In 1956, armed with one man’s vision and £50,000 of race winnings from a generous benefactor, the University of Sydney helped launch Australia into the computing age. The 50th anniversary of the building of Australia’s first electronic computer, called SILLIAC (Sydney’s Illinois Automatic Computer), will be celebrated at the University in September.

One of the most advanced computers of its era, SILLIAC was built at the University thanks to the inspiration of the head of the School of Physics at the time, the charismatic Professor Harry Messel (MSc ’87, DSc ’92), a Canadian-born scientist who moved to Australia after completing his PhD in Ireland. Carrying out complex calculations on the fluctuation theory of nuclear particles and cosmic ray air showers, he realised he needed an electronic computer for his work. The most advanced then available was the ILLIAC (Illinois Automatic Computer), designed and built at the University of Illinois.

Faced with what he describes as a “great lack of enthusiasm”, Messel was determined to raise the money to build it. He knew computers were the way of the future, but the University, government and business disagreed. “I was told to stick to my slide rule,” he says. “I needed [a computer] for my own research but what was more important, I thought this was the coming thing of the future and would be a great jump forward for Australia.”

Using his contacts in the US, Messel managed to arrange for two scientists from Australia to help upgrade the ILLIAC. But he needed £50,000 to build it – about $2 million in today’s terms. “When I mentioned this, everyone started laughing,” he says. Fortunately, Messel was introduced at a “very posh luncheon in town” to Adolph Basser, an owner of racehorses and Saunders jewellery store. “I put forward the idea he might be willing to support the construction of the first major computer in an Australian university. He had the common sense and vision to see this might be an exciting and wonderful thing for Australia. He then gave the University the £50,000” – later doubled to £100,000. One of Basser’s horses, Delta, had won the 1951 Melbourne Cup and he donated the prize money. The computing laboratory was named in Adolph Basser’s honour.

Messel’s team approached Standard Telephones and Cables Pty Ltd (STC, now Alcatel Australia), and SILLIAC was built in the School of Physics using STC components in 1955 and 1956. The first scientific calculation was performed on 4 July 1956, and the computer was launched by Sir John Northcott, the governor of New South Wales, on 12 September 1956.

Despite SILLIAC’s bulk, it had a tiny memory, in today’s terms, of about 5 kilobytes. To program it, operators had to type the instructions directly on to paper tape. The mainframe, which contained nearly 3000 old radio valves, reached from floor to ceiling and consisted of a closed cabinet in which chilled air circulated to cool it. Occupying a whole room in the physics faculty, it used so much power it had a separate room...
for power equipment and an enormous cooling plant downstairs. Keeping it maintained and adjusted required a team of full-time engineers. Even turning it on was a major exercise.

But its design made it about 40 times faster than anything else around. Other designs minimised the number of electronic components for simplicity, but at the expense of performance. SILLIAC was based on John von Neumann’s fast design from the US, in which everything operated in parallel rather than a bit-by-bit serial design.

“A remarkable group of people were involved,” says John Deane, a computer historian who has written a book on SILLIAC that will be launched during the celebrations. Construction was directed by Brian Swire, whose team included engineers Barry de Ferranti and Peter Aplin. Its software was written by John Bennett, who taught people how to use SILLIAC. “Somehow he made them think this was easy,” Deane says.

“John Bennett was a marvellous man,” says Elizabeth Johnston, one of SILLIAC’s original operators. “No one knew anything about computers at that stage. It was another language.”

Its first operator was Judy Ogilvie, who married Chris Wallace from the physics school. Ogilvie became an author and Wallace a world expert in computer techniques. With many enthusiastic young men and just a handful of women working on SILLIAC, it was no surprise there were four marriages in one year, says Elizabeth Johnston.

“It was an exciting and demanding time,” says Barry de Ferranti, now chair of the ICT [Information and Communication Technology] Pioneer and Leaders Events Committee running the anniversary event. “We were a team and we worked hard. My intended bride would stand outside the window and ask when I was coming home.”

When sustenance was needed, “Peter, Brian and I would go up to the Newtown pub, order some prawns and chips and work through until 10 or 11 at night. Then Brian would say, ‘I’m thirsty’ and he’d reach down to the bottom of SILLIAC, where there was just enough room in bottom drawer for two bottles of beer where the cold air came in. It was an ideal refrigerator.”

In the mid-1950s it was not obvious what a computer was good for, other than number crunching. But SILLIAC became a workhorse and a vital part of the physics faculty and other University departments. It also became a way of introducing computing to business and the rest of the world outside the University. “SILLIAC and the people around it were able to introduce problem solving as the key use of a computer as opposed to the whizbangery of giant electronic brains, the concept at the time,” says de Ferranti.

The physics faculty ran courses, training heads of companies and computing departments. The Snowy Mountains Scheme was initially designed using SILLIAC and a program was devised

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“SILLIAC was the springboard for the IT revolution. It's vital we recognise that pioneering and leadership role. It's a real milestone.”

to produce payrolls for post offices. It was used by Australian and New Zealand computer departments, government and industry for projects including helium physics, cosmic ray air shower analysis, X-ray diffraction data processing and aircraft design. It was also used in Australia’s first networking experiments.

One of SILLIAC’s more quirky applications was its ability to play music through an attached loudspeaker. On Open Day in 1956, before its official unveiling, it played Happy Birthday and Yankee Doodle Dandy. It was the University’s principal computer until 1964, when the English KDF 9 was installed. In a moving ceremony in 1968, SILLIAC’s power was turned off as it played a Chopin funeral march.

