



Universal Turing machine: a design for a multi-purpose computer

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JIM AL-KHALILI:

Turing had to find a way of getting machines to understand instructions like 'add', 'subtract', 'multiply', 'divide', and so on... in the same way that humans do.

In other words, he had to find a way of translating instructions like these into a language that machines could understand.

And with flawless, impeccable logic, Turing did exactly that.

This may look like a random series of ones and zeroes, but to a computing machine it's a set of instructions that can be read off step by step, telling the machine to behave in a certain way.

So, while a human computer could look at this symbol and understand the process that was required, the computing machine had to have it explained like this.

This paper tape that Turing envisaged is what we would now call the memory of the computer.

But Turing didn't stop there.

Turing realized that feeding a machine instructions in this way had an amazing consequence. It meant that just one machine is needed to perform almost any task you can think of.

It's a beautifully simple concept. In order to get the machine to do something new, all you had to do was feed it a new set of instructions, new information. This idea became known as the universal Turing machine.

The more you wanted your machine to do, the longer the tape had to be. Bigger memories could hold complex multi-layered instructions about how to process and order any kind of information imaginable.