Editorial

Welcome to the first issue of iCS! This newsletter has been put together to introduce you to the real subject of Computer Science or widen your knowledge of it by challenging you to learn more about issues that you may have not come across before. At Leicester we are inspired by Computer Science, and find it fun, interesting and also challenging. We would like you to be given a chance to feel the same way, and hope to show you just how exciting and thought provoking Computer Science can be.

Every edition will feature topics that we think will be of interest to high-school students, even those who are not necessarily considering studying Computer Science. Would you like to read the latest computing news from top scientists? Can we challenge you to solve some problems and puzzles? Just what is the difference between Information Technology and Computer Science? We will tell you about the history of Computer Science, and also about what computer scientists do now and what they envisage happening in the future. At the same time, we want you to be informed of what you will learn if you choose to study Computer Science at university, and what things you can do once you graduate. There are many professions open to Computer Science graduates; you may be surprised how wide the range is. Most of all we hope you may think that Computer Science can be exciting and that it is well worth studying at university.

In this first issue we meet up with Andrew Moody, a graduate of the University of Leicester, and talk to him about his current job. We also have an exciting article written by Professor Kevin Warwick (see photo below) of the University of Reading about Upgrading Humans.

Meet A Computer Scientist

Andrew Moody took A-levels at Upton-by-Chester High School, before going to Leicester where he graduated with a BSc in Computer Science in 2004 and went on to complete an MSc in September 2005. We asked him about his experiences since studying at the University.

What are you doing now?

I’ve just had my one-year anniversary at RI3K, a small-to-mid sized company in London, developing a trading platform for the reinsurance industry along with project collaboration and contract management products. I’m just about to start my second software development project as a team leader.

Team leader? Will you take tips from David Brent?

The people I work with are great fun and I get to use some of the most cutting-edge technologies that are out there in a fast paced and exciting environment; this is not The Office, and computer doesn’t always say “no” (sic)!

What do you mean? Don’t you just do more spreadsheets and school ICT?

Certainly not! Going to University involved a complete change of pace and was a fabulous experience. I can promise you, hand on heart, that the course wasn’t like anything I’d ever done at school, and neither is my job.

Please try out the puzzles, enter our competition, write programs to solve the problems, and visit the web sites we point you too. We will be very pleased to address topics and answer specific questions that you may have on the subject, your future studies, or your future profession. You can write to us at ics@mcs.le.ac.uk.

We do hope that you will enjoy this first issue of iCS, and that it will inspire you to find out much more about the fascinating subject of Computer Science. Finally, as editor of iCS I would like to thank our guest writers, and also the members of staff at Leicester who have helped a great deal throughout production.

Roy Crole.
Do people actually have to take a degree in Computer Science to do your kind of job?

As well as learning new programming languages or how to create advanced databases, one of the key things you’ll develop from CS at a good university like Leicester is the ability to approach a problem from a number of angles and with a number of possible solutions in mind. Skills like that can’t be picked up easily and they are irreplaceable in whatever career you choose.

But doesn’t Computer Science narrow your choice of job too much?

No! There are no ends to the career paths you can follow from a CS background. Graduate schemes abound and most welcome CS students. There are, however, a number of graduate schemes and positions out there for which CS is one of the few, if not the only, background that will afford you access. The bottom line is that a degree in Computer Science is a qualification that’s going to open far more doors to you than it’s going to close.

Dear iCS

Dear iCS. I have never understood the difference between Computer Science and ICT. Can you explain?

Infact the word “computing” was chosen by UK Universities as the general noun to embrace all University courses. This is a very general term, and it is often used to refer to either Computer Science or ICT. We now give short definitions of these two subjects.

Computer Science: This means those aspects of computing that focus on the fascinating study of its foundations, the creation of exciting new computer systems, developing a better understanding of what computation actually is, and the calculation of specific new results. It includes the specification, design and implementation of new software systems, involving small scale programming to large scale software engineering.

Information Technology (IT/ICT): This refers to those aspects of computing concerned with the use of technology in analysing, managing, processing and communicating information, especially in large organizations. In particular, ICT deals more with the use and application of computers, along with their social impact, computing law and ethics.

Do you have other questions about Computer Science? What is your answer to the question above? What you would like to see appear in future issues of iCS? Please let us know by writing to ics@mcs.le.ac.uk.

If you would like your questions or comments to appear in iCS, then please give contact details, including your name, age, school year and school address.

Andrew Moody

Competition

An article entitled “A Computer from 65BC” appears below. It concerns an ancient mechanical computer which was salvaged from a Roman shipwreck and thought to be built by ancient Greeks. The machine was lost in 65BC when the ship carrying it sank off the coast of the Greek island of Antikythera.

Scientists have at last unravelled the strange workings of a 2,000 year old astronomical computer which was salvaged from a Roman shipwreck and thought to be built by ancient Greeks. The machine was lost in 65BC when the ship carrying it sank off the coast of the Greek island of Antikythera.

Pieces of the machine were discovered by sponge divers exploring the remains of the ancient shipwreck in 1900. Ever since, scientists have been trying to figure out how the machine’s 80 or so fragmented parts fit together and to understand how it might work. The computer consists of gear wheels and dials within a wood and bronze casing bearing ancient Greek inscriptions.

