Where and when X lived: E

What X’s specialty was: E

How X learned his specialty: E

Contributions to CS: E

Technical background: E

X’s personality: E

Tells an interesting story: E

Writing mechanics: G+

E = Excellent

G = Good

MN = More Needed

M = Missing

Very interesting and well researched paper! I learned a lot from it.   
See other comments below

Alan Turing’s Life and Achievements

Alan Turing was born in 1912 in West London. Unbeknownst to his parents at the time, he would grow up to be one of the most influential computer scientists of all time. From a young age, Turing displayed a remarkable potential for problem-solving. By age 16, Turing could grasp the concepts of Einstein’s theories. In college, he studied mathematics rigorously and proved the central limit theorem. Although this had been done by another mathematician years ago, Turing’s knowledge in math and logic would only increase as time passed. At this point, Turing’s skill in computer science also began to develop at a rapid pace: before receiving his PhD from Princeton University, Turing designed a theoretical machine. The Turing Machine, as he named it, was able to emulate computer programs of any type and complexity. This machine would become a cornerstone of modern computer science.

Turing made his greatest contributions to world history during World War 2. One of the critical components of the German military’s function was intelligence, which was required for everything from coordinated attacks to the position of military units at any given time. In order for the German armies to send and receive sensitive information, they used a device called an Enigma machine to encrypt their messages. First invented during the First World War, Enigma machines were exceptionally complex for their time, so much so that Allied forces were unable to make sense of war messages even if they were intercepted. As the war escalated, various additional complexities were added to the Enigma machine such that encoded messages would be even harder to decipher. Before the war, Turing was already working with the British government to help analyze the Enigma machine. However, his work intensified with the involvement of Great Britain in the war against Germany. Utilizing his prior expertise in logical deduction and mathematics, Turing began to unlock the Enigma machines’ secrets.

The Enigma machine consisted of a keyboard, three rotors and a set of other components used to encode messages. Each of the rotors had 26 notches so that each letter was represented by a notch. The Enigma machine encodes messages by substituting a letter for another. When a letter is pressed on the keyboard, it is sent through the rotors which scramble it based on the positions of the rotors before outputting the letter. Moreover, the next letter to be scrambled will be done so in a different way than the one before because each rotor in the machine changes its position after scrambling a certain number of letters at different intervals. The resulting encoded message is very hard to decipher. Polish cryptanalysts attempted to decipher the Enigma before Turing but failed. However, Turing devised a unique way to approach the problem.

Alan Turing’s solution to the Enigma machine came in the form of another machine called a “bombe.” The bombe was a collection of cogs that emulated an Enigma machine’s workings. Groups of three cogs represented the rotors normally used on an Enigma machine. The Enigma machine relied on a “crib.” Cribs were pieces of messages that Allied forces expected to be within the encrypted message. For instance, espionage revealed that the Germans sent weather reports at the same times each day. In these messages, the German word for “weather” always appeared at the top of the report – an extremely valuable clue for Turing and other Allied code-breakers. Once a crib was found, the bombe would be wired such that it was consistent with the information given by the crib. At this point, messages would be able to be decoded through a brute force attack. The bombe’s cogs would then run through every possible Enigma rotor configuration while ruling out certain settings based on logical contradictions and weaknesses known to the Enigma – for instance, the fact that the Enigma never encoded a letter with the same letter as itself. This process would continue until the bombe found a rotor setting that began to show signs of a coherent message. However, the Germans changed the rotors’ settings for their Enigma machines on a regular basis, so code-breaking was a constant challenge. Even so, Turing’s brute force attacks on the Enigma’s code proved to be very effective in decoding valuable information that aided Allied forces during the war. Some sources estimate that, had it not Turing’s cracking the Enigma code, the war in Europe may have lasted another six years.

Alan Turing is mainly known for his work in cryptanalysis and early computer science, though not all of the attention that he garnered was positive. Early in his life, teachers disapproved of his focus on mathematics and science because the British curriculum at the time placed a greater emphasis on literature, history, and arts. His headmaster in elementary school even wrote that Turing would be “wasting his time” if he were to only study science. Turing’s eccentricity remained through his adult years. While working on the Enigma machine, Turing exhibited a number of strange behaviours: wandering around the offices in a gas mask to prevent hay fever, chaining his coffee mug to a pipe to prevent theft, and so on. However, one of the most controversial aspects of Turing’s life was his sexuality. Alan Turing was homosexual at a time when sodomy laws were still the norm. In 1952, Turing was charged for indecency when it was discovered that he had a relationship with another man. Found guilty, Turing underwent chemical castration and was stripped of his duties.

Turing died in 1954. Although his death was ruled to be accidental poisoning, it is more likely that Turing committed suicide with cyanide due to his social ostracism. Several decades later, Turing was given a posthumous pardon and an apology from the British government for his ill treatment. Even without his controversies, Alan Turing remains as one of the most influential computer scientists whose theories and work are still studied by scholars.