How does a microchip work?

KS3 KS4 Ages 11-16 ⏰ 2 min read

Inside your phone, computer, and even your digital watch lives one of humanity's most impressive inventions: the **microchip**. Also called a semiconductor or integrated circuit, this fingernail-sized marvel contains billions of components working together faster than you can blink.

The Language of Electricity

Microchips speak in the simplest language possible: on and off. Every piece of information—your favourite song, a photo of your dog, or this very article—gets translated into countless combinations of electrical signals that are either flowing (on) or not flowing (off). We call this **binary code**, and it's like having a conversation using only the words "yes" and "no."

Think of a microchip like a massive city viewed from space at night. Each tiny light represents a transistor—a microscopic switch that can turn on or off. When billions of these switches flip in precise patterns, they create the digital magic that runs your devices.

Transistors: The Tiny Workers

The real heroes inside microchips are **transistors**—switches so small that hundreds could fit across the width of a human hair. These transistors are made from special materials called semiconductors (usually silicon) that can control electricity in clever ways. When electricity hits them just right, they either let current flow through or block it completely.

Different areas of the chip handle different jobs. Some sections store information temporarily (like remembering what app you just opened), while others perform calculations (like figuring out what happens when you tap that button). Still other areas manage communication between different parts of the chip.

From Sand to Supercomputer

Creating a microchip starts with ordinary sand, which contains silicon. Through an incredibly precise process involving extreme heat, special chemicals, and clean rooms that make hospital operating theatres look grubby, engineers build layer upon layer of circuits. They use light patterns—like incredibly detailed stencils—to etch pathways narrower than viruses onto the silicon surface.

The result is a chip that can process billions of operations every second while using less power than a small light bulb. Modern microchips are so complex that if you printed their circuit diagrams on paper, the stack would tower higher than a skyscraper—all crammed into something smaller than your thumbnail.

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