A recent analysis of the machine used X-ray scanners to reconstruct the workings of the machine’s gears and high-resolution surface imaging to enhance faded surface inscriptions. It appears to be more advanced than previously thought, and as far as we know nothing comparable to it was built for another thousand years. The scans showed the computer uses a differential gear, which was previously believed to have been invented in the 16th century. The level of miniaturisation of its parts is like that of 18th century clocks. It seems to be the most sophisticated object we know about from the ancient and medieval periods.

Calendars were used by ancient peoples for timing agricultural activity and arranging religious festivals. In fact more than 30 bronze gears enable the machine to track the movements of the moon and the sun through the zodiac and predict eclipses. It can even recreate the irregular orbit of the moon (caused by the moon’s elliptical orbit around the Earth) by way of two superimposed gear-wheels that are connected by a pin-and-slot device. By winding a knob on its side, the positions of the sun, moon, Mercury and Venus could be determined for any chosen date. The machine’s front dials had pointers for the sun and moon, and markings from the zodiac and solar calendars. The back dials appear to have been used for predicting solar and lunar eclipses.

An international team, led by Mike Edmunds and Tony Freeth of Cardiff University, included astronomers, computer scientists, conservation experts, mathematicians and script analysts from the UK, Greece and the United States. The machine is held at the National Archaeological Museum of Athens. The team’s findings were published in 2006 in the November 30th issue of the journal Nature.

http://www.straatvaart.com/2006/11/30/a-65-bc-computer/
The Graphics Column  by Gavin Cox

XNA: The Future

XNA is the latest offering from Microsoft in the area of computer graphics. XNA builds on DirectX, the multimedia software development kit by Microsoft used in games for Windows, Xbox and Xbox 360. Basically XNA provides DirectX plus some of the repetitive stuff that goes in to nearly every game or graphics program. Also one of the key features of XNA is it’s cross platform nature and friendliness, which at the moment includes both Windows XP/Vista and Xbox 360. Thus when you create your games they can run on both Windows and Xbox 360, just by recompiling for the specific platform, where as currently under DirectX they would need to be rewritten.

So the core of XNA is DirectX and specifically it includes Direct3D (for 2D / 3D graphics), XACT (Cross Platform Audio Creation Tool for audio) and XInput (for input). Also it adds XContent which is designed to streamline and simplify the loading of content such as 3D models. To use XNA you use parts of the framework such as Graphics, Audio and Input which is inherently DirectX with some added simplifications, but with no loss of power or control. New to XNA are Math, which provides a solid and quick maths library (maths is at the heart of all graphics) and is Storage which simplifies the concept of saving and loading files such as save games and options for both Windows and Xbox 360.

Finally, to aid the beginner there are starter kits, which are complete games using XNA. The game follows the adventures of Bill the Ninja Badger as he goes on a quest to save the forest from destruction! Gavin’s research involves looking at reversible process calculi, in particular CCS, and the possibility of using a reversible debugger in game implementation to deal with the fact that it is very difficult to recreate the state of game when an error occurs in a subsequent execution. He is also a Microsoft Student Partner and has contacts at Microsoft, Rare and Lionhead Studios.

Moore's Law

Not a “mathematical” law but really an informal observation, Gordon Moore, a co-founder of Intel, stated back in 1965 that the number of transistors on a memory chip typically doubled every 18 months. Interestingly this has proved to be amazingly accurate over the last forty years and may only be eventually challenged by limits of atomic size.

Printing Puzzle

Here is a puzzle that is easy to write down, but less easy to solve. It is: “Write a program which, when run, prints itself on the screen”.

In more detail, pick your favourite programming language and write down some code which you store in a file, say PrintMyself, where PrintMyself is a suitable name for a program in your chosen language. When you run PrintMyself, exactly the same text as in the file PrintMyself should appear on your screen. (Note: your program should not access files written by you.)

Find Out About

At University you will spend a lot of your time doing self-study. See what you can find out about

- Alan Turing and Turing Machines
- Genes and the Human Genome
- Machine Learning
- Neural Nets
Upgrading Humans

by Kevin Warwick

Humans are limited in their capabilities both physically and mentally. We presently use technology to improve our performances in both ways, e.g. aeroplanes to enable us to fly, pen and paper as external memory. Mentally we can see that without technology humans are very limited – as examples we have limited senses and our method of communication is, to be honest, extremely poor. The question is: could we actually become one with the technology and dramatically improve our capabilities? Could we upgrade humans and enhance our abilities?

Implant technology is rapidly diminishing the effects of certain neural illnesses, Parkinson’s disease being one example, and is distinctly increasing the range of abilities of those affected. A key element is the need for a clear interface linking the human brain directly with a computer and thence into a network.

In experiments already carried out, a neural implant was used to link the nervous system of a human (me) bi-directionally with the internet. With this in place neural signals were transmitted to various technological devices to directly control them, in some cases via the internet, and feedback to the brain was obtained from such as the fingertips of a robot hand, ultrasonic (extra) sensory input and neural signals directly from another human’s nervous system [my wife].

So what are the prospects for the future? In the short term there is enormous potential as a therapeutic device and in the long term as a form of human enhancement, including the realistic potential, in the relatively near future, for thought communication – thereby opening up tremendous commercial potential. Clearly though, an individual whose brain is part human - part machine can have abilities that far surpass those who remain with a human brain alone. Will such an individual exhibit different moral and ethical values to those of a human? If so, what effects might this have on society?