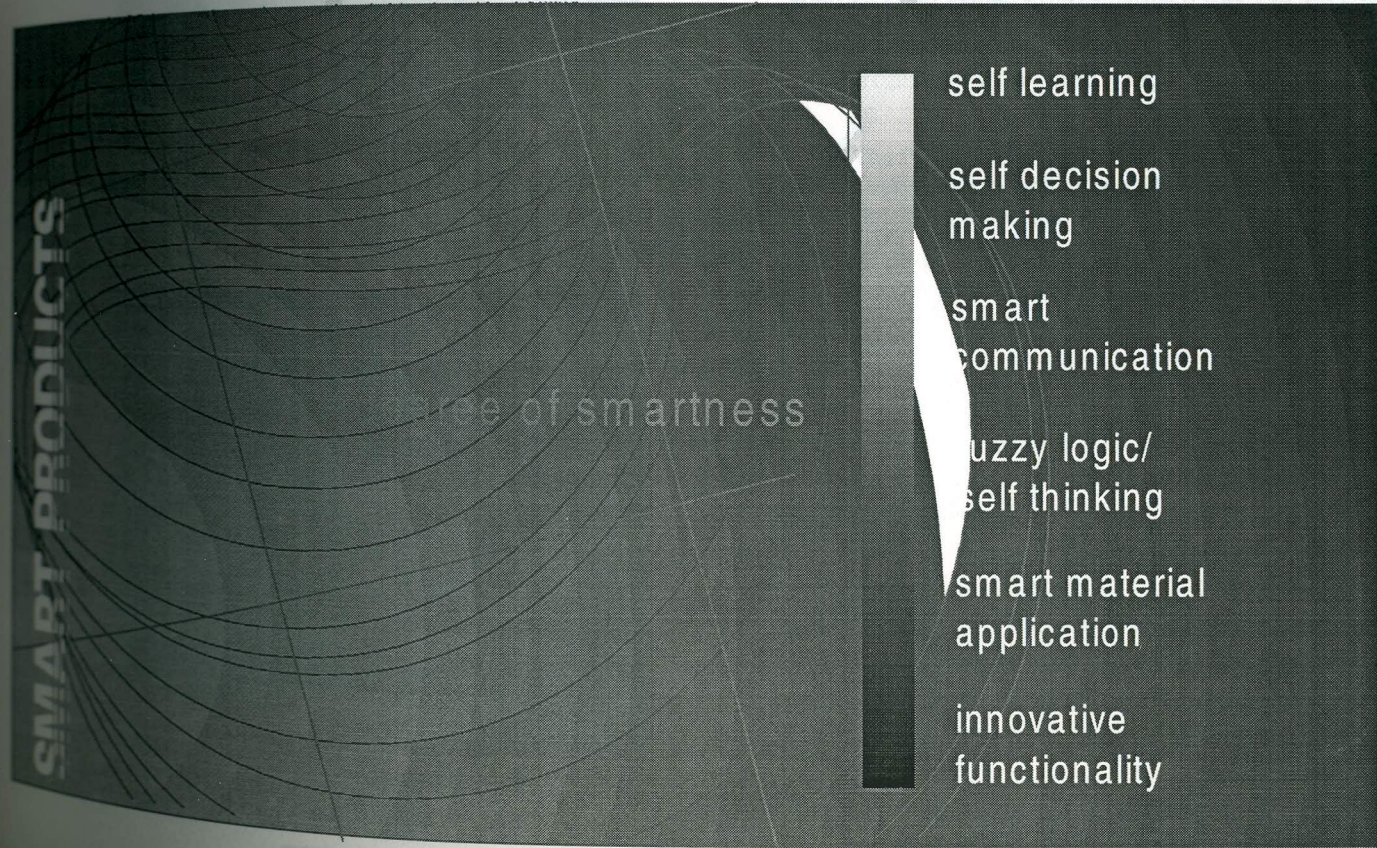
self decision
making

smart
communication

fuzzy logic/
self thinking

innovative
functionality

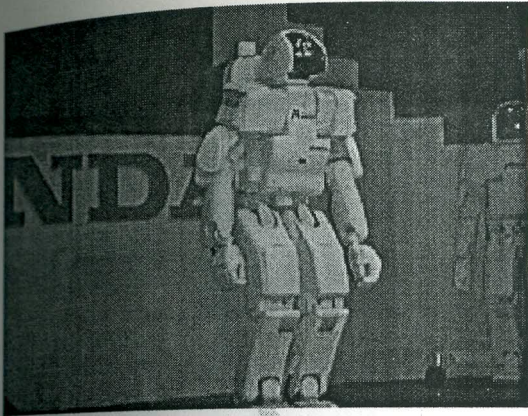
smart material
application



At first various product attributes are listed as per their contributing capacity towards smartness and products those which are having more attributes of higher ranking are listed as smarter products than others.

or instances, robotic pets attribute listing is mentioned above.

Honda P3 Robot

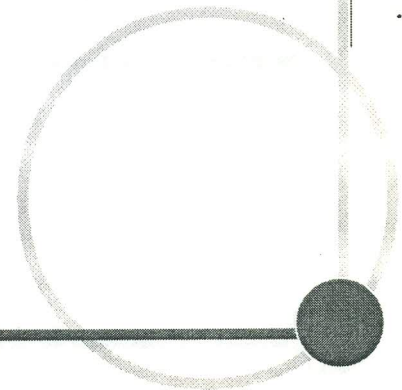


Honda Motor Co. recently unveiled the prototype Humanoid Robot P3 at the Science Museum, Tokyo. The P3 is the latest version of the two-legged robots the automaker has been developing since 1999.

A two-legged robot is said to be very difficult to develop as it involves an array of high technologies, such as sensor technology to maintain stable walking. But Honda has been focusing on the two-legged mobility technology because it wants a humanoid robot to be able to move through furniture-equipped rooms and go up and down stairs so people can use it in their daily lives.

Honda's initial efforts at making a two-legged robot resulted in the E2 model, developed after an analysis of an ostrich's movements. It was 132 cm (4.3 ft) tall and weighed 67.7 kg (149.2 lb). But the head was disproportionately big, and the E2 fell over easily, unable to balance the body section's right and left sides well. After a number of improvements, Honda came up with humanoid-type robots with synchronized arm and leg movements—the P1, the P2, and now the P3.

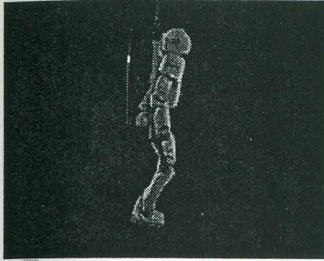
The P3 can walk freely on its own two legs. It is 160 cm (5.25 ft) tall, weighs 130 kg (286.6 lb), and comes very close to looking like a human adult. Without a battery, the weight goes down to just 100 kg (220.4 lb). The P3 can walk at a speed of 2 km (1.24 miles) per hour and go up and down stairs around 20 cm (8 in) high without trouble.



Specification

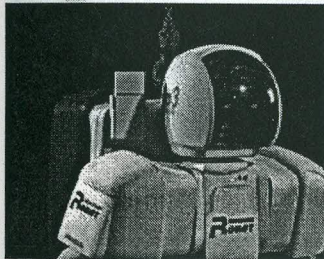


P3's proportions and the positions of its joints were adapted from the human body.



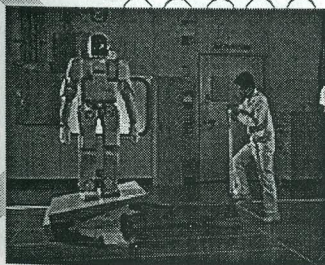
The robot is one metre sixty tall, has a shoulder width of 60 centimetres, a depth of 55 centimetres, and weighs 130 kilograms. The skeleton consists of magnesium, and the movements are powered by servomotors. P3 can work for up to 25 minutes on a battery charge, and carries weights of up to nine kilograms per hand effortlessly.

The maximum walking speed is approximately two kilometres per hour. A four-processor high-performance computer contained in the rucksack is in charge of controlling the balance as well as coordinating its extremities during coordinated movements.



P3's carbon rucksack also holds the battery. Two video cameras, which function independently of one another, are located under the visor...

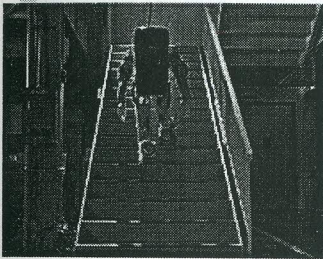
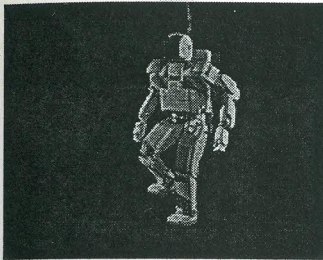
...and a microphone and speaker are also already on board. Overall, P3 is quite a delicate robot. In terms of its dimensions and technical data, it is already well suited for activity within everyday human surroundings.



Control

P3 possesses a largely autonomous balance control that can also cope with uneven surfaces. It quickly and independently compensates for uneven or sloping floors.

Capabilities



P3 possesses 16 joints which can be individually selected and which, due to their degree of flexibility, also enable complex movements. The most important difference in comparison with the human apparatus of locomotion is that the spinal column is missing. Thus P3's back is rigid. P3 has therefore been equipped with relatively long arms in order to reach the floor on bent knees.

