Turing and the Universal Machine: The Making of the Modern Computer (Revolutions of Science)

By Jon Agar

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The history of the computer is entwined with that of the modern world and most famously with the life of one man, Alan Turing. How did this device, which first appeared a mere 50 years ago, come to structure and dominate our lives so totally? An enlightening mini-biography of a brilliant but troubled man.

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Editorial Review

Review
Try Jon Agar's Turing and the Universal Machine. His excellent treatment [is] highly readable, of general interest and a useful introduction to the subject. -- *New Scientist magazine, May 26th, 2001*

About the Author
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Universal Machines

Take out a Swiss Army knife and have a good look at it. I have one here. It has the full range of gizmos and attachments. There is a pair of scissors, a retractable pen, a ruler, a magnetic Phillips screw-driver, some tweezers, a small blade and an emergency blade. There is even a 'cuticle pusher' and a nail file, essential for any well-manicured soldier. Nothing to get stones out of horses' hooves, but very handy nevertheless.

Swiss Army knives are versatile machines: they can be put to many different uses. Other machines are far more restricted. A lawnmower, for example, can mow lawns, but not much else. It has been designed for a specific purpose, and the function of each part of it follows. The handle is there so that it can be pushed by an adult human. The engine will power the blades, which would be exhausting to turn by hand. The blades are set so that grass is cut to an inch off the ground, the height we like lawns to be. While the lawnmower can be put to other purposes – propping open a door, perhaps – it will usually not be very effective. No one tries to fly the Atlantic on a lawnmower. Flying requires different kinds of special-purpose machines.

Some devices are more versatile because they are simple. A sharpened stick, for example, can be used as a lever, or to cook a kebab, or to knit a sweater. Indeed, more uses can probably be found for a simple sharpened stick than for a Victorinox Pocket Size MiniChamp II – my top-of-the-range Swiss knife. Yet, despite their varying versatility, Swiss Army knives, lawnmowers and sharpened sticks are all a similar sort of machine. Even the knife and the stick are, in the end, special-purpose machines, and are radically different to an astonishing device built for the first time in the middle of the last century: a machine of universal application.

The Blue Pig

An early example could be found in Manchester in 1951. It filled a room, and broke down regularly. A team of engineers tended it, replacing the valves – or vacuum tubes – as they blew. They called it the 'Blue Pig'. If you had £150,000 you could buy one of these machines for yourself, although there would be a queue of military establishments and scientific laboratories ahead of you. Three years earlier, the first ever machine of this type had been built a hundred yards away. That one was an experiment, rows of electronic tubes and a tangle of gutta-percha- covered wires filling what resembled a set of bookshelves. The 1951 model gleamed – the valves hidden in banks of metal cupboards, a shiny central console with rows of switches and lights.

Late in the year, the Blue Pig had some visitors. They were from a children's radio programme, and had come to hear the Pig sing. The engineers prepared the machine, and, after a moment's hesitation, a gratingly

harsh but stately National Anthem blared forth. The radio presenter was delighted. The patriotic hymn was followed by 'Baa Baa Black Sheep' and finally the dancehall jazz of 'In the Mood'. The Blue Pig had trouble with the last tune: it improvised some notes of its own and then fell into silence. The machine, concluded the radio presenter, was not, after all, in the mood.

With the visitors gone, the engineers returned to another task, but with the same machine. The Pig could produce poetry, doggerel love letters. Here's an example:

Darling Sweetheart,

You are my fellow feeling. My affection curiously

clings to your passionate wish. My liking yearns

to your heart. You are my wistful sympathy: my

tender liking.

Yours beautifully,

M.U.C.

The Blue Pig could do mathematics too. Much faster than any human mathematician, it made calculation after calculation. What it searched for were moments when a certain function – the Riemann Zeta function – took the value of zero. It was something of a fishing expedition, but if they were lucky and found an unexpected zero, then a famous mathematical hypothesis would be proven wrong. Despite the Pig's all-night efforts, none was found. This was a particular disappointment to a middle-aged man of awkward manner, who had achieved early fame proving another hypothesis wrong – and at the very same moment had come up with the idea now expressed in massive material form by the Blue Pig. This man was Alan Turing, and the renaissance Pig – one machine producing music, poetry and mathematics – was MUC: the Manchester University Computer.

Computers nowadays look nothing like the Blue Pig. But the machine that sits on your desk shares the same ability as its predecessor from half a century ago: it is a universal machine. They present a strange case in the history of technology. They are machines of apparently limitless applicability, yet they are also the drudges of the modern world. Numbering millions, they have a typical working day made up of repetition, repetition, repetition. How can the invention of this remarkable device be explained? The question is the same as asking: what sort of society would ever need such a thing?

Users Review

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