

Alan Turing and the Decryption of Enigma

Alan Turing (1912-1954) is best known as the father of theoretical computer science, but his most consequential practical contribution was his work at Bletchley Park during World War II. Recruited to the Government Code and Cypher School in 1939, Turing led the effort to break the German Enigma cipher.

Turing's key insight was the design of the Bombe, an electromechanical device that exploited structural weaknesses in how German operators composed messages. By early 1940 the first Bombe was operational; by war's end more than 200 were running around the clock. Historians estimate Turing's work shortened the war in Europe by at least two years and saved over fourteen million lives.

After the war Turing turned to the question of machine intelligence. His 1950 paper 'Computing Machinery and Intelligence' introduced what became known as the Turing Test: if a machine's responses are indistinguishable from a human's in a blind interview, the machine may be said to think. This framing dominated AI research for decades.

In 1948 Turing joined the University of Manchester, where he contributed to the Manchester Baby (SSEM), one of the first stored-program computers. His later work on morphogenesis proved decades ahead of its time and is still actively studied.

Turing was awarded a posthumous royal pardon in 2013 and appears on the British 50-pound note issued in 2021. The ACM Turing Award, computing's highest honour, was named after him in 1966 and is awarded annually to this day.