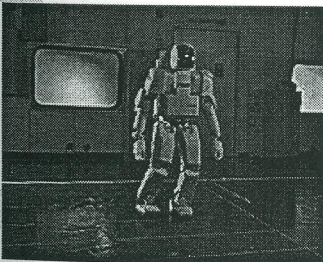
However, P3's outstanding balancing act is its ability to climb up a flight of stairs on its own.

The robot does this with an admirable steadiness, despite the extremely high demands on foot control. It is even more difficult to come back down a flight of stairs due to the fact that the feet have to absorb and balance out very high forces, but this is also no longer a problem for P3.

Despite a built-in camera, P3 is currently not capable of recognising the height of a step independently and to automatically adapt its gait. But nevertheless... .. even today, P3's abilities clearly illustrate the potential of future bipedal service robots.

Conclusion

At present, P3 can, without exaggeration, be considered the highest-performing bipedal robot in the world. Its kinematic abilities are already highly developed and mostly function autonomously. This success in the area of kinematics allows one to look towards the great challenges of the future with optimism: The energy supply must be optimised in order to enable longer activity. Tele-senses such as hearing... .. and seeing must be implemented in combination with cognitive abilities for object recognition in order to one day enable P3 to act autonomously in an unfamiliar environment. And P3 should also be able to articulate itself acoustically if it one day wants to move among human beings. The next big step in the further development of P3 will be the implementation of visual abilities. We have learned a great deal in this regard from the results of brain research and hope to soon be able to make further progress with the aid of these neuroscientific approaches. Vision is an active, intelligent process and we must become aware of the basic architecture of the intelligence we want to give P3 to accompany it on its way through the world. This venture is a tremendous technical challenge and, not until P3 can move naturally and unobtrusively in the immediate environment of human beings and actively support them, will Honda have achieved its goal.



SONYS SDR-3X HUMANOID ROBOT



Sony's SDR, an acronym for Sony Dream Robot, is a humanoid robot far smaller than ASIMO, measuring 50 centimeters in height and weighing 5 kilograms. With 24 joints, it can dance, and walk 15 meters per minute with a stride measuring 6 centimeters. In a demonstration, the SDR chose a yellow soccer ball, as instructed, out of three differently colored balls and scored a goal, finishing the feat off with an "I did it!" pose.

Technologies used in SDR-3X (Prototype)

1) Efficient Power Output from Small Sized Actuator

Sony developed three types of small actuators (ISA) for joints with different power output requirements. High power output actuators are used in the knee joints to support walking movement.

2) Quick Motion/Synchronized Body Movement

In the same way as a human being, the SDR-3X moves the upper half of the body to counteract the yaw-axis moment generated from the lower half of the body. As a result, the SDR-3X can walk at a speed of 15 meters per minute with 60mm strides. In addition, when it walks up slopes or moves its whole body, information gathered from posture sensors in the torso area and touch sensors on the bottom of the feet are used to control its posture to prevent it from falling over.

3) Communication by Voice

Movements of the SDR-3X can be verbally controlled through two microphones in the ear section. The robot possesses a speech recognition function and can recognize about 20 pre-recorded words. In addition, it can respond to these verbal instructions through a speech synthesis function that enables the SDR-3X to answer with one of about 20 recorded words.

4) Movements based on Image Recognition

The robot can distinguish specific color areas from visual data captured by the CCD camera in the head area. Based on this ability, the SDR-3X will recognize the instructed color ball, find the goal net, move beside the ball, shoot the ball and recognize whether the ball has landed or not in the net.

5) Other

- The SDR-3X can be operated by remote control by using a Wireless LAN Card in the PC card slot.
- A simulation software has been developed to simulate the movements of SDR-3X on a personal computer.

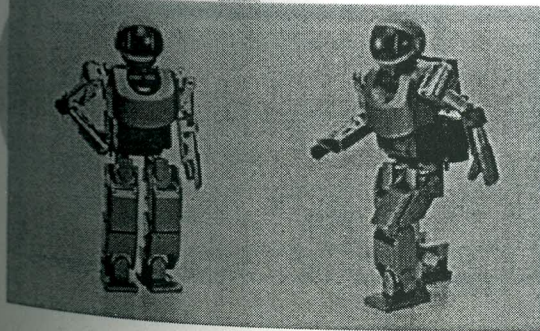
SDR-3X Main Features

CPU 64 Bit RISC Processor (x2)

Internal Memory 32MB DRAM (x2)

Mass Approx. 5.0 kg (with battery & memory stick included)

Dimensions (height x width x depth) Approx. 500 x 220 x 140 mm



NEC PERSONAL ROBOT R100



The Personal Robot R100, which has been under development at NEC since 1997, marks the company's ascension into a select group of Japanese electronics makers who want to populate everyone's homes with robots.

The human-like NEC machine is potentially a higher life form than either Tama or Aibo. The robot can recognize 300 vocal command words and identify the faces of up to 10 people, a feat the other robots can't perform, according to NEC.

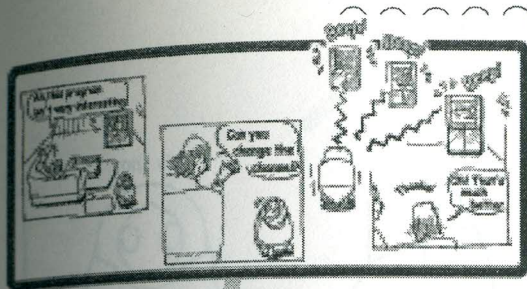
But the R100 wasn't on its best behavior recently when the robot put on a stumbling demonstration of its skills at NEC's Incubation Center. Responding to voice commands, the prototype can remotely control a TV and air-conditioner, send and receive e-mail, and surf the Net. The robot often became confused, however, when confronted with the face of a new master, emphatically insisting, for example, that Fujita was its "mother."

A 75MHz, Intel 486 DX4 processor controls the movement of R100, but most of the processing power to run the recognition software is handled by a PC connected to the robot. The PC will have to be shrunk down and fitted inside the knee-high robot to enable R100 to act completely autonomously, Fujita said.

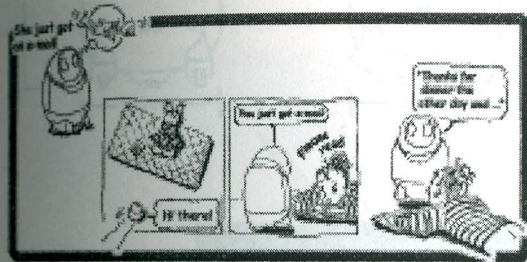
The R100 sees through a one-third inch CCD (charge coupled device), stays powered for two hours and will charge up again in three hours, said Toshikatsu Hosoi of NEC Home Electronics.



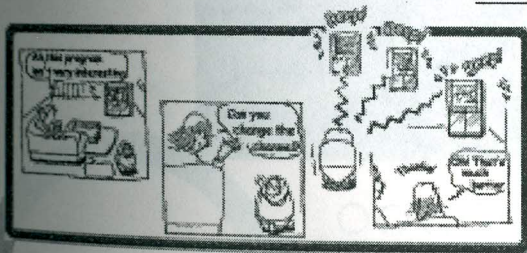
R100 is a prototype robot developed at NEC's Central Research Laboratories. Using visual recognition, voice recognition, mechatronics and Internet communication technologies, the robot can recognize individual faces, understand verbal commands, and move smoothly around the home, avoiding such obstacles as tables and chairs.



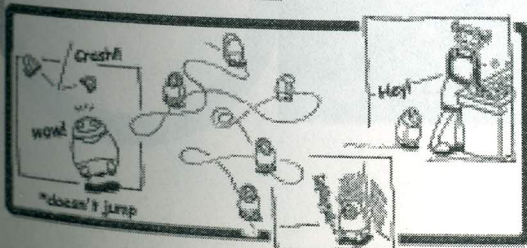
With its built-in, full-time Internet connection, your R100 knows when you have email. Equipped with cameras and microphones, the R100 can even record video messages and replay video messages on the TV.

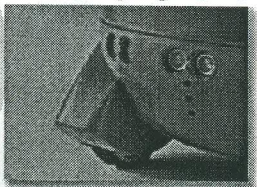
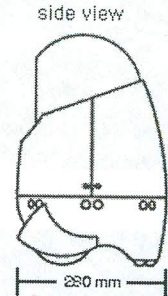
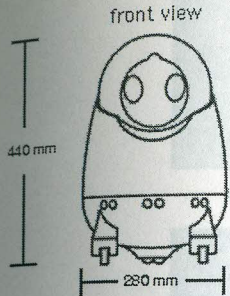


The R100 can turn your TV, lights and other appliances on/off at your request. When you're away from home, the robot looks after your home. If the robot comes across somebody, it can instantly record what it sees and send it to you as a video message to an e-mail address you specify.



When it has nothing to do, the R100 will wander around the home. If it meets someone, it will say "Hello" or "Let's have some fun together." Sometimes it will just turn round and round, humming a tune to itself. Of course, all these features can also be turned off, if you'd like your R100 to sit quietly in a corner until you call it.





With a pair of video-camera eyes, the robot can avoid objects while moving around the home. It can measure distances and recognize the people that it meets.

Hears

The R100 has directional hearing. It will turn and look in the direction of the person who calls it. It will also understand and respond appropriately to a variety of spoken commands.

