perception**enhancement**

Life and soul

Professor Joseph Giacomin draws us into the 21st Century where products are demonstrating activity, intelligence and emotion

❚ **Inview** - real-time head-up display swimming goggle projecting time and lap count. *Katie Williams*, *Sharper Innovation Show 2005*.

A question which has been loitering among my neural synapses for some time now is what is meant by the use of the word "animate" when describing design products. What has a designer achieved when she or he has created a product which is "animate"?

A quick hop into the Oxford English Dictionary suggests that the adjective "animate" has its origins in the Latin "anima", which is customarily translated as "life" or "soul". But what does it mean to have life or soul? Here we quickly find ourselves lost in a dense jungle of philosophical debate, a rich la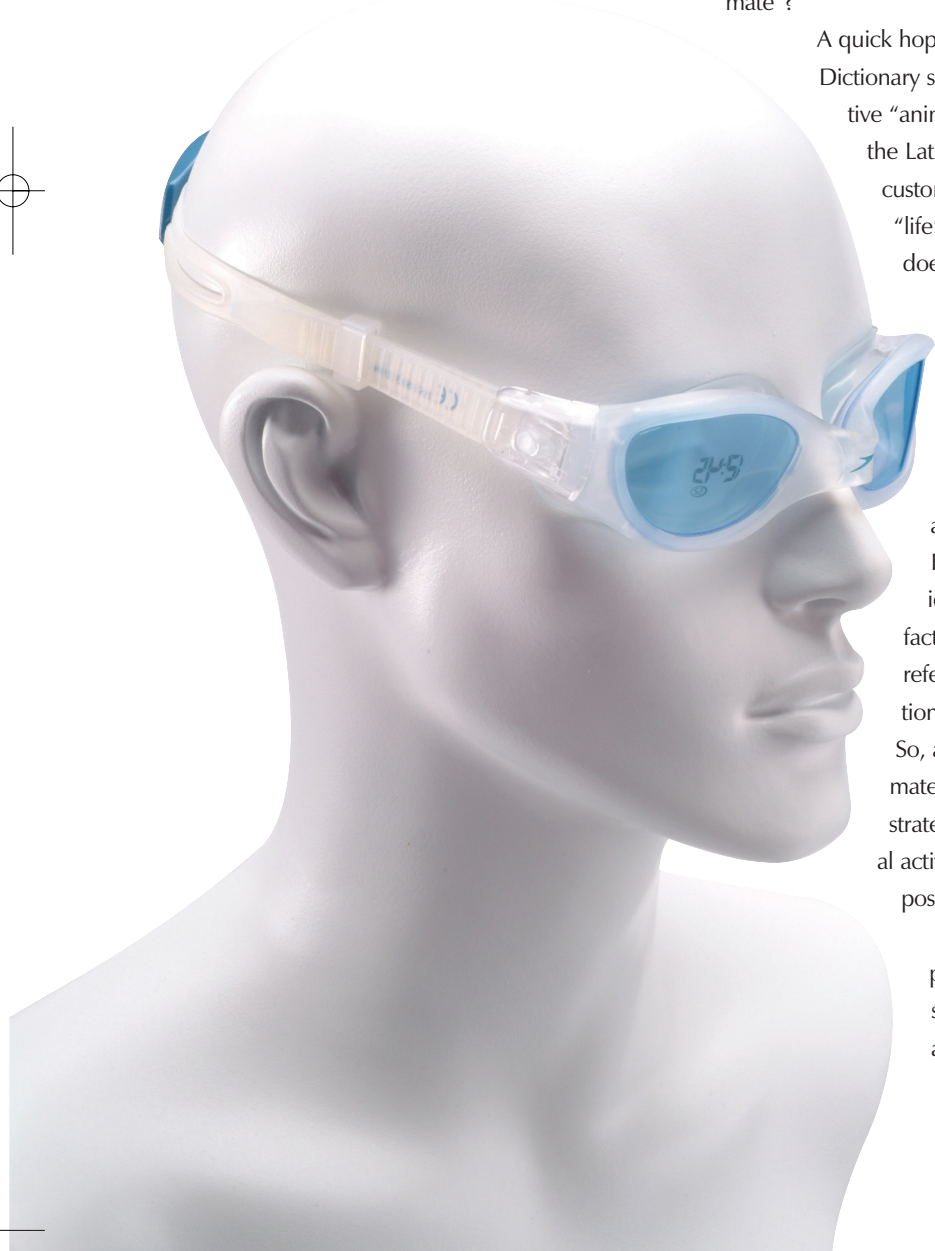nd of observation, hypothesis and argumentation. However, reappearing ideas tends toward the fact that soul somehow refers to intellectual, emotional and moral behaviour. So, a product which is "animate" presumably demonstrates properties of functional activity, intelligence and possibly even emotion.

