

## ACT I

Morning

David

So you have been to Wuthering Bytes, John? Is this a new sandwich shop in Haworth?

John

No, it's bytes with a y. It is an annual ten day long festival for hardware geeks in Hebden Bridge. It starts with a Festival Day and then there are various events, including the Open Source Hardware Camp over the next ten days.

David

What did you go to?

John

I went to the festival day which comprised talks on a variety of computing and science topics.

The first talk was by David Hartley, a Hebden Bridge lad, who went to study at Cambridge and never came back, ending up as head of computing at Cambridge University. Before that he had written the Autocode compiler for EDSAC II as his PhD and went on to contribute to CPL and BCPL which influenced the development of the C programming language.

The idea of Autocode was to allow people to program computers without knowing anything about machine code.

His final act before retiring from Cambridge in 1993 was to install the university's network.

Since retirement he has been involved in the project to recreate EDSAC I, funded by Hermann Hauser, at the Bletchley Park Museum of Computing.

David

What is this EDSAC thingy you keep talking about?

John

EDSAC I was the first British designed working computer; it formed the basis for the more advanced Lyons Electronic Office used by the Lyons Group. But at Cambridge they quickly replaced it with the more advanced EDSAC II.

(Any more questions?)

The second talk was by *Caroline Gorski*, Head of IoT at the Digital Catapult Centre. She told us that over a third of the world's population will soon own and use a smartphone; in the UK it is already two thirds. There are around 1B wearable devices in the world; one in seven, predominantly 16–24 year olds, have them in the UK.

David

Aren't they really aimed at the younger generation anyway?

John

No, there is Doppel, for example, which is programmed to emit a pulse slightly slower than your resting heartbeat and which has been shown to lower feelings of stress.

There are also health programs using voice interactions which have been shown to be more successful in treating schizophrenics than drugs.

In fact, Artificial Intelligence programs in the US have been found to be better at diagnosing illnesses than human.

David

Yes but there are lots of privacy issues with these programs.

John

Yes. Also they tend not to say Please and Thank you. And some Artificial Intelligence programs have learned what you might not want them to learn.

When Microsoft set up some Twitter robots, they degenerated into hate speech while two robots Google set up developed their own language for communicating.

There are also security issues around all these types of devices as well as the fact that they are often only available to the better off.

(Any more questions?)

After the coffee break we had a talk from Ian Drysdale of Coop Digital which runs mainly laboratory based experiments into new uses of digital technology which will encourage cooperation between people.

David

Is Coop Digital anything to do with the Coop?

John

Yes; it is — as Ian told us, the Coop was founded six years before the state of California and was innovating long before Silicon Valley was thought off.

(Any more questions?)

Perhaps the most interesting talk of the morning was by Katie Hassell, a senior spacecraft thermal engineer, who talked about how you build spacecraft where the temperature on one side of the spacecraft might be  $180^{\circ}\text{C}$  and on the other  $-180^{\circ}\text{C}$ ; so, if you turn the spacecraft round, things can exciting.

Anything on a spacecraft is black or silver to absorb or reflect heat so that temperature levels across the spacecraft level out. They also have to avoid sparks, make sure that moving parts can last at least 25 years and take account of heat changes when things are switched on and off.

She had been involved in the Rosetta project where, after it came out of hibernation on its long journey to rendezvous with a comet, they had done a planned software update, and in the LISA Pathfinder project to measure gravity.

She is currently working on the Solar Orbiter where they have to plan for temperatures of up to  $700^{\circ}\text{C}$  outside while maintaining  $-10^{\circ}\text{C}$ – $40^{\circ}\text{C}$  inside. It will have a massive heat shield capable of reducing the temperature from  $700^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ . They will also have to work out how to move the solar panels that generate electricity for the Orbiter as it gets closer to the sun. They will aim to match the sun's rotational speed; this will be first time this will be have been done.

The side facing the sun will have black carbon blankets and cryogenic cameras operating at  $-180^{\circ}\text{C}$ .

She stressed that she only considers heat issues; others look at things like contamination issues.

(Any more questions?)

The last speaker of the morning was Ross Dalziel who has been involved in creating text adventures using Twine linked to particular locations.

David

Twine, what's that?

John

Twine is a program that allows you to create text adventures and run them in a browser.

Ross has done one for visitors to Wray Castle in Cumbria and one along the milecastles along Hadrian Wall.

For the Hadrian's Wall game, you use a tablet to play the game and store the game state using RFID tags to as you move from box to box along the wall. The kids love all the different locations and people will mostly do the things the game boxes tell them to do.

(Any more questions?)

ACT II

Afternoon

David

So back at Wuthering Bytes, what about the afternoon session, John?

John

The first talk of the afternoon was by Kevin Murrell about the Harwell Dekatron Computer.

David

Dekatron — that sounds like something out of a Marvel Comic!

John

Wait a moment and I will explain.

During the War people went to Los Alamos to work on the atomic bomb with an agreement that everything would be shared at the end the War. However, Atlee and Truman did not get on and the McMahon Act forbade the sharing of information from Los Alamos.