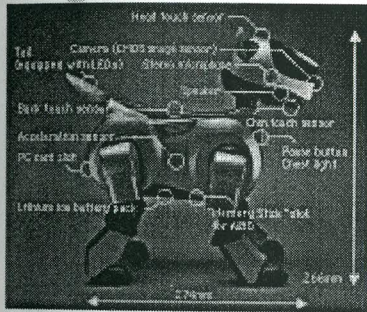
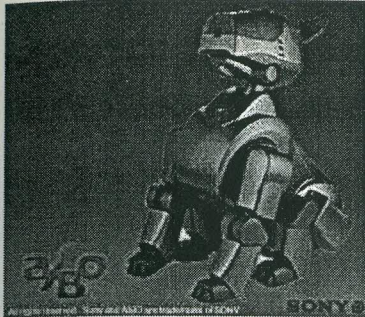
Talks

The robot can greet you by name and respond when you speak to it. It will also announce incoming e-mail messages.

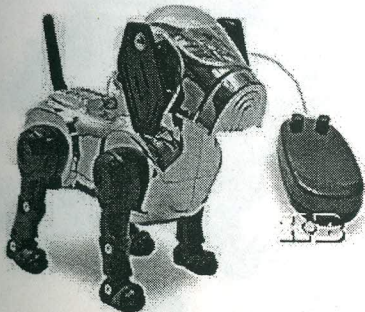
height	440mm	
width	280mm	
depth	280mm	
weight	7.9kg	
battery duration	1.5 - 2 hours	
battery charge	2 - 3 hours	
number of commands recognized	about 100 phrases	number of
spoken expressions	about 300 phrases	

eyes	2 CCD cameras
ears	3 microphones
touch sensor	senses your tap, stroke or press
ultra-sonic sensors	6 sensors around its body
environmental sensors	measures temperature and ambient light
feet	- 2 drive wheels (front)
	- 1 free wheel (rear)
	- max. speed : 60cm/s
head	up-down, left-right
sound	2 speakers
face	LEDs in eyes and mouth for facial expression

SMART ROBOTIC PETS



The AIBO is gaining attention as something more than just a mechanical dog.



Robot pets are one of the most exciting new developments in robotics. The trend was started by Sony with their AIBO robot dog, motorized joints for a wide range of amazingly realistic movements.

Sony's AIBO

Sony's AIBO resembles a dog, much like Star Wars' C3PO resembles a human. AIBO (which stands for Artificial Intelligence roBOT) also means "buddy" in Japanese, and that's what these amazingly lifelike robotic dogs will become. The robot contains 18 motors (four for the head, three for each leg and two in the tail) that let it walk, sit, sleep, beg, and perform a host of other dog-like actions.

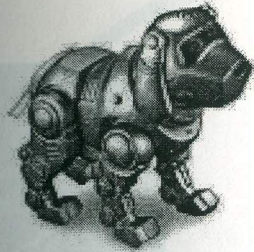
A remote control emits tones that the robotic dog "hears". The remote puts the dog into one of three activity states: lying, sitting, or standing. Within each state, the dog performs one of five to 10 actions, based on the key pressed. The motions are surprisingly fluid and lifelike, and the robotic dog can walk as fast as 20 feet per minute.

That certainly won't set any speed records, but it's amazing to watch a robot move around the room and perform actions that are so, well, dog-like. The robot is built around a 64-bit RISC processor from MIPS, and it includes a lithium ion battery that lasts about 1.5 hours. The robot commands are stored on an 8MB memory stick, Sony's new removable storage medium. You can also store sounds on the memory stick to control what the dog-bark sounds like.

I-Puppy

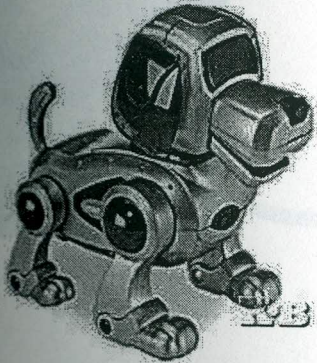
This is the simplest and least expensive of our robot dog collection. He walks, he barks, and you control him! It's I-Puppy, the remote control electronic puppy of the future.

His sleek metallic and black coloring give him a cool futuristic look and the remote control makes him so much fun to play with. Just press the button and he walks - press the other button and he barks! You're sure to love this electronic pooch



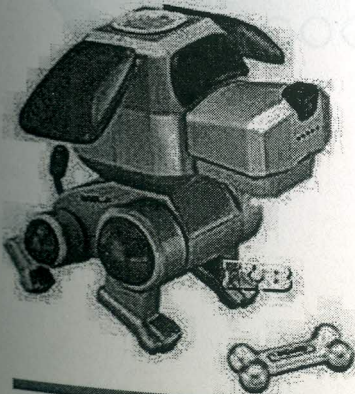
Tekno

Tekno, a walking, talking, card trick playing bundle of electronic puppy personality. He's never a bad dog (unless you program him to make rude noises!). And even then, he's unfailingly polite with a vocabulary that includes "Excuse me," "Thanks," "Whoops!" and "Sorry." This next-generation computer canine thrives on love.



Super-Poo-Chi

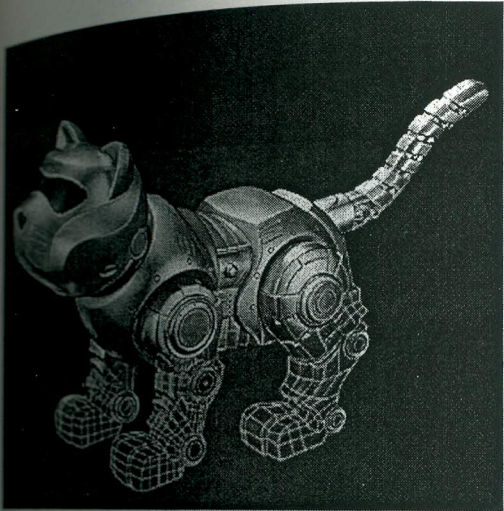
Super Poo-Chi is the interactive dog that responds to your commands! Super Poo-Chi's advanced biorhythmic technology and voice recognition make him the Top Dog. You can actually influence Super Poo-Chi's development through interaction. He will grow and mature as you train him - just like a real pet. He will respond to your commands and will learn to sing songs and do tricks - if you train him well. Your voice commands him to give paw, lie down, stretch, sit and more. The more care and attention Super Poo-Chi receives, the more willing he is to do tricks.



Poo-Chi

He sits. He sings. He even dances on his tiptoes. And he won't shed or chew up the couch. The latest innovation from the folks who brought you Furby, Poo-Chi is one smart puppy. His sensors allow him to react to light, sound and touch. Three separate motors give him the ability to do all the doggie basics—tail wagging, ear flapping, and stretching

KITTY THE ROBO-CAT



○ ○ ○ ○ ○ Kitty the Tekno Kitty is a true robot. She can think for herself and will act differently depending on what is happening to her or how she is played with. She “meows” in many expressive ways, cries when unhappy, wiggles her tail and purrs when she’s petted, and can even do amazing tricks!

Her sophisticated artificial intelligence software and state-of-the-art sensor technology, Kitty will let you know how she is feeling and provides feedback for the care you provide. She knows how long it’s been since she’s been fed and how often you have petted and played with her. She’s quick to let you know she needs more!

Kitty has a mind of her own! There are no “remote controls” to “command” her. She will do what she wants to do when she wants to do it - just like a real kitty cat. It all depends on her emotional state based on the situation around her and what’s happened to her in the past.

Pettin' and Purrin'

Kitty has three electronic “nerve” sensors located on the back of her head and running down the top of her body. These electronic sensors trigger Kitty’s emotion program. To make Kitty purr, run your hand over her back. You can also scratch her in the back of her head or pat her on her back. Kitty loves to be petted.

Walking

Kitty will walk when she wants to. Usually, if you call Kitty, she will Meow and start to walk. Sometimes she has a mind of her own and may take several calls. Be patient. She will come to you eventually.

Meowing

Kitty will Meow when she is stimulated. You will be able to tell over time if she is happy, upset, sad, lonely, excited, anxious, scared, or any number of emotions. Listen to your Kitty and you will learn a lot about how to take care of your pet.

Sleeping

Kitty will go to sleep during the day if she is not kept active. This may be several times a day. You will see Kitty’s eyes turned off and she will be silent. As soon Kitty hears something, is petted, or the lights suddenly change, Kitty will wake up and want to play again

Sniffing

○ ○ ○ ○ ○ Kitty will sniff anything that comes in contact with her nose. Put the object to her nose and press lightly.

Eating

Kitty loves her Fish Treat! Press the Fish (or any other food you want to feed her) up against her mouth sensor. You will hear crunching noises of one happy Kitty!

Wakin' up at exact time

Kitty will wake up at exactly the time you wish her to and play a special song.

SCREENFRIDGE

Electrolux has brought the refrigerator of the future - Screenfridge. Screenfridge made its premier at the international trade show Domotechnica in Cologne, Germany in February -99. The response was overwhelming. People from all over the world came to see our new prototype. Screenfridge is a combination of refrigerator and computer. Very powerful and useful for home automation. To give you a hint of what the Screenfridge can do, check out our on-line demonstration.

Internal communication

Screenfridge is a communication central where family members can communicate with each other either using e-mail or video-mail. A touch of a button is all it takes to record a video message and post it to another family member. Instead of using a traditional keyboard, we have installed a virtual keyboard using the touch-screen on the fridge.