But how did this happen? When did products start demonstrating activity, intelligence or emotion? The roots of this phenomena are often identified with the golden age of the automaton in the 18th Century, when craftsmen scientists like Jacques de Vaucanson produced mechanical devices and toys with a bewildering array of sound and motion abilities. Vaucanson's mechanical duck was a marvel of mechanical engineering which awed the people of its age. Nevertheless, mechanical engineering alone could not produce the richness of motion and the diversity of action required to exhibit complex and lifelike behaviour. Machines capable of such richness of output are generally believed to have first arrived on the scene in the 20th Century, with the advent of the computer and of solid state electronics.

Since the mid 20th Century researchers have used criteria such as the well known "Turing Test" to compare machine behaviour to human behaviour, attempting in the process, albeit indirectly, to define what aspects of our behaviour actually makes us human. Today as we enter the 21st Century we find ourselves on the shores of a surprising new world in which the products we design are becoming smarter, incorporating more numerous and sophisticated human perceptual and cognitive abilities. Thanks to new sensor technologies, cost-effective digital electronics and flexible servo-motors, many recent products blur the traditional distinctions between human and machine.

In this new century, which some scientists describe as the century of the human brain,

ASIMO - the humanoid
robot from Honda
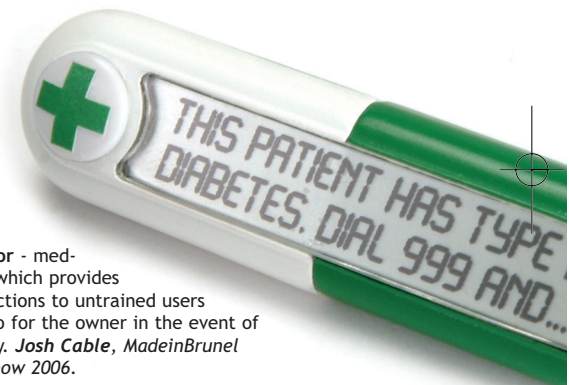
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there seems to be an ever increasing stream of daily announcements regarding new findings in the fields of physiology, neuroscience, psychology and artificial intelligence. While product design has occasionally struggled to match the blistering pace set by the scientific pioneers, a simple book search on Amazon nevertheless suggests that the gap between theory and the practice is not as wide as one might think. Scientifically minded individuals are moving into the gap with thought provoking works such as Neil Gershenfeld's *When Things Start to Think*, Ford, Glynour and Hayes' *Thinking About Android Epistemology* and Ray Kurzweil's *The Age of Spiritual Machines: When Computers Exceed Human Intelligence*. Some of our design colleagues have likewise begun the rush into the gap with works such as Bill Moggridge's *Designing Interactions* or Dan Saffer's *Designing for Interaction: Creating Smart Applications and Clever Devices*. Even the quickest of surveys leads to the inevitable conclusion that basic science's ever increasing understanding of the working brain is having a knock-on effect on product design. Two particularly recent technological paradigms which I expect will soon be filling bookshelves and infiltrating conversation are those of 'perception enhancement' and 'augmented cognition'.

