

TECHNOLOGY & INNOVATION



Whole new industries are now emerging as a result of the ever-increasing rate of technological development. Still others will emerge as our world expands, creating more and more challenges in areas like the environment, transport, food production and health...challenges you can be seeking answers to.

Innovation and Technology is the leading edge of manufacturing and offers a tremendous diversity in careers for people with a head for science and a love for exploring possibilities.

Conducting ground-breaking research and using state of the art equipment and facilities, you could work on manufacturing new medicines, medical devices, nutraceuticals, health products, 'smart' building products, information and communication systems, diagnostic and therapeutic equipment and fibreoptics.

There are opportunities for careers in Biotechnology, Biomedical Engineering, Clinical Engineering, Computer Engineering, Systems Design, Systems Engineering, Software Engineering and IT. There are also opportunities in a variety of laboratory work for lab technicians.



Kate Meagher

"If you're the kind of the person that really likes practical application of the theory - if you like the hands on stuff, and you like pulling stuff apart and working out how it's made - then I think being an Engineer is a great job.

What's good about it is that you interact with people and you feed off each other's ideas.

I really like my work mates actually; they're a great bunch of people and it's a fun kind of place to be..."

Design & Process Engineer @ Cochlear

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TECHNOLOGY & INNOVATION

BIOTECHNOLOGY



Biotechnology will significantly change how we live. You can be part of the way we diagnose and treat society's most serious diseases, produce food, repair and manage the environment, or even use DNA to solve serious crimes.

Working in Biotechnology, you'll manufacture products that use micro-organisms, plant cells and animal cells to produce or modify materials such as food and medicine that are useful in our daily lives.

Australia's Biotech industry is one of the most advanced in the world. Our medical research pedigree, biodiversity of plant and animal life, infrastructure and political stability ensures a big competitive advantage in the Asia-Pacific region.

Biotech represents a major growth sector for scientists, manufacturers and business people, with many government departments, hospitals, universities and



Professor Ian Frazer is inventor of the world's first cancer vaccine Gardasil.

Gardasil is a vaccine to prevent human papilloma virus (HPV) infection, the leading cause of cervical cancer.

Cervical cancer is responsible for 270,000 deaths each year worldwide.

As a result of his work, Professor Frazer was named 2006 Australian of the Year.

LIFE SAVER

start-up companies now involved in commercialising research projects.

If you like the idea of using biological means to mould the future, a career in Biotech will allow you to contribute to the development of new products and work on exciting research projects.

Relevant qualifications that could lead to a job in this area are to be found in the Laboratory Operations Training Package ([see the Qualifications InfoSheet](#)).



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AGRICULTURAL BIOTECHNOLOGY



The agricultural sector continually seeks innovative solutions to providing enough food for the world while at the same time supporting a healthy, efficient agricultural system that is environmentally sustainable. Agricultural Biotechnology is providing these answers.

With the world's population growing exponentially, the Ag Bio sector is likewise rapidly growing, and it has the potential to respond to the challenges of producing enough food to feed the planet.

You could work towards reducing chemical fertiliser use by manufacturing bulk compost for agriculture. Emerging companies are supplying custom compost to agriculture and making soil additives and soil remineralisation products. There are also opportunities in milk harvesting and fabricating milking equipment. Or you might find new ways to make vegetables grow faster or increase their shelf life.



'Rusts' are a type of fungal disease that affect many plants, including wheat and some fruits, and in Australia sometimes whole seasons of wheat and barley crops are wiped out.

Discovering how plants can resist attack from the 'rust' fungus resulted in Dr Jeff Ellis and his team winning a CSIRO Medal in 2004.

The discovery has made it possible to develop rust-resistant varieties of wheat, already saving the industry \$300 million a year. It also has the potential to combat 'rust' diseases in all the world's major crop plants.

EARTH SCIENCE

If you like research and development and finding solutions for environmental issues interests you, then you could get in on the ground floor of this growing industry.

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**BIOMEDICAL
ENGINEERING**



Would you like to research and design ways to improve health care and medical services? You could develop and oversee the operation of diagnostic and therapeutic equipment or design medical devices that improve the quality of life for people with disabilities.