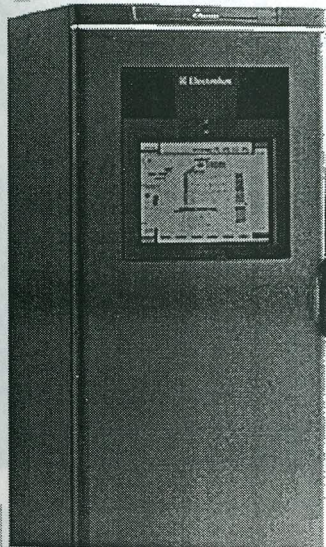
External communication

In addition to sending video messages to family members, you can also use the Screenfridge to send and receive e-mail. Family members have their own mailbox where both e-mail and video messages are stored. And yes, you can surf the web too.

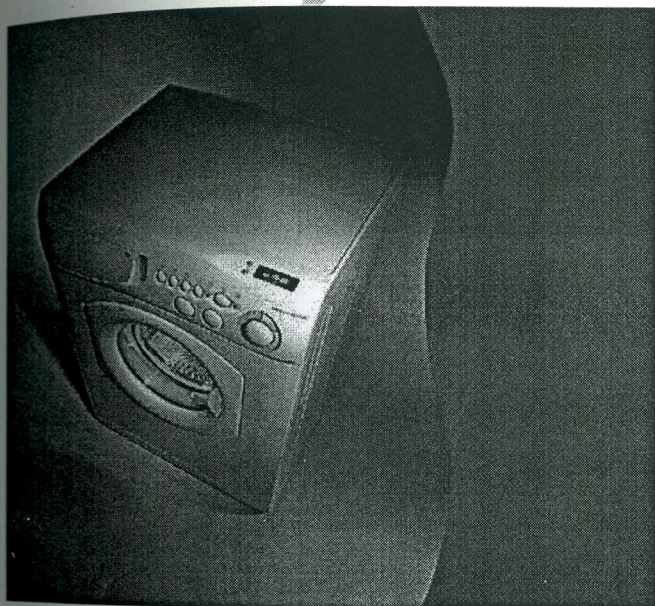
Food management

Food management deals with how to store, handle and prepare food. Screenfridge makes food management easier. By providing recipes suitable for food stored in the fridge and tips on how to store food correctly you gain valuable information how you best handle your foodstuffs.

Screenfridge is also equipped with a TV and radio receiver. Just imagine getting rid of that bulky tv-set in the kitchen and watching the morning news directly on the fridge instead. You can also connect surveillance cameras to your fridge to monitor your back yard or maybe your newborn.



Margherita 2000 washing machine

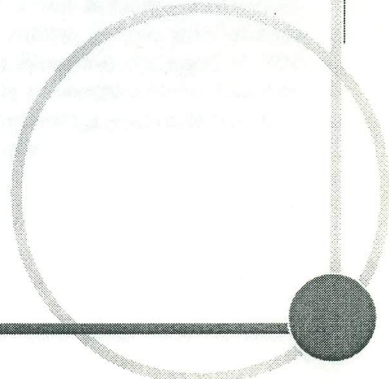
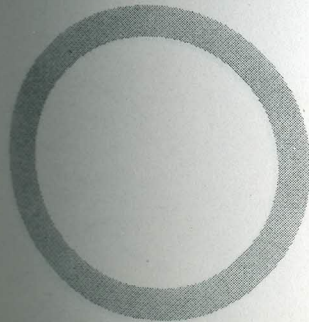


The new combined with the most advanced version of the Ariston Digital system has produced margherita2000.com. It is born a matchless synthesis between Ariston Digital Services and the “machinery” quality.

It starts a revolutionary, as well as an easy way to interact with the washing machine:

The revolutionary Margherita 2000 washing machine with the most advanced version of the Ariston digital system and created margherita2000.com. The result is an unrivaled perfectly balanced coexistence of Ariston Digital Services and the quality “machinery”. Yes, it's revolutionary. And yes, it actually does the wash. margherita2000.com is a clever appliance that communicates through its very own website and through the GSM lines

[Margherita2000.com](http://margherita2000.com) can receive text messages and it has a menu with remote access through GSM. Enter your code and see its condition, then set functioning parameters. [Margherita2000.com](http://margherita2000.com) not only receives. If some problems occur and it's necessary tele-assistance, the washing machine can send a diagnostic SMS to Digital Service Centre. On the display it will appear the cause and the Service Centre will call you back.



CHAT PEN



Swedish company Anoto, which has teamed up with Ericsson, showed off one of the most exciting Bluetooth products at this week's Bluetooth Developers Conference. By thinking beyond the standard applications imagined with Bluetooth technology, Anoto has made something old new again—the ink pen.

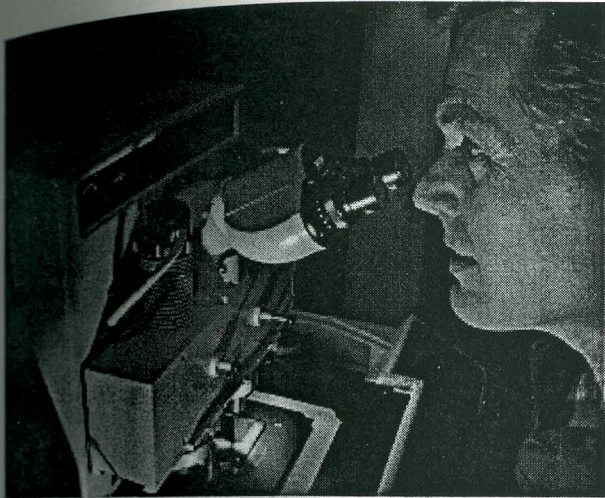
The Chatpen, currently in the prototype stage, lets you turn ink on paper into digital communication with seemingly endless applications. If you've ever tried to type a lengthy message on a mobile phone's keypad, you'll immediately understand the need for something like the Chatpen. Anoto has married sophisticated technology with a simple idea - people usually prefer the spontaneous expression of writing and drawing to typing.

Imagine writing information in your Filofax and having that information automatically sync up with your contact manager software on your notebook PC, with a colleague's PDA in an office half way around the world, or with your mobile phone in the other room. Imagine providing directions to a friend by drawing a map to your house and having him or her see it on the screen of his or her Internet/e-mail station across town, only seconds later. Finally, imagine doing all of your holiday shopping by leafing through glossy catalogs and simply circling the items you want. Your order would be sent instantaneously, and you'd never have to get off the couch or even enter your credit card and billing information. All of these things could be possible with the Chatpen.

The Chatpen has a regular ink cartridge in its tip and a miniature camera. Also, the interior of the pen holds a Bluetooth chip as well as a rechargeable battery, which provides power for days of use when fully charged. When you write on paper imprinted with a special Anoto pattern of tiny dots, the pen's camera can track what you're writing by how it aligns horizontally and vertically to the dots. These dots are hardly noticeable to the eye, and the pen is able to capture your handwriting almost exactly as it appears on the paper. The sensitivity is so refined that you can see the position, rotation, inclination, and pressure of what has been written. You don't have to learn a new alphabet or symbols, as with the Palm's Graffiti, and if you have terrible penmanship, it doesn't matter. As you write and the camera captures it, the Bluetooth chip sends the information to either a Bluetooth PC card or USB adapter in your computer, a mobile phone, or a base station that in turn is connected to the Internet. The pen can store 2MB of written information, so if a Bluetooth connection isn't available at the time, you can store your notes, drawings, etc. in the pen and beam them out later.



smart surgical scalpel



The device works by incorporating cancer cells into the lasing process, rather than shining a laser light like a spotlight upon the cell. A vertical microlaser beam enters individual cells as they are pushed by a micropump through tiny channels cut into the glass surface of the device. Because cancerous molecules contain more protein than normal cells, their additional density changes by refraction the speed of the laser light passing through them. This change is registered as a difference in output frequency by a receiver and transmitted by optical fiber to a laptop computer a few feet from the instrument. An algorithm translates the data into a graph that, changing moment by moment, provides surgeons with easily read peaks and valleys that clearly depict when tissue pumped from the incision has been cleared of cancerous cells.

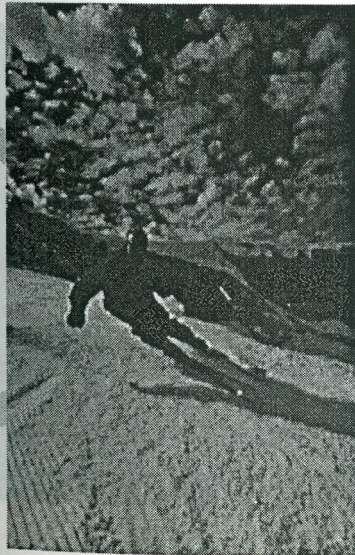
In a surgical scalpel, an aspirator would vacuum fluid from the incision to the microcavity laser enclosed in the handle of the scalpel. Information would be transmitted from the scalpel to the computer by optical fiber. The microcavity laser is far quicker to produce results than flow cell cytometers — the standard instrument used to determine the presence or absence of cancer in cells removed from an incision. Flow cell cytometers require cells to be stained with a dye in order to examine them. This lengthy process may take hours to alter the cells, and is of little immediate help to the patient, who

K2 Smart Ski

Now ski manufacturer K2 of Vashon, Wash., has developed a radical ski that it claims performs well in all conditions. The product development team set out to design an all-mountain expert ski with good performance in hard and soft snow, according to Timothy Petrick, vice-president and general manager for K2 North America. The engineers determined that short, wide, hourglass-shaped skis would provide the greatest versatility, he says. “But the downside of short skis is that they vibrate at high speeds, which causes instability and loss of control.”

