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The universal machine : from the dawn of computing to digital consciousness

[Watson I.](#), Copernicus Books, New York, NY, 2012. 367 pp. Type: Book (978-3-642281-01-3)

Date Reviewed: Apr 10 2013

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This interesting popular science book sheds light on important works and key figures in the world of computing. It starts with the early work of Charles Babbage, progresses to recent achievements in the fields of computer science (CS) and information technology (IT), and ends with a glimpse of future advances. All in all, it is very well narrated and illustrated.

The book considers the history of CS with speculations on artificial intelligence (AI) and robotics. It is unique in considering the history of computing from its early notions up to its latest forecasts, with no gaps in between. Such coverage does not exist in the current computing history literature. The author offers plenty of information and facts that are usually difficult to find or not easily accessible in existing computing books, journals, encyclopedias, and biographies.

Furthermore, this is not only a history book of computing. Every chapter takes the reader on a journey, with great details and story-like narratives. Once you start reading a chapter, you can't stop until you reach the end. Also, the section titles are catchy. For example, in "Hitler's Secret Writer," we learn that the "secret writer" (or "Geheimnis Schriftsteller") is the name of the machine used by the Germans to encrypt and communicate text messages.

The book is organized into 14 chapters. The first three chapters include an introduction and a prehistoric representation of the dawn of computing machinery with its practical outcomes. Chapters 4 through 6 discuss Turing machines, their influence in World War II, the early use of electronics, and their widening use in the business field after the war. The next five chapters cover the personal computer (PC), the Internet, and social networking. Hacking is covered in chapter 12. The last two chapters are a futuristic rumination on ubiquitous computing and conscious machines.

In chapter 1, the author introduces the concept of universality, with examples such as a stone hand axe and a wheel. In chapter 2, the author looks back to the dawn of computing and Charles Babbage, the British mathematician who first conceived of the difference engine, an automatic mechanical calculator. Babbage also designed the analytic engine, which was a programmable version of the difference engine. Babbage faced problems with the government throughout the course of his project, but was supported by Ada, the Countess of Lovelace, who is considered the first computer programmer. The program she wrote for the analytical engine is based on an algorithm to compute Bernoulli numbers.

In chapter 3, the author talks about marvelous machines like typewriters, keyboards, tabulating machines, and cash registers. Chapter 4 starts with an interesting tribute to Alan Turing's decency. The chapter continues with a biography of the mathematician and a discussion of the influence of his work, especially his contribution to ending World War II. The author also looks at other problems Turing worked on, including Entschcheidungsproblem (that is, the decision problem), the chemical basis of morphogenesis, which gave rise to bioinformatics and mathematical biology, and the Turing test, which became the foundation of AI. The chapter contains many illustrations on early computing machinery (Mark I, Colossus, and so on), encryption machines (the German Enigma machine), and deciphering machines (the Bletchley Park British Bombe). The chapter ends with an homage to Turing's legacy. Chapters 5 and 6 show the chronological progression of computers on both the personal and business levels.

Networking, the Internet, and the World Wide Web (WWW) figure in the next part of the story. This section starts with the first web page ever created (<http://info.cern.ch>), which was launched in November 1992, progresses through the dot-com bubble in the late '90s, and concludes with the evolution of social networking and Web 2.0. The author talks about influential figures such as Tim Berners-Lee (founder of the WWW), Sergey Brin and Larry Page (founders of Google), Mark Zuckerberg (founder of Facebook), Jeff Bezos

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(founder of Amazon.com), and many others. This section also offers interesting stories about eBay, Netscape, and Napster. This is supplemented with a detailed explanation of network architectures, Internet browsers, and mobile technology.

Chapter 12 discusses the dark side of computers, including viruses, cyber attacks, Internet fraud, and hacking. The author includes a snapshot of the original "Hacker Manifesto" [1], as well as a discourse on hacktivism, which is the philosophy of making information freely available to everyone.

The book concludes with two interesting chapters on ubiquitous computing, including augmented reality (that is, making computers as personal companions), examples of virtual retinal displays (VRDs) and autonomous vehicles, digital consciousness, cyborgization, and quantum computing. The author offers his take on realistic goals and challenging projects for the near future, such as IBM's Systems of Neuromorphic Adaptive Plastic Scalable Electronics (SyNAPSE) project.

This book is for CS teachers and computer devotees, as well as scholars and IT professionals. It is unique in its structure and instructive in its content.

Reviewer: [Mario Antoine Aoun](#)

Review #: CR141125 (1307-0610)

- 1) The Mentor. Hacker's manifesto. *Phrack* 1, 7 (1986), <http://phrack.org/issues.html?issue=7&id=3#article>.



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