Biomedical Engineers have produced artificial parts for hearts, ears, limbs – and given quality of life, and life itself, back to many who otherwise would be without it.

Biomedical Engineers work in health care and must have a good theoretical and practical knowledge of engineering, a sound understanding of medical sciences and the ability to combine the two. As a Biomedical Engineer, you may design new medical monitoring, diagnostic and therapeutic equipment, test safety, efficiency and effectiveness of equipment or plan data processing services and develop the associated computing programs.



Invented by Dr. Graeme Clark, and designed and made in Australia, Cochlear Limited's hearing implants have already helped over 60,000 severely and profoundly deaf children and adults around the world.

Cochlear implants work by stimulating inner ear nerves directly, bypassing the recipient's outer and middle ear structure altogether.

Cochlear has recently won an order to supply \$270 million worth of hearing implants to a Taiwan healthcare organisation.

LISTEN UP

You could design and deliver technology to assist people with disabilities, analyse and design prosthetic and orthotic devices or design and develop equipment for medical imaging to display anatomical detail or physiological function.

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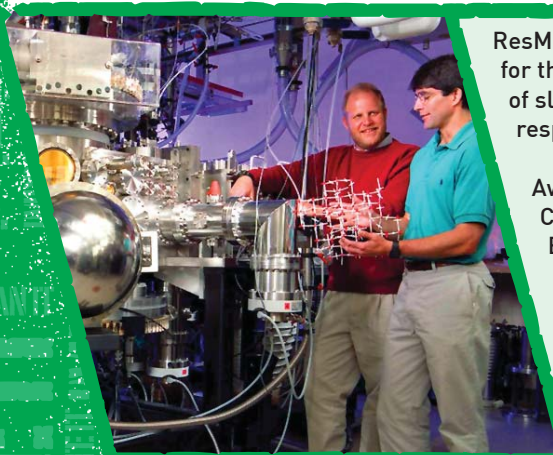
SCIENTIFIC EQUIPMENT



Manufacture of precise medical, surgical and optical equipment is a craft in its own right, where design tolerances must be strictly adhered to – the smallest error in the calibration of a mirror in an earth-orbiting satellite reflecting telescope is not easy to fix in space!

Scientific equipment in Australia is manufactured by a small number of large multinationals and a large number of small to medium sized manufacturers that are often highly competitive and innovative. Some of our companies lead the world in high quality instrument development, in areas such as spectroscopy, chromatography and highly specialised medical equipment.

This is a knowledge intensive industry and concentrates heavily on research and development. High global demand for medical equipment and strong export sales has also resulted in strong growth in this area.



ResMed develops and manufactures products for the screening, treatment and management of sleep-disordered breathing (SDB) and other respiratory disorders.

Awards include BusinessWeek 100 Hot Growth Companies (6 times), Ernst & Young Entrepreneur Of The Year® 2005 (CEO Dr Peter Farrell), and 2005 NSW Premier's Exporter of the Year.

Their S8 Series Flow Generator and HumidAire 3i Humidifier System won a 2006 Australian Design Award.

BREATHE EASY

This is an excellent area in which to make a career if you are interested in science, can work with great accuracy, and have a strong attention to detail.

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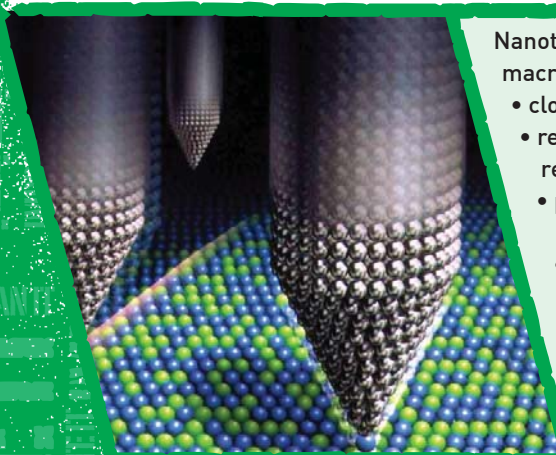
NANOTECH



Are you interested in molecular science and quantum mechanics? Would you like to work in a hot new emerging technology predicted to have a \$10 trillion dollar marketplace by 2010?