The team decided to investigate so-called “smart materials” technology, which can use piezoelectric devices to detect the vibration and then function as actuators to oppose and cancel it out. Piezoelectric devices have the unique ability to detect an induced physical deformation such as a shock or vibration and convert it directly into an electric charge. (One of the more common piezoelectric sensors is the phonograph needle, which produces minute electrical currents in response to the tiny bumps in record grooves.) What makes the materials suitable for dampening vibrations, however, is that they can also do the reverse—convert an electric field into an applied stress or force.

This vibration-canceling capability boosts control on fast downhill runs and when carving quick turns on hard snow by keeping the Smart Ski on the snow, says Anthony DeRocco, director of the development team at K2. It works like a car’s suspension system, which improves control by maintaining contact between the tires and the road. As long as there is air between tire and road, no amount of steering will have any effect, he says. “The same is true of skis and snow: no contact, no control.”



NETSTAR JUKEBOX



Currently in development and expected to be ready for shipment in early 2001 the NetStar's appearance is similar to the traditionally popular LaserStar CD series.

However, this new jukebox has online Internet access through the Ecast software.

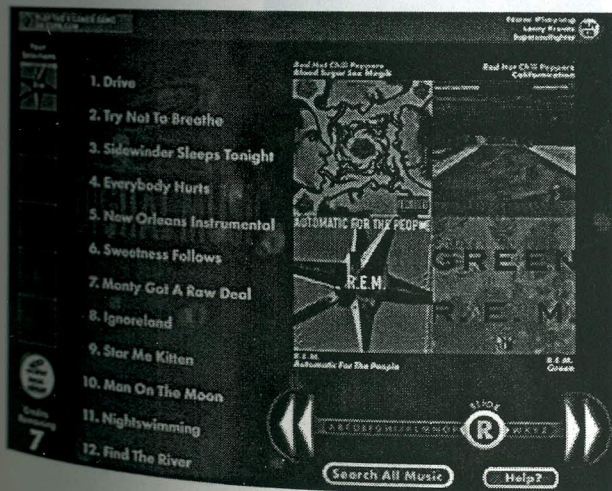
You can now have the following revenue enhancing features:

- Album capacity
- CD purchase option
- Play mine first option
- Single song download
- Credit card acceptance

From any PC you can log on to get a multitude of comprehensive management tools including:

- Remote component failure indicator
- Top songs on any or all machines
- Add/Delete albums at any or all sites
- Revenue indicators by machine

The Rowe NetStar powered by Ecast offers fully licensed music, a comprehensive operating software program, revenue enhancements, consistently updated features, solid construction, highest quality sound no moving parts and full warranty.



JALDA ONLINE PAYMENT OPTION



How it works

"Jalda" payment option on an Ecast-powered device. The transactions are completed quickly, securely and easily, and all purchases will appear on the user's monthly cellular service invoice. No messing around with tedious accounting - - since Jalda is an account-based system, both consumers and payment service operators are connected to a special account which administrates all transactions for both parties.

Perhaps most importantly, security is not an issue with Jalda. The system builds on digital certificates for authentication and SSL encrypting, making these transactions both secure and easy to administrate.

Why it's great!

Together, Ecast and Jalda provide a new service that gives customers what they want, when they want it. No mess, no hassle - - all in a secure, familiar, consistent fashion. Mobile devices have moved into the hands of almost everyone. Using mobile e-commerce you no longer need to fumble for coins, search bills, or drag out your credit card. Use your phone - and you're done.

What's it all about?

It's about freedom. It's about convenience. It's about trust. It's about enabling technologies to work together -giving people more choices about how they work and how they play! It's about time. Ecast, provider of the first universal platform for distribution and management of third party content in smart appliances, now deploys Jalda™, an open and global payment method. The Jalda payment method makes it possible for Ecast Network enabled devices, such as jukeboxes, to handle local payments made through the Internet simply by using your mobile phone. Whether micro or sessionbased payment - - with Jalda, no transaction is too complex. Jalda is a secure Internet payment method developed by EHPT, an Ericsson - Hewlett Packard joint venture. Its success is based on a thorough understanding of the convergence of telecom and computer networks. Jalda is the result of the combined strengths of these world leaders and have the potential to unleash the true revenue generating power of the Internet.



ROTOR 2000 WEBPHONE



The Rotor 2000 Webphone designed by Milan Pacific is more than just a pay telephone; it's a full-service telecom kiosk that brings public communication into the new millennium.

It is equipped with a touchscreen Internet browser in addition to traditional voice technology, the Webphone sets a new standard for accessible communications devices - both in performance and style. The Rotor 2000 Webphone exemplifies Milan Pacific's 20-year history of ground-breaking product designs.

Rotor 2000 phones are available in several different versions -- with or without fax, Internet or ISDN connections, and as a wall-mounted unit or freestanding phone booth.

The Webphone meant rethinking the traditional pay phone concept to incorporate new applications and technologies. The challenge was to design and engineer a reliable, sturdy and economical telecommunications terminal that is also appealing.

e-Coffee Machine



This Automatic Coffee Machine was designed and engineered for Rancilio, a leading Italian manufacturer of professional catering equipment.

Designed for use in high traffic bars and restaurants, it features a simple front LCD that enables one touch access to making espresso, cappuccino, café latte and all the combinations thereof. It simultaneously holds three different kinds of beans as well as two kinds of milk.

It also features a smart card reader and an Internet connection. The latter is used for sending self-diagnostic information back to the manufacturer.

Milan Pacific worked on all aspects of design, engineering and industrialization of this product.

E- HOME

Europe's first commercially available intelligent home, with a front door that opens at the touch of a fingerprint, a fridge that orders the groceries and a robot that mows the lawn, has been unveiled in Sweden.

The three-bedroom \$A774,000 house, one of six e-homes at Hageberg, an island suburb in the Stockholm archipelago, bristles with automated systems designed to minimise the stresses of modern living.

If the washing machine springs a leak, the house will phone the owner. Once a plumber has been summoned the front door can be opened remotely by tapping a PIN code into a mobile phone. For security's sake, the code is encrypted and the house checks the mobile phone number to ensure the householder is issuing the open-door command.

Until now, automated homes have been the stuff of science fiction. In his 1958 film *Mon Oncle*, Jacques Tati's character, Monsieur Hulot, was terrorised by a nightmarish robotic house of the future, with self-opening doors and remote-controlled fountains.

The Swedish e-home has turned fanciful futurist dreams into something akin to an electronic house servant. The screenfridge suggests weekly menus tailored to diet or lifestyle, then orders the necessary groceries on the Internet.

"You'll be able to phone your fridge when you're in the supermarket and ask it how much milk you need to buy," Mr Klein said.

The e-home begins the day by waking its residents with music piped from speakers hidden in the ceiling of each room.

Over breakfast, residents can watch television or read electronic newspapers on the screenfridge, or use it to check the weather, public transport timetables or traffic

THALIA PRODUCTS



thinking and linking appliances



*Thalia HomeHelper
Kitchen Console*



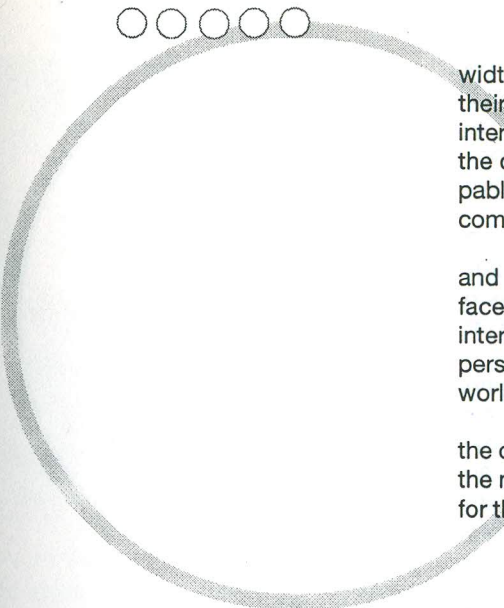
*Thalia HandHelper Personal
Digital Assistant (PDA)*



*Thalia TimeHelper
Alarm Clock*



Sunbeam Blood Pressure Monitor



Creating a sense of communion among a distributed group linked by low-to-moderate bandwidth networking is a complex challenge. Some people favor technology-mediated communication as their most authentic way of sharing ideas and enjoying fellowship. Most people prefer face-to-face interaction, but find that the convenience of just-in-time, any-place access to others often outweighs the disadvantages of distributed sharing of ideas, experiences, and support. Groupware tools, a capable moderator, and shared interactivity and control are important for sustaining the vitality of virtual communities, as is occasional direct contact among participants.

To succeed in sustaining communion among people, distributed learning must balance virtual and direct interaction. A relationship based only on telephone conversation lacks the vibrancy that face-to-face interchange provides. Similarly, while digital video will broaden the bandwidth of virtual interactions via information infrastructures, teleconferencing will never completely substitute for direct personal contact. We can expect a variety of social inventions to emerge that provide the best of both worlds.

We are just beginning to understand how knowledge webs and virtual communities can reshape the content, process, and delivery of conventional distance education. Information infrastructures are the new type of learning device that is spurring this evolution, just as the steam engine was the driver for the industrial revolution.