The concept of perception enhancement emerges from the observation that not all product stimuli are informative. Only certain cognitively-relevant features have meaning for humans. The term can be used to describe

any situation in which the visual, sound, tactile, olfactory or gustative stimuli are shaped so as to optimise the flow of useful information to the user. The goal is to design products which selectively modify key stimuli such that human interaction with the product is enhanced. In elementary terms, such systems clarify what is going on, and, in certain situations, can make the machine feel like an extension of the user's own body. Systems for providing humans with enhanced perceptual abilities have been in use for some years now in military environments, but they are also currently finding their way into consumer product design. Products ranging from the primary controls of an automobile through to home video games can be designed so as to be perception enhancing. Further, if the designer is both courageous and determined, advanced sensors can be built into products such that the human operators sees and feels information which are not normally available through the usual biological channels. Heat can be seen, smell can be felt and movement can be heard. There are today few technological limits to the ability to filter, adapt and transform stimuli before they reach the product's user.

The concept of augmented

cognition emerges from the observation that human cognitive mechanisms are usually the bottleneck of the information processing which occurs when a person uses a product. The goal when designing an augmented cognition system is to extend human capabilities by means of tech-
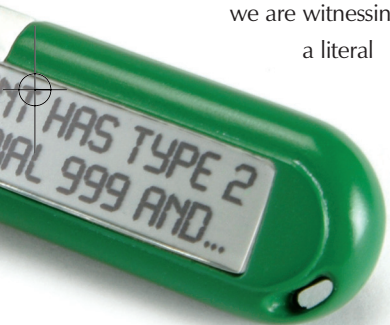

❙ **Emergency Communicator** - medical product which provides simple instructions to untrained users on what to do for the owner in the event of an emergency. **Josh Cable**, *MadeinBrunel Innovation Show 2006.*

❙ **TomTom GO710** - portable car navigator system.

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nologies which overcome human cognitive limitations. Some typical ways in which a product designer can achieve this goal include the use of cues to attract attention to specific items of data, the use of cues to aid in the efficient switching between tasks and the use of multimodal or multi-dimensional information streams. Currently, we are witnessing a literal

explosion in the number of consumer products which include some level of augmented cognition. Simple glasses and goggles provide information by means of embedded or heads-up displays, some devices for the home monitor the correct function of various items and warn the occupants of unusual situations, and various medical and navigation devices aid people by means of instructions in both written and natural language formats. Intelligence and animation are already obvious characteristics of many products, and the number of products which exhibit such characteristics is likely to expand dramatically as cheaper and more intuitive technologies are made available to designers.

So, the use of the words "intelligent" or "animate" must refer to this growing tendency to design products which assist their users, either by perception or by cognition. Science fiction? Scary? Well... not really. It has always been good design practice to produce functional, intuitive and emotionally engaging products. This does not change in the new landscape. What does change, however, is the rigour which the designer can deploy to achieve these traditional goals.

Whereas in the past a product concept might be judged against the aesthetic and emotional values of the designer, or of the client or of a small user group, the emerging science of the brain, and the new technologies that it brings with it, are providing a wealth of rigorous neural, psychological, philosophic, ergonomic and artificial intelligence criteria which the designer can use to achieve his or her objectives. The designer of the 21st Century is therefore faced with the immense opportunity, but also with the not inconsiderable challenge, to master these new techniques so as to systematically achieve high quality, emotionally engaging, product designs.

Ask today a randomly chosen stranger on the street what is meant by good design and his or her response will very likely involve the use of the words "form" or "function" or "emotion". It is quite possible, however, that in 10 or 20 years time the same randomly chosen person may respond that good design is achieved when the product is animate. A walk around any recent design show, or a quick read through many recent product catalogues, suggests that products are evolving. The interested observer might also spot that many aspects of perception or of cognition are being designed into many new products. Some small part of what it is to be human is being put into the products we use. What is very interesting about this process is that, far from being scary, this trend appears to be finding a warm reception from the public. In many market areas it seems that the public cannot get enough of animated products, with buyers streaming into stores to purchase a range of products from wearable electronics, to satellite navigators to robotic toys. In fact, this is also the century of the humanoid robot, possibly the ultimate in perception enhancing and augmented cognition systems. What about these new household partners? What are the sociological, technological and ethical considerations needed to design them?

Designers be advised, we are at the start of a very busy century... ▮

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