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Picture: MICHAEL WEBB



Prof Stephen Hawking at work: 'My computer system is vital... Without it I would be a vegetable, unable to communicate'

ONE OF THE most brilliant theoretical physicists of our time — Cambridge University's Prof Stephen Hawking — is a striking example of how, with the help of computers, the human intellect can triumph over disability.

He is now widely considered one of the greatest theoretical physicists since Einstein. Yet, at 46, Hawking has lived more than 20 years longer than he once expected to.

He is one of the disabled people who last Wednesday at London's Dorchester Hotel helped show representatives of the Government, employers, trade unions and computer companies how disabled people have become eminent in their own fields with the help of computers.

Deprived of virtually all voluntary movement by years of wasting illness, Prof Hawking guides his battery-powered wheelchair — and operates its built-in computer and voice synthesiser — with a barely perceptible movement of a finger.

He says he is "all in favour" of the initiative to use high technology to help more disabled people that has been launched by the British Computer Society. "A large number of disabled people could be helped by modern information technology," he says.

He speaks with a synthesised American accent. "My computer system is vital to me. Without it I would be a vegetable, unable to communicate."

However, he feels that not enough attention is being paid in this country to easing the lot of the disabled. "There is

Finding a voice with a flick of the finger

TECHNOLOGY

Roger Highfield

much less done in Britain for disabled people than in other countries, such as the United States or Sweden."

When he talks he squeezes a slim black control box, his head lolling back against a head-rest. A series of clicks issues from the computer. A personal dictionary of about 3,000 words scrolls down a screen, and Prof Hawking is able to move his finger a fraction to squeeze the control box and halt a cursor on the required word.

When his answer is complete, the voice synthesiser, made by the Californian company Speech Plus, speaks. The voice "is the best I have heard, though it gives me an accent that has been described variously as Scandinavian, American or Scottish".

He was recently offered an upgraded version of the voice but, says Mr Walt Woltosz, president of Words Plus, the company that developed the software, "he didn't like it. He said that is not my voice and

made them put the old one back." Mr Woltosz says the key to setting up a system for a disabled person is to find a way for them to communicate with the computer. Some can use a keyboard, others, like Prof Hawking, use a switch.

Infra-red switches, tiny joysticks, blinking, eye movement or eye gaze, are also used. A "morse code" system has been developed for blind disabled people.

"There is something available for almost any disabled person," Mr Woltosz says.

Using his hand switch, Prof Hawking is able to write lectures and save them on disc. "I can then send it to the speech synthesiser a sentence at a time," he says.

Recently he gave a series of lectures at the University of California at Berkeley, a campus that is striking because of the large number of disabled people that can be seen whizzing around on wheelchairs.

His lectures were packed out — professors and students charged into the university's largest lecture theatre to hear him talk about his goal: a complete understanding of the universe.

To this end, he has been working since 1974 on marrying the two cornerstones of 20th-century physics: Einstein's General Theory of Relativity, which deals with gravity and the study of large scale phenomena, and quantum theory, which covers elementary particles and the study of the very small.

He has proposed a model of the universe based on two concepts of time: "real time", or time as human beings experience it from their limited standpoint; and "imaginary time", the time on which the world might really run.

Prof Hawking studied physics at Oxford University, and when his illness first struck, he was a first-year research student at Cambridge. He was diagnosed in his twenties as having amyotrophic lateral sclerosis (ALS), a paralysing disease that attacks the body's nervous system.

"The only consolation they could give me was that I was not a typical case. There did not seem much point in working at my research, because I didn't expect to live long enough to finish my PhD," Prof Hawking says.

But the spread of the disease slowed, and he met Jane, his future wife. They now have three children. "This gave me something to live for," Hawking says. "If we were to get married, I had to get a job. And to get a job, I had to finish my PhD. I therefore started working hard for the first time in my life. To my surprise, I found I liked it."