Attentional Problems in Using Smart Products

One of the major reasons why person fails to use a new product is that the product over-loads user's attention and working memory. People have limited ability to process information, but new technology often offers too many or inadequate signals how to use products. For efficient use, it is not desirable to force people to use manuals or memorize complicated operations and symbols.



The Links Between Product Design and Interaction Design

These attributes have to do with the physical part of the product - its aesthetic design, ergonomic issues and suitability to human body and to the intended use environment - as well as with the software part of the product - its aesthetic design, usability issues and suitability to the intended task. The different purposes of modelling in the product development process, and in concept definition especially, will be studied and the modelling techniques suitable to the purposes will be defined.

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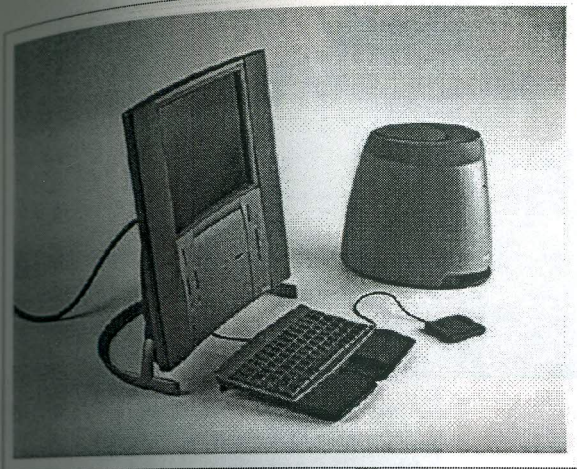
MATERIALS FOR SMART PRODUCTS

Materials technology is the hidden revolution in engineering. Historically, we have been dependent upon the intrinsic limitations of materials in whatever we built. Fundamental new knowledge now allows us to realistically consider designing new materials from scratch with any set of characteristics we choose. (Glass, for example, that it is flexible in a certain temperature range, photoresponsive, and perhaps also simultaneously electrically conductive is not beyond our capabilities.)

Social forces are acting to push many of the large artifacts of society to greater durability and longer lifetimes, and encouraging greater use of recycling, reclamation, and remanufacturing. Environmental pressures, limitations on resources, and the capabilities of engineering will make durability and those three Rs universal and routine throughout the world.

Another aspect of materials is the movement to miniaturization and modularity. Small modules use less material and energy and lend themselves to convenient replacement and centralized repair or reclamation. Microdevices smaller than the cross section of a human hair are now in commerce. These devices will function as sensors, actuators, and functioning elements in boundless applications in machines and living organisms, including people. Beyond micromachines lies the more speculative world of nanodevices. Nanotechnology will be based on the manipulation of individual atoms and molecules, with the ultimate goal of allowing us to duplicate what nature does. While it is hardly conceivable that we can collapse 3 billion years of evolution into a few decades, we are already witnessing the engineering capability to cut, to machine, to make sandwiches at the nanolevel. Those capabilities will develop into important parts of the engineered world over the next few decades.

20TH ANNIVERSARY MACINTOSH



The 20th Anniversary Macintosh titillates the user's senses, surpassing its functionality as a computer and entertainment system and elevating the computer to a new level of artistic achievement.



Released as a limited edition item, in the hopes that it would become a collector's item, the *20th Anniversary Macintosh* was perhaps the first personal computer to be designed with the express intent to serve not only as a high-end performance machine, but also as an art object. Its striking, flat-panel design, with its vertical CD-ROM drive and cable-ready television and remote-control hookups, is matched by an equally impressive sound system, designed by Bose, comprising an AM/FM tuner, upper and midrange speakers, and an elegant, separate subwoofer.

The *20th Anniversary Macintosh's* concave profile, based on Bang & Olufsen's stereo component designs, cradles the screen framed by the narrow fabric-covered speakers. Its minimalist design, however, is not for want of sophisticated and intricate details, such as the hidden wire track and removable wrist pad that accompany the detachable mouse. Weighing in at only ten pounds and characterized by its unique slim footprint, this desktop computer also features an aluminum stand, which allows the machine to tilt at various angles and doubles as a handle for carrying the computer.

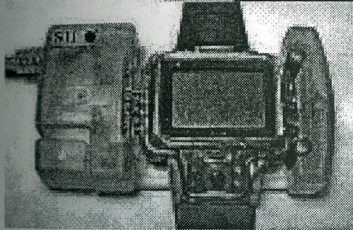
From its Italian-glove-leather wrist rest to its concert-hall-quality sound system and metallic green-gold-and-gray-hued surfaces, the *20th Anniversary Macintosh* titillates the user's senses, surpassing its functionality as a computer and entertainment system and elevating the computer to a new level of artistic achievement. The *20th Anniversary Macintosh*, therefore, serves as testament to the inherent potential of the assimilation of computer technology into our aesthetic lives.

WRIST WATCH GADGETS

OnHand PC

The onHand PC comes with a small serial docking station for syncing data to a desktop PC. The dock is plastic and holds the onHand via a spring loaded lever. Getting the unit in and out of the dock is quick and easy. The docking station requires the use of a COM port and has a max speed of 38,400 bps for transferring data to the desktop PC.

The onHand PC comes with nice PC Desktop software. The Desktop Applications Software includes the onHand desktop PC versions of the address book, scheduler, memo, to-do list, and expense tracker. The Desktop Applications Software also includes the file manager, control panel and synchronization software for the onHand PC. Plus, the Desktop Application Software comes with several bonuses like an image converter, world time editor and alarm sound editor

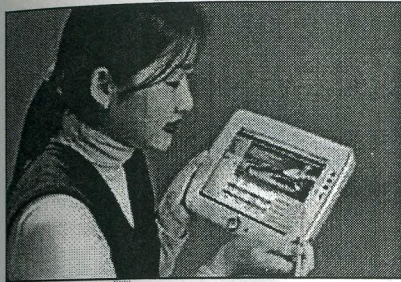


wrist watch camera



Samsung wrist watch mobile phone

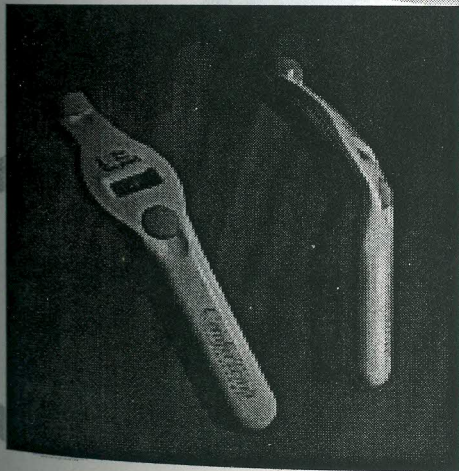
DIGITAL IPAD



LG Electronics has developed a web pad, Digital iPAD, signaling its entry to the potentially very lucrative web pad market. Since web pads support wireless Internet search and AV data transmission/reception while enabling wireless connection with other devices, it is being hailed as a "Post PC."

The new product can directly access the Internet in a wireless environment and enables wireless networking with devices within a maximum of 100 meters around it through wireless LAN. In the future, in addition to simple Internet access, it will also support home networking features to wirelessly control various appliances at home. LGE plans to introduce Bluetooth-enabled home networking products in April.

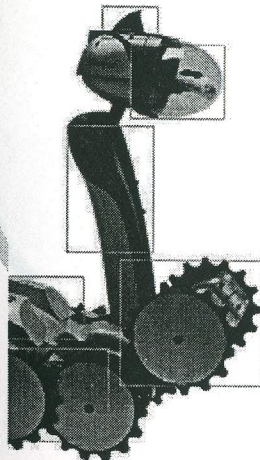
Digital iPAD has a pen recognition function that recognizes Korean as well as English inputs so that you can use the touch-screen function on the 8.4-inch LCD for e-mail, word processing and many other functions. It also has a media player that can run video and MP3 files. When the voice recognition feature is added, video phoning will be possible. It can also be used for car navigation via a geographic information system.



Infrared thermometer

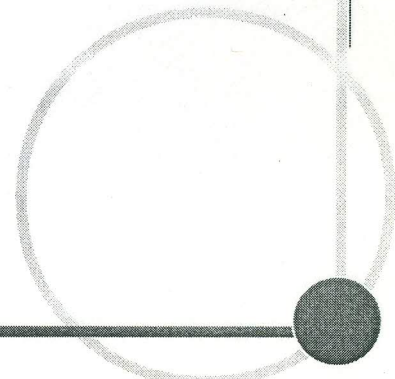
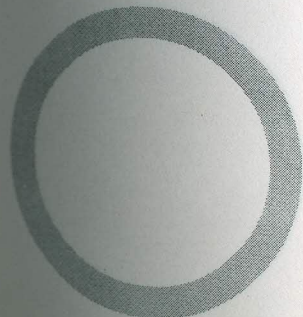
The First Years Comfortemp is the first axillary infrared thermometer to be developed for home use. The unique curved head design is ergonomically optimized for use with infants on a changing table or in a mother's arms while also being appropriate for self-testing by an adult. It uses battery-operated infrared technology to take an instant temperature measurement in the underarm area. A single button is depressed and the temperature is instantly displayed on the LCD display. A replaceable cap protects the sensor from moisture and dust.

