



When Archimedes met Jackie

Finding a way for a child with cerebral palsy to use a typewriter sparked a sharp career turn for Neil Scott.



In 1977 the man who witnessed a little girl named Jackie valiantly, but vainly, flailing away at a typewriter in Wellington, New Zealand wasn't Archimedes, the third-century Syracusan mechanical genius famed for exclaiming "Eureka" upon displacing his bathwater and for boasting "Give me a lever and a place to stand, and I will move the world". It was me. But ultimately, if circuitously, my meeting Jackie led to the founding at Stanford University's Center for the Study of Language and Information (CSLI) a research organisation called The Archimedes Project, whose mission is leveraging technology to allow people with disabilities to efficiently 'move their world' through interacting with information and controlling their environment.

Just weeks before meeting Jackie, the director of the design school at Wellington Polytechnic, where I was then dean of the engineering department, saw a small teaching computer on my desk and had asked me if computers could be used to turn lights on and off. Immediately, I wrote a little program that did so. Impressed, the director asked me to demo the solution at the Crippled Children's Center, where many of the kids couldn't operate light switches manually. This demo of how inputs other than keyboard command could turn lights off and on inspired a request from the headmistress of Wellington's special education school. Could something be done to help ten-year-old Jackie, who couldn't do most of the things children her age could do, including write in a school notebook?

When I arrived at the school, Jackie's wheelchair had been set before a typewriter and the little girl was swinging her arms so violently, she seemed to be attacking the machine. She could not control her movements well enough to hit the keys with the nail-like device strapped to her wrist. In retrospect, I recognise that seeing Jackie's struggle, and similar ones by other disabled children, mostly in wheelchairs, was my Eureka moment: "This is all so wrong" was the intense thought that instantly overcame me.

Before turning in that night, I hit on an

engineering approach that not only proved successful for Jackie – she could move her knees to tap out Morse code on switches on stalks projecting from a computer – but also changed my life. Trained as an electrical engineer, I have for more than 25 years focused on using technology to improve access to information and control over their environment for people with disabilities.

In 1986, I emigrated to the United States. After two years in San Francisco as a consultant in disability access, I spent five years at the Northridge campus of California State University, where I developed and ran one of the first major Computer Access Labs for students with disabilities. The lab, which served more than 1,000 students, was a very educational experience for me. Forcing me to assess the pervasiveness of the barriers to computing for disabled people, it strengthened my determination to remove them.

The Archimedes Project

In 1991, I was invited to continue developing computer access technology for people with disabilities at Stanford, where I co-founded The Archimedes Project. Not a specific project, we are a group of individuals from multiple disciplines and broad real-world experience who are committed to making information technology universally available to all people, regardless of their abilities, needs, preferences, and culture. As with other innovations originally aimed to compensate for human limitations – for example, the TV remote control, which was invented for people with limited mobility but now used by everyone, our work with adaptive technology has inevitably brought us to see radically new approaches for how all people can more affordably, efficiently, comfortably, and conveniently benefit from our ever increasing wealth of information appliances. And by 'all people', we mean every person on the planet, not only people with physical and cognitive limitations, but also the elderly, people who can't



read or have little money, as well as the increasing numbers of people everywhere who must, or wish to use computers and information appliances for work or personal enrichment.

Adaptive technology with a twist

Traditionally, adaptive technology has required the modification of existing computers and devices to enable their use by people with disabilities. As we all know, this approach simply doesn't work: it takes too long, costs too much, and quickly becomes obsolete, given the predilection of the information technology industry for predicating profitability on planned product obsolescence.

The Archimedes approach is radically different in that it equips individuals with a device that allows them to use all computers and devices, including future models, without requiring modification to their hardware or software. Our model is analogous to giving a person with limited vision a pair of glasses that enables him or her to see everything clearly. For example, with my glasses, I can read this article, watch TV or a movie, or enjoy a sunset. Similarly, Archimedes's patented Total Access Port (TAP) allows its user to use any computer, including ones not yet released, as well as public information kiosks, and the whole spectrum of information appliances.



Neil Scott (left) and quadriplegic user JB Galan

Turning concepts into products

Because the Archimedes team believes that information technology holds enormous promise for improving human lives, we are dedicated to helping realise that promise through original and collaborative research, education, and studies and projects with companies, organisations, and nations.

Education is a vital part of our mission. We encourage creative and entrepreneurial people from all parts of the world to join us as visiting research assistants or interns. This summer, 20 exceptionally talented graduate students from nine countries as well as Stanford, toiled away in the Archimedes Access Factory, a 10-week program designed to complete the testbed and demo suite requested by several universities and technology centers worldwide to allow them to replicate our approach to developing universal access systems. Given the huge opportunity for technological solutions to prevent human limitations from being handicaps and the

wealth of global resources eager to contribute their efforts, we believe that sharing our research approach can save others time and money in working toward their own solutions.

For human beings to benefit, solutions must reach the people for whom they are intended. Consequently, we established a non-profit corporation – Archimedes Access Research and Technology International, Inc. (AARTI) – to design, develop, and test prototypes incorporating technologies resulting from our research. AARTI offers training and consulting services such as seminars on accessibility, project management tools, process control strategies, design information, legal requirements, and website assistance.

And then, to license these prototypes to companies for the manufacture and marketing of prototype-based products, we formed a for-profit entity, AARTI Holdings, Inc.

Finally, given the urgent need for solutions and the fact that many of the world's people who could benefit most from our technology can afford it least, we are establishing the Archimedes Foundation at Stanford University. It seeks funding not only to support our collaborative research efforts and our researchers, many of whom have joined us from far-flung parts of the globe, but also to make the fruits of our research available to people who could not otherwise obtain them.

The need for accessibility tools is global, but so are the resources for creating them. One of Archimedes' key strengths, I believe, is the alliances we have formed not only at Stanford, one of the world's leading centers of information and computer science, but with other universities, product developers, and manufacturers worldwide. These include Ritsumeikan University (Japan), the Royal College of Art (UK), Trinity College (Ireland), Auckland University of Technology (New Zealand), the San Sebastian Technology Park (Spain), and EDF (France).

The Archimedes Project had its beginning a quarter century ago in my encounter with Jackie in New Zealand. But since there are no limits to the ways technology can extend human ability, this project – really, an article of faith and aspiration – has no ending. My hope is that increasing numbers of individuals, companies, organisations, and nations will share our commitment to empowering people everywhere through developing and deploying innovative and affordable technology that serves their unique needs. □

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