Nanotech is already being used all around us by many industries and multinational corporations. The use of molecular or nano-size particles, and their special properties, underpins most of the consumer electronics industry and is fundamental to the silicon industry.

Nanotech companies are innovation-driven and offer many opportunities to design, develop and manufacture new nano-materials and products, such as self-cleaning glass, stain resistant fabrics, solar controlled glass and UV protective coatings for plastics and polymers.



Nanotechnology is the micro technology having macro impact. Already in development (or here):

- clothes that clean themselves
- regeneration of nervous system to enable reversal of paralysis
- plastic food wrap that blocks oxygen, multiplying the shelf life of food
- computer switching technology, much smaller that will change the rules of data storage;

...and if you've used a UV-blocking sunscreen it may well be "powered" by nanospheres of titanium.

SMALL STUFF

You could be a computer scientist working on high performance computing, a microscopist using scanning probe microscopes, a nanotech engineer, an industrial chemist or a research scientist. This area is only limited by your imagination!

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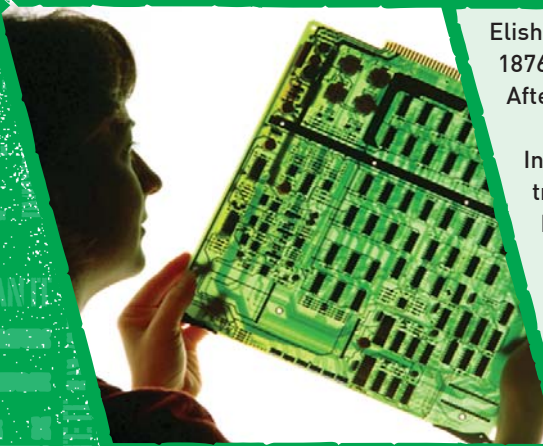
INFORMATION COMMUNICATION TECHNOLOGY



The information, communication and computer technology (ICT) industries are growing rapidly in Australia. Most businesses are small, employing less than 20 people and offering good opportunities for building a career with a dedicated team.

ICT is now also embedded in almost everything we use – from cars and washing machines to refrigerators and toys. You could also work on the making of innovative new mobile phones, wireless technology, smart card and touch screen technology, automated ticketing systems, automatic telling machines, digital video systems or even supercomputers.

The ICT sector contributes to the communication and processing of digital information using electronic networks. They include the operation and set up of computer aided machining and programming systems.



Elisha Grey registered his telephone patent in 1876 one hour before Alexander Graham Bell. After years of litigation, the patent went to Bell.

In Scotland in 1926 John Logie Baird transmitted moving pictures with his 'telvisor'. In San Francisco Philo Farnsworth was already developing his television concept, and in New York Vladimir Zworykin was working on cathode ray tubes.

Farnsworth was first to market however, his 'televisions' selling at \$75 each.

**GREAT MINDS
THINK ALIKE**

You could also be servicing mechanical, electrical and electronic controls in equipment such as industrial robots, fluid power systems and advanced manufacturing centres.

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PHOTONICS



Communication systems are essential in the modern world, and photonics is the science behind the physical transfer of data from A to B. Australia has an energetic and growing industry of fibre-optic and photonic component suppliers.

Would you like to work in the manufacture of fibre-optic communications and transmission systems? Would you like to use semiconductor materials to make state-of-the-art photonic devices for telecommunications systems and networks? Hi-tech? For sure!

You could work with lasers, laser amplifiers, electro-optic materials and photodiodes and work on beam propagation, sub-carrier multiplexing, wavelength division multiplexing, coherent transmission, trunk networks, video distribution systems and customer access networks.



The history of dielectric optical lightguides (optic fibre) goes back to Victorian times, when the total internal reflection principle was used to illuminate streams of water in elaborate public fountains.

In a world first, an Australian team has developed hollow optic fibres made from Perspex that are only a few times thicker than hair. This optical fibre technology makes possible major advances in medical imaging inside the human body and may, in the future, deliver personal computers that run on light.

LIGHT WORKS

You could even get involved in the emerging new area of photonic crystals, which are made from hydrogel nanoparticles. These self-assembling crystal structures can be used as optical waveguides and lenses.

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