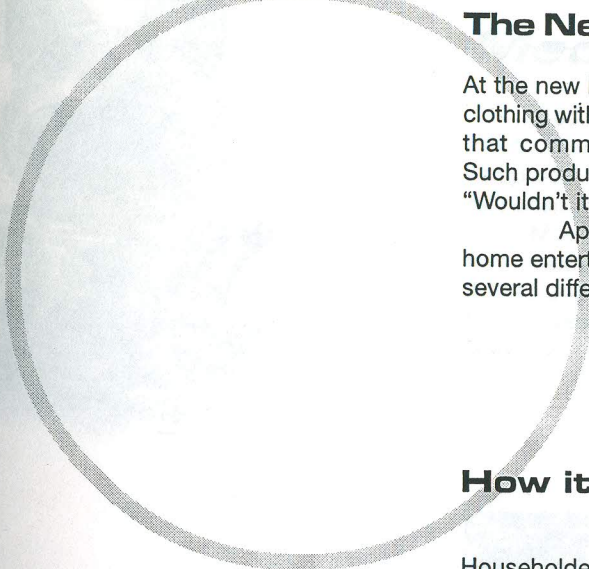
iRobot-LE



The iRobot-LE™ is not a web cam. The advent of mass access to immense bandwidth has made it possible to put personal web video cameras everywhere. While this is, in itself, neither good or bad, it could lead to situations where we are being monitored 24 hours a day, and privacy is a thing of the past. For example, if you wanted to be able to see what was going on at your house, you would have to install and wire cameras in every room. That's a lot of cameras, and for your family, it means never knowing if you are being watched or not. The iRobot-LE is different since it's a "physical presence" that can be driven anywhere in your home. If it is in the room looking at you, then it can see you. If it's not there, then it can't. If you want privacy, close your door. That's it. The iRobot-LE is an example of technology used responsibly to simplify our lives, not make them more stressful.

Up until now, home robots have been little more than toys, but the iRobot-LE is different. It is a powerful personal computer integrated into an ingenious mechanical body with sensors that allow it to understand the world around it. Unlike the many robots that have preceded it, the iRobot-LE is a serious appliance that can bring the power of the Internet out of the study and into the kitchen or living room when you are at home. With the iRobot-LE, you can project your physical interactive presence anywhere in the world there is an iRobot-LE you are authorized to use.





The Next Level of Smart Applications

At the new lab, scientists will go to work on a whole new wave of smart product applications — like clothing with computerized labels that can tell a washing machine which cycle to use, and dishwashers that communicate with other household appliances about noise levels and energy usage. Such products would improve appliances that have the capacity to be smart, but aren't linked with . "Wouldn't it be great for the consumer if smart products could be smarter and talk to each other?"

Appliances able to chat with each other would make everyday life far easier. For example, a home entertainment center with "talking" components would free users from having to struggle with several different remote controls or download each machine's specifications into a universal remote.

How it Works

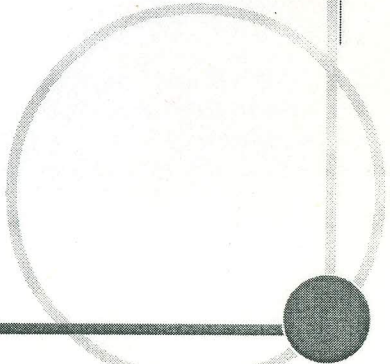
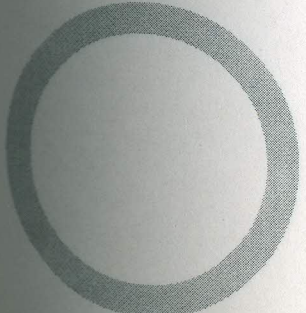
Householders will have a private Internet home page, secured by firewalls and a security code, to control their homes, and operate machines via a small box installed in the house. the new system would not require people to buy new ovens or fridges. other machines by a computerized network.

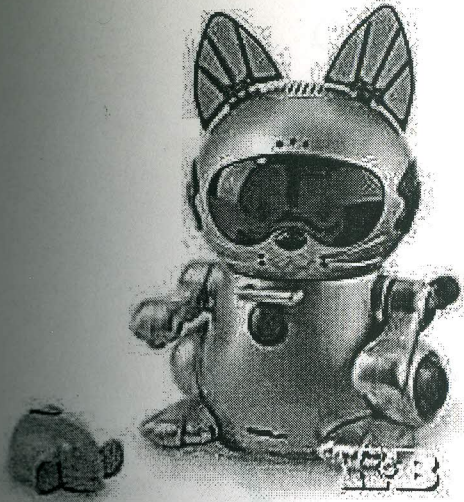
"Small units will be added to the machines which can then communicate with the box,"

The system will also help people save time and money by combining services which they pay for

For instance,

"People will be able to rent a washing machine in a "pay-as-you-wash" deal, registering water and electricity used for each wash,"

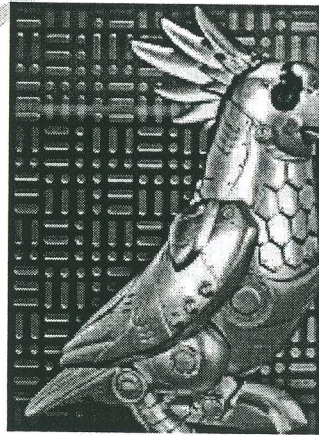




Meow-Chi

Meow-Chi, the interactive toy that's like a real cat! With its moving head, ears, legs, and mouth, Meow-Chi meows, sings, stands, sits, wiggles its ears, moves its paws and even dances on its tiptoes! This cute cat uses advanced bio-rhythmic technology to create realistic emotional responses that adapt and change as you play.

Meow-Chi senses light, sounds, and your special touch! Its animated eyes convey emotion from happiness to sadness to love. Meow-Chi loves to be cared for and the more you take care of it, the happier Meow-Chi will be! Meow-Chi loves playing with its play mouse and responds with happy eyes and wiggling ears! Meow-Chi can speak, sing 8 different songs, and interact with other Robo-Chi animals! Meow-Chi stands 5" high and 6.5" long.



ROBOTIC PARROT

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WHAT IS FUZZY LOGIC

FUZZY LOGIC is a problem-solving control system methodology that lends itself to implementation in systems ranging from simple, small, embedded micro-controllers to large, networked, multi-channel PC or workstation-based data acquisition and control systems. It can be implemented in hardware, software, or a combination of both. FL provides a simple way to arrive at a definite conclusion based upon vague, ambiguous, imprecise, noisy, or missing input information. FL's approach to control problems mimics how a person would make decisions, only much faster

Fuzzy Logic and Neural Networks in Washing Machines

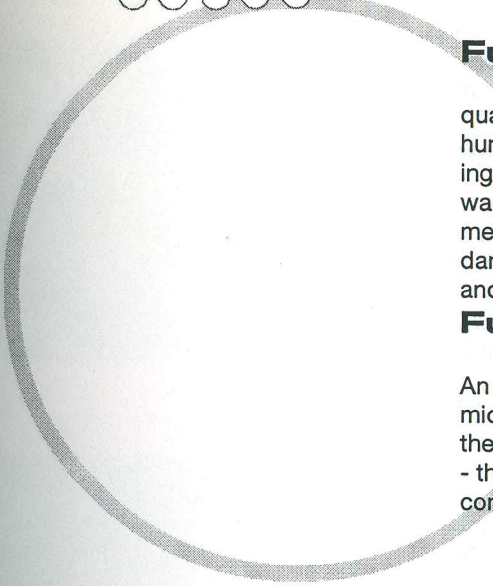
- When creating washing machines, water consumption and energy is a concern
- Fuzzy logic systems help relieve this concern with washing machines that sense the type and size of the clothing load, adjusting temperature and water output accordingly based on the knowledge of installed fuzzy logic sensors
 - These optimal temperatures and water outputs are easily determined by washing experts but must be installed by using experimental results of a neural network
 - These efficient washing machines run on the fuzzy logic systems that a neural network's learning generate

These new machines have a small chip or microprocessor that is programmed to store fuzzy logic rules and make decisions as fuzzy weighted averages. The "smart" washer has just one button to push and automatically adjusts the wash cycle to the type of clothes and dirt status. The agitator feels the load size and guesses at the clothing type as it knocks off dirt. An optical device senses the murkiness of the water and tells the microprocessor the dirt level and thus the detergent level needed. Fuzzy set instructions in the microprocessor turn sensor data into wash commands: load size detected (small, medium, large or very large), water clarity detected (very dirty, dirty, medium clean, or very clean), and water/detergent level needed (little, medium, or a lot of water/detergent). In the same way, a fuzzy dryer turns the flow of hot air, load size, and fabric type into drying times and drying strategies.

Additionally, fuzzy logic blood pressure gauges, video cameras and elevators are emerging from Japan and are now being sold in the world market.

FUZZY LOGIC APPLICATIONS TO IAQ

The specialty area of indoor air quality is very much suited to a fuzzy logic approach. The Japanese have incorporated fuzzy logic into building ventilation systems and janitorial and building maintenance equipment. Even IAQ project management lends itself to this fuzzy approach. It has proven to be more useful and effective than the classical "binary" approach currently used by project managers.

