

ALAN TURING – THE FATHER OF COMPUTER SCIENCE

Alan Turing is a British mathematician who made significant developments in topics such as mathematics, cryptanalysis, logic, and mathematical biology and to new areas such as computer science, cognitive science, artificial intelligence, and artificial life.

Turing is known for his major advancements in breaking Nazi ciphers during WWII.

EARLY LIFE

Turing was born on June 23, 1912 in Maida Vale, London, England. From the age of 13 he became very interested in mathematics and science when he joined a top private school. Years later he entered the University of Cambridge to study Maths in 1931.

CAREER

After graduating in 1934, Turing was elected a fellow as a result of his dissertation in which he proved the Central limit theorem. Two years after graduating Turing released a paper "On Computable Numbers, with an Application to the Entscheidungsproblem" which presented what is now called the Turing machine. This machine could compute anything that could be computable and is the precursor to the modern computer.

For the two years that followed, Turing studied maths and cryptology at the Institute for Advanced Study in Princeton, New Jersey. After receiving his Ph.D. from Princeton University in 1938, he returned to Cambridge, and then took a part-time position with the Government Code and Cypher School, a British code-breaking organization.

CODE BREAKING AND CRYPTANALYSIS

When the Second World War began in 1939, he moved to Bletchley Park; the organisations wartime headquarters. Here he made 5 major advancements in cryptanalysis. One of these advancements was inspired by the polish code breaking machine called the Bomba. The Bomba was an enigma code breaking machine that depended for its success on German

operating procedures, and a change in those procedures in May 1940 rendered the Bomba useless.

Turing developed the Bombe, this was a much significant version of the Bomba. It was an electro-mechanical device that replicated the action of several Enigma machines wired together. By 1942, Turing helped the allies decode 39,000 messages every month with this machine. This number rose to about 84,000 which is about 2 messages every minute. For all of his code-breaking war during the war, Turing was made an Officer of the Most Excellent Order of the British Empire (OBE) for his code-breaking work.

THE FIRST COMPUTERS

After the war Turing joined the National Physical Laboratory (NPL) in London to create an electronic computer. Turing's ACE; the Automatic Computing Engine was the first spec of an electronic stored-program all-purpose digital computer. However the engineering of this machine was too difficult at the time and the engineers at the NPL so a much smaller model Pilot Model ACE was built. It had less memory and it was a lot slower.

In 1948 NPL lost the race to build the first ever electronic stored-program digital computer. The Royal Society Computing Machine Laboratory at the University of Manchester beat them to it. In that same year Turing had left NPL and joined the team at the Computing Machine Laboratory. The computer they developed here was influenced by Turing's Universal Turing Machine. At the Computing Machine Laboratory, Turing's developed an input-output system and he designed it's programming system. Turing was the first to write a programming manual. His programming system was used in the first ever marketable electronic digital computer; Ferranti Mark I.

ARTIFICIAL INTELLIGENCE

Turing is considered one of the founding fathers of Artificial Intelligence. he was a leading early exponent of the hypothesis that the human brain is in large part a digital computing machine. Turing's theory is that our brain

at birth is an unorganised machine and through training it becomes organized “into a universal machine or something like it.” There is now a Turing test to determine whether an artificial machine is thinking.

LATER LIFE

Turing was a homosexual and in Britain at this time, it was illegal to be gay. After admitting to police that he had a sexual relationship with another man, he was charged with gross indecency. That gave him the choice of prison or hormonal treatment that would reduce his libido.

This treatment further resulted in Turing taking his own life in 1954. It is estimated that Alan Turing saved the lives of 21 million people for his work on the bombe during the war, however was still punished for being a homosexual man.

In 2013, the Queen granted a royal pardon to Turing after almost 60 years of him committing suicide. On October 20, 2016, the British government announced “Turing’s Law” to posthumously pardon thousands of gay and bisexual men who were convicted for homosexual acts when it was considered a crime.