Brief prospectus for *Genius Inside: the inspired ideas your computer uses every day*

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1 What is the book about?

Every day, billions of people use computers to accomplish feats that are truly remarkable, if one stops to think about them: securely purchasing goods online, searching the entire internet, planning complex trips, or downloading immense files without the slightest error in the files' contents. How is it possible to do so much, with such ease? *Genius Inside* answers this question in the most concrete way possible: by explaining the workings of the most ingenious ideas in computer science, in non-technical language. In doing so, the book aims to provide readers who have no background in computer science with an understanding of the extraordinary ideas that have revolutionized the way we use computers. The topics covered are chosen for their combination of ubiquity (each idea is employed by ordinary computer users every day, although most users will not realize that before reading the book), and fascination (each idea involves one or more ingenious tricks that will delight readers with their inventiveness and effectiveness).

The book devotes one chapter to each of nine major ideas. Two chapters concern the workings of search engines. The first of these covers the concept of indexing vast document collections, and the second explains the famous PageRank algorithm, which is often attributed with launching Google to the forefront of the search industry. Another chapter covers the key ideas behind the public key cryptography, the remarkable 1970s invention that enables two computers to communicate with perfect security over a public network (such as the internet), on which a malicious adversary can observe every last bit of communication between the two computers! Further chapters address such topics as: error correcting codes (how can we read data from a scratched DVD, or a noisy network transmission, with no errors whatsoever?), data compression (how can we send a 2-megabyte picture file as a 30-kilobyte e-mail attachment?), and pattern recognition (how can computers recognize faces and handwriting?).

2 Who is the book written for?

The primary target audience is members of the general population who have a casual interest in technology or science. While the core population of likely purchasers would consist of readers who have previously enjoyed other popular science books (especially in subjects such as math, physics, and computer science), the book will also have strong appeal to readers who lean towards business books with a technology focus. In addition, it is hoped that intellectually curious readers with no previous interest in popular science or business books will nevertheless be attracted by the obvious applicability of the subject matter to their everyday computer use.

The book assumes no knowledge of computer science or mathematics, beyond some very occasional references to elementary high school math which are explained in detail when the need arises. Therefore, the book can be read, understood, and enjoyed by a wide range of the population, from high school students to technology professionals. Although primarily intended to be read by individuals for personal interest, the book would be very suitable as a text for discussion by high school classes and college seminars. Despite the fact that the book assumes no computer science knowledge, computer professionals will not find the book trivial or uninteresting: each topic is presented in a novel manner, frequently using abstractions or explanations quite different to those used in college computer science courses.

3   Why is the book important? What is new or exciting about the material?

The book is important because it makes accessible, to a non-specialist audience, many ideas that are central to the computer technology our society has come to rely on. To the best of my knowledge, no previous book or publication has attempted this task. Some of the ideas have been presented to a non-specialist audience in much narrower books that concentrate on only one topic (cryptography, for example). But several of the topics in *Genius Inside* do not appear to have been presented to non-specialist audiences before, and certainly not collected in a book that emphasizes the ingenuity and applicability of the ideas without relying on any background technical knowledge.

The two chapters that explain the technology behind search engines contain exciting material that should help the book benefit from the recent surge of interest in the search industry (and Google in particular, which is the topic of several recent books). Most of the other chapters are based on ideas that evolved much earlier (between 1950 and 1980), but are only now becoming part of the daily experience of every computer user. This material too can be viewed as new and exciting, in the sense that non-specialists have not previously been able to appreciate the great importance and inventiveness of the ideas that make their computers work so well.

4   Author bio

John MacCormick has degrees in mathematics from the University of Cambridge and the University of Auckland, and a doctorate in computer vision from the University of Oxford. He has spent over 12 years researching and creating new computer technologies, both at Oxford (where he was a research fellow at Linacre College), and in industry, having worked as a research scientist for several years at both Hewlett-Packard Laboratories, and the Silicon Valley Lab of Microsoft Research. Professor MacCormick is currently on the faculty of the Department of Mathematics and Computer Science at Dickinson College. He has published one book (a technical monograph on automated video analysis; Springer, 2002), authored or co-authored approximately 25 peer-reviewed conference and journal papers, and filed over 15 computer-related US patents. Professor MacCormick's research is in the areas of computer vision (getting computers to understand images and videos), and large-scale distributed computer systems (getting thousands of computers to cooperate in solving complex problems). He is also an enthusiastic teacher of computer science, and especially enjoys explaining computer concepts to people who think they won't be able to understand them.

5   Practical details: length and timeline

The manuscript is approximately 70% complete. Near-complete drafts of seven chapters are written; two substantive chapters and the introduction and conclusion remain to be written.. The present draft is 124 pages long, comprises approximately 45,000 words and includes 40 black-and-white figures. When completed, the book will probably be 160–180 pages in length, with roughly 60,000 words and