

# The Transistor

**1947** Invention of the point-contact transistor (Bardeen, Brattain at Bell Labs)

**1948** Invention of the junction transistor (Shockley at Bell Labs)

**1952** First transistorized US consumer product: Sonotone hearing aid

**1953** First fully transistorized computer (Manchester Univ., 48-bit machine, 92 point-contact transistors and 550 diodes)

**1953** First transistor radio (Intermetall Corp., Germany)

**1954** First silicon transistor (Tanenbaum at Bell Labs)  
First commercial silicon transistor (Teal and team at Texas Instruments)

**1955** First all transistor car radio (Chrysler and Philco)

**1958** First all transistor satellite (Explorer 1)

**1958** Invention of integrated circuit (Kilby at Texas Instruments)

**1959** Invention of the MOSFET transistor (Atalla and Kahng at Bell Labs)

**1965** Moore's Law

**1970** First commercial DRAM IC chip (Intel 1103)

**1971** First microprocessor (Intel 4004, 2300 transistors, 10,000nm size)

**1983** First commercial mobile phone, powered by transistors: Motorola DynaTAC 800X

**1984** Transistor size below 1000nm

**1989** First million transistor chip (Intel i860 microprocessor)

**2003** Transistor size below 100nm

**2003** Introduction of chips with strained transistors (90nm node)

**2007** First commercial chips with high-k/metal gate (HKMG) transistors (45nm node)

**2011** First commercial chips with finFET transistors (Intel)

**2016** Transistor size at/below 10nm

**2022** First volume production of chips with gate all around (GAA) transistors (Samsung)

<sup>1</sup> Photo by Joe Haupt <sup>2</sup> Photo by Joe Haupt <sup>3</sup> Recreation by Florian Schäffer <sup>4</sup> Photo by Hubert Berberich <sup>5</sup> Photo by Dick James <sup>6</sup> Photo by Texas Instruments <sup>7</sup> Photo by Thomas Nguyen <sup>8</sup> Photo by Dirk Oppelt