Did the people involved have any idea to what extent computers would be part of our lives 50 years later? Barry de Ferranti knew that when people asked him questions related to problem solving, “we were doing more than just mucking around with binary digits. We were handling information, and this is at the heart of every decision. Information and the processing of information is vital.”

Harry Messel is delighted that 50 years ago he “helped launch Australia into this amazing age we live in today”. Now in his 80s, he is busier than ever, concentrating on travelling, fly-fishing, writing recommendations and reports. He is just as enthused today as he was 50 years ago and is still a computer user. “You can control them mostly these days but they can still drive you round the bend,” he says.

“SILLIAC was the springboard for the IT revolution,” says de Ferranti. “It’s vital we recognise that pioneering and leadership role. It’s a real milestone.”

The 50th Anniversary of SILLIAC will be celebrated with the ICT Pioneers and Leaders, Information and Communication Technology Symposium and Celebration Events (12–13 September 2006). For more information visit www.silliac.org

The SILLIAC 50th Anniversary Celebration Dinner will be held on Tuesday 12 September 2006. For more information please contact Alison Thorn on: +61 2 9036 5194 Fax: +61 2 9351 7726 or Email: a.thorn@physics.usyd.edu.au

THE UNIVERSITY OF SYDNEY INVITES YOU TO CELEBRATE A GOLDEN ANNIVERSARY IN COMPUTING

**ICT PIONEERS AND LEADERS CONFERENCE**

**12-13 September, 2006**

SILLIAC, the first supercomputer built in Australia, began its life right here in the University of Sydney, 50 years ago. This year we celebrate its creation in a two-day gala event. We look back to see how far we have come since that momentous day, and look forward to see what will the next 50 years in ICT bring?

This is a unique opportunity to see where it all began! Meet the pioneers behind the first Australian supercomputer.

**DAY 1: THE FIRST 50 YEARS – AND BEYOND**

- Grand Opening and tour of the new Home of ICT in Sydney
- Book launch & DVD
- Celebration Dinner

**DAY 2: COMPUTING THE FUTURE**

- What will the next 50 years in ICT bring?
- Symposium with International Speakers
- Panel discussion with industry leaders
- NSW Pearcey Awards

For further information go to [http://www.silliac.org](http://www.silliac.org)
As with the revolution that started with SILLIAC, research currently being carried out by CUDOS (the Centre for Ultrahigh bandwidth Devices for Optical Systems) will change our world, says its director, Professor Ben Eggleton. Funded by an Australian Research Council grant, five universities and more than 80 researchers are investigating the leading-edge science of photonics – the science and technology of sending, controlling and processing information with photons - and its use in the next generation of optical communications.

Optical physics and photonics have already produced communication systems from the laser to the optical fibre. “We now have an incredibly efficient way of communicating through the internet and cell-phones,” says Eggleton. “It’s one of the breakthroughs of the 20th century.”

CUDOS is researching two main ideas in the field of nanophotonics (the behaviour of light in nano scale dimensions): controlling light in small structures and light-by-light switching. Combined, these ideas could create a photonic chip, a microprocessor that relies on photons or light beams.

Currently, information can be transported with photonics, which has given us the internet. But electronics still does much of the processing or information control. An electronic switch relies on an electrical current to turn a light beam on and off, and this is a slow process. CUDOS’s solution uses another optical beam, called light-by-light switching, to do this and is 1000 times faster.

Eggleton says the University of Sydney is leading the world in photonics, bringing together Australia’s top researchers and working on problems that will produce the next generation of optical communication systems.

“It’s fundamental science right now … a leading-edge and ambitious program that’s about solving problems in 10 to 25 years,” he says. “It’s strategic science to make sure Australia is in the lead.”

**Embedded computing**

A separate research group known as the SMART Internet Technology Research Group aims to build smart personalised spaces for the future when computers are more embedded in everyday objects.

“We are looking at a future where computers are closer to personal assistants, where they help you communicate and keep in touch,” says Associate Professor Judy Kay, co-leader of this group in the School of Information Technologies.

Their first idea, called Keep in Touch, aims to make intergenerational communication easier, so that, for example, grandparents can keep in touch with their grandchildren. Its technology is easy and natural to use and is embedded in the environment. “It could be used by a frail, elderly person or a pre-literate child,” says Professor Kay.

A touch screen shows pictures of people in your closest circle. Touching someone’s picture allows you to send them a message whether they are in your home or another home. The message is delivered a bit like an SMS or email. The system tells the recipient they have a message, they touch the message and it is played. A small child could tell grandma what they did that day.

Another area of research is known as the magic mirror, an exploration of an unobtrusive, “invisible” computer system. When inactive, it looks like a mirror in a frame and is literally “part of the furniture”. But when a member of the family comes up to it and waves, the screen becomes active.

“Because it’s a mirror, you don’t want to touch it but we want people to be able to wave to play and record messages,” Professor Kay says.

**Photonic research will change our world, says Professor Ben Eggleton.**

Associate Professor Judy Kay presents a free public lecture, Hidden Intelligence in Pervasive Computing, on Wednesday 25 October 2006 as part of the Sydney Science Forum. The venue is the Eastern Avenue Auditorium, University of Sydney, at 5.30pm. Phone (02) 9351 3021 for more information. Bookings essential.