So the UK government decided in January 1947 to go it alone using Harwell, a disused World War II airfield, but only announced it in passing in Parliament in May 1948. The problem was that the people who had come back from Los Alamos had worked on different aspects and no-one had an overview. However, they were able to build the GLEEP reactor by 1946; it went critical in 1947 and was shutdown in 1990; though it only produced 3KW of power, or about enough to power a domestic kettle, it was very reliable and was used for calibration.

David

What is that to do with a Dekatron?

John

In the 1940s, all the maths was done by hand until British Ericsson demonstrated the Dekatron which could be used as a storage and counting device by adding pulses. Harwell used them in their thousands.

Inspired by EDSAC I at Cambridge they decided to build a computer using Dekatrons.

It was started in 1950 and finished by April 1951. It took nine seconds to add two numbers and eighteen to multiply them but, though it was slow, it was very reliable. Between May 1952 and February 1953 it ran for an average of 80 hours per week or 55% of the time available which was far better than any other computer of the time.

By 1957 when it was decommissioned, a competition was then run for who could get it and Wolverhampton and Staffordshire College of Technology won the competition and used it for its first undergraduate computing course in 1965. IBM recruited all but one of the first intake.

In 1973 it went into a second retirement at the Birmingham Science Museum where it remained until 1997. Its third retirement was to a collection centre where it remained until restoration began in 2009; this was completed in 2014. You can see it at the Museum of Computing at Bletchley Park; it is now the oldest computer still running.

David

You still haven't explained what a Dekatron is.

John

A Dekatron tube has ten little tubes arranged in a circle which flash when they receive a pulse. Each pulse goes in turn to the next little tube until they get back to the first when it sends a pulse which can be used by the next tube to count the tens and the next to count the hundreds and so on.

You have probably seen them in sci-fi films pretending to be a very powerful computer.

(Any more questions?)

The next talk by Suzie Sheehy was on the secrets of particle accelerators.

She said that there are 35,000 particle accelerators in the world. The first were cyclotrons out of which evolved synchrotrons.

When particle accelerators are mentioned, most people think of the Large Hadron Collider which discovered the Higgs-Boson particle but 50% of synchrotrons are used for the treatment of cancer by radiotherapy.

Other uses include

producing the radioisotopes need for PET scans

cargo screening for stowaways

medical sterilisation

food irradiation — though not in the EU

getting rid of nuclear waste by reducing the half life of nuclear waste thus reducing its toxicity to 300–500 years  
checking fakes.

(Any more questions?)

Next came Jenny List talking about the Hackaday website

It mostly covers hardware hacks.

Apart from explaining how to contribute to Hackaday and mentioning that the international Hacker Camp will be in the UK next year, she said she was most proud of *Debunking the drone versus plane hysteria*.



For this she went through all the proximity reports filed by pilots and found that most of the drones reported by pilots would have been way beyond their possible range or height.

David

So who reads Hackaday?

John

The readership is very international but mostly male covering the whole age range and a significant number of tips come from young people doing projects.

(Any more questions?)

After the tea break David Allen described how they were trying to archive as much of the material as possible of the BBC's 1980s computer literacy project.

This had begun as a result of a 1978 *Horizon* programme about the failure to teach people the basics of computing.

David

So what changes?

John

This had prompted the Manpower Services Commission — older listeners may remember this — to approach BBC Education about doing something on computer literacy. The programmes on a Sunday morning attracted audiences of 2–3M. Interestingly, the audience went up in the second year when they started teaching coding.

300,000 people took the course in BASIC.

Perhaps it was a mark of their success that, after two years, when they tried to demonstrate connecting to BT Gold over an acoustic modem, they were hacked.

We were shown the recording of this hack.

They tried to get all the BASIC vendors together to agree on a standard BASIC which anyone taking their courses could take.

But there was no agreement and, with the support of Kenneth Baker, the Secretary of State for Education, they put out the tender for the BBC Micro which Acorn won — and the rest, as they say, is history.

The hope to get BBC approval to publish all the programmes from the 1980s, complete with the hack, but some material will require copyright approval.

If they cannot put it on a public website, they hope to be able to make it available at the Museum of Computing in Bletchley Park.

David

So why did the BBC get out of computing?

John

In one sense, they didn't because their engineering department went on develop some of the technology which goes into set top boxes and, of course, the BBC website is one of the largest in the world.

But David Allen thought it was partly because the BBC Education Department, which had been responsible for the programmes, was abolished in a restructuring and partly because people lost the appetite for coding in the 1990s.

(Any more questions?)

The last session of the day by James Larsson gave a new twist to recycling.

James takes outdated technology and finds new uses for it. These included using the drive wheels in an old VHS recorder to create a cat feeder which releases food for the cat at predetermined intervals, using an old pen plotter to create a shooting gallery and finding a novel use for the AY-3-8500 'Pong on a chip' to make a tactile 'boot fetish' controller.

The paddles are a pair of kinky boots which have to be massaged to move the bars in the pong game and, if the other side scores, a whip hits the kinky boot of the loser — and thus the loser if their hands are still on the kinky boot.

(Any more questions?)

(David to wrap up)