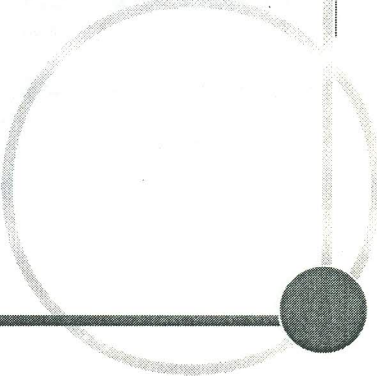
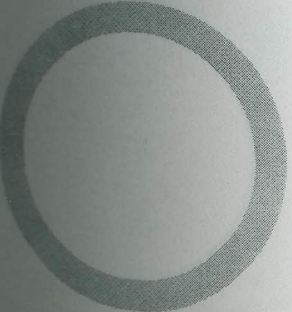


Fuzzy HVAC Systems

Control the temperature, humidity and carbon dioxide parameters in order to achieve optimum quality indoor air. Thermal sensors are set up to control fan motor speeds and heating/cooling coils, humidistats to control fan motor speeds and steam and carbon dioxide sensors to control the opening/closing of outside air dampers. Each parameter has a fuzzy set: temperature - cold, cool, just right, warm, hot; humidity - very humid, humid, just right, dry, very dry; carbon dioxide - very low, low, medium, high, very high. These parameters are mapped into air velocities, on/off times, outside air damper settings and patterns which combine all of these parameters for optimum occupant comfort and energy usage.

Fuzzy Vacuum Cleaners

Sense the amount of dust on a carpet or condition of the floor and set the proper suction level. An infrared sensor detects the amount of dust being sucked up and relays that information to the microprocessor, which selects the proper motor speed; the more dust the higher the power. Because the sensor also tracks the changing levels of dust, a set of lights indicates the cleanliness of the floor - three red lights for plenty, two for some and one for little. When the floor is clean, a green light then comes on.



Fuzzy Traffic Light Controller

In a conventional traffic light controller, the lights change at constant cycle time, which is clearly not the optimal solution. It would be more feasible to pass more cars at the green interval if there are fewer cars waiting behind the red lights. Obviously, a mathematical model for this decision is enormously difficult to find. However, with fuzzy logic, it is relatively much easier.

Fuzzy Design

The first sensor behind each traffic light counts the number cars coming to the intersection and the latter counts the cars passing the traffic lights. The amount of cars between the traffic lights is determined by the difference of the reading of the two sensors. For example, the number of cars behind traffic light North is $s_7 - s_8$.

The distance D , chosen to be 200ft., is used to determine the maximum density of cars allowed to wait in a very crowded situation. This is done by adding the number of cars between to paths and dividing it by the total distance. For instance, the number of cars between the East and West street is $(s_1 - s_2) + (s_5 - s_6) / 400$.

Next comes the fuzzy decision process which uses the three step mentioned above (fuzzyfication, rule evaluation and defuzzification).

Step 1

As before, firstly the inputs and outputs of the design has to be determined. Assuming red light is shown to both North and South streets and distance D is constant, the inputs of the model consist of:

- 1) Cycle Time
- 2) Cars behind red light
- 3) Cars behind green light

The cars behind the light is the maximum number of cars in the two directions. The corresponding output parameter is the probability of change of the current cycle time. Once this is done, the input and output parameters are divided into overlapping member functions, each function corresponding to different levels. For inputs one and two the levels and their corresponding ranges are zero(0,1), low(0,7), medium(4,11), high(7,18), and chaos(14,20). For input 3, the levels are very short(0,14), short(0,34), medium(14,60), long(33,88), very long(65,100), limit(85,100). The levels of output are no(0), probably no(0.25), maybe(0.5), probably yes (0.75), and yes(1.0). Note: For the output, one value (singleton position) is associated to each level instead of a range of values. The corresponding graphs for each of these membership function is drawn in the similar way above.

Step 2

The rules, as before are formulated using a series of if-then statements, combined with AND/OR operators. Ex: if cycle time is medium AND Cars Behind Red is low AND Cars Behind Green is medium, then change is Probably Not. With three inputs, each having 5, 5, and 6 membership functions, there are a combination of 150 rules. However using the minimum or maximum



smart shoes

Over the last seven months The Electric Shoe Company has embarked on the development and commercialisation of Trevor Baylis' latest innovative idea: footwear capable of converting the energy generated by movement into electrical power. Piezo-electric materials incorporated, either as discrete devices within the structure or as an integral part of the structure of the shoe/boot, which when compressed generate a substantial voltage and, with the addition of appropriate electronics can be used to charge a mobile phone battery.

Miniature electro-mechanical devices, such as a "heel-strike" dynamo, which when positioned in the heel of a shoe would rotate as a result of contact with the ground.

Inductive, magnetostrictive and biomechanical devices will also be evaluated over the coming months.

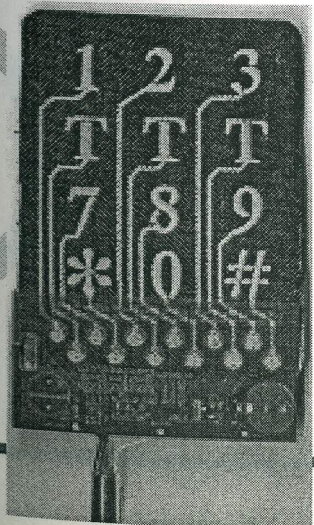
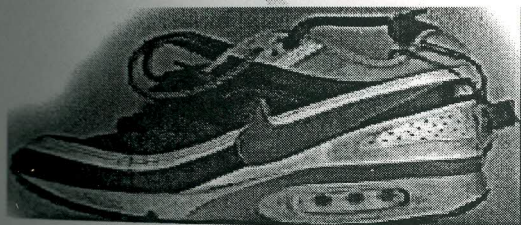
Just as difficult and part of the overall challenge is the issue of storing & distributing the raw electrical output of the shoe in a format that suits the needs of the myriad of devices that could be powered using this energy source.

Examples of smart clothing include internet-connected shoes (Figure 1) which allow one to run with a jogging partner located in some distant place, but connected via the network. Viewpoints might also be shared using the "eye-to-eye" glasses (where a portion of each runner's visual field comes from the other runner [Mann94].) One of author's shoes, equipped with sensors, measure the impact of various parts of the shoe with the ground. This gives the wearer's computer a sense of the pace, so that, for example, joggers might pace themselves with a distant partner connected through wireless communications. Such technologies enhance one's capabilities of self-expression.

All-fabric capacitive keyboard.

Keyboards can also be made in a single layer of fabric using capacitive sensing [Baxter97], where an array of embroidered or silk-screened electrodes make up the points of contact. A finger's contact with an electrode can be sensed by measuring the increase in the electrode's total capacitance. It is worth noting that this can be done with a single bidirectional digital I/O pin per electrode, and a leakage resistor sewn in highly resistive yarn. Capacitive sensing arrays can also be used to tell how well a piece of clothing fits the wearer, because the signal varies with pressure.

The keypad shown here has been mass-produced using ordinary embroidery techniques and mildly conductive thread. The result is a keypad that is flexible, durable, and responsive to touch. A printed circuit board supports the components necessary to do capacitive sensing and output keypress events as a serial data stream. The circuit board makes contact with the electrodes at the circular pads only at the bottom of the electrode pattern. In a test application, 50 denim jackets were embroidered in this pattern. Some of these jackets are equipped with miniature MIDI synthesizers controlled by the keypad. The responsiveness of the keyboard to touch and timing were found by several users to be excellent.



CONCLUSION

In the Near Future.

Two out of three homes are connected to the Internet and our simple electrical-devices communicate with each other across our household power lines. Services and controllable functions are piped into our homes upgrading our products, and helping us manage our busy lives. Simple products change functionality and features with nearly every bit of information that flows in and out of our homes. More than ever, product designers and manufacturers must keep pace with the explosion of new products and services created by emerging technologies.

Intelligent Devices. Alarm clocks, refrigerators, home-heating controls, toasters...they communicate with each other and the world to do one simple thing: save time and help people manage their increasingly hectic lives. The cooking-range is now a portal for information and control, while it still helps us cook our meals. This cooking-range contains speakers, an LCD screen, a hot-water spigot, bar-code scanner, an automatic mixer...and more features can be added at the touch of a finger. As these heretofore "simple" devices begin to communicate, and as their functions expand, so too must their basic designs. What possible evolutions can these products make? The possibilities are virtually unlimited, which is a good thing for the product design business. But beyond the growing volume of business, the real impact on the design community may well be the concept of speed. The increasing speed of development projects. The speed with which new ideas become products and services. The blazing speed of change in a connected world. The speed needed to help people save time for things other than managing their lives..

Why on earth would I want my refrigerator to talk to my coffee maker? It's all about time...saving it and doing more in less of it. The time we once spent not working, yesterday's "leisure time," is ancient history. Whether we know it or not, we now seek "recovery time," where we aim toward a recharge from living in five-minute increments. That recharge demands speed. Products and services will continue to evolve as we become more and more time deprived.

Designers and developers must understand how to develop or appropriate the right technical and human knowledge to inform their innovations.

As products get smarter, as they begin to communicate and think, almost overnight, they create opportunities for new services, which in turn create opportunities for new products. Somebody has to design these new products, so we may as well start talking about what the future holds.

References...

Books..

Toffler A., Future shock
Toffler A., Third wave

URLs..

www.amazon.com
www.comforthouse.com
www.CNN.com
www.honda.p3.com
www.howthingworks.com
www.jalda.com
www.maytag.com/mths/appliance_breakthroughs
www.nec.com
www.robotbooks.com
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www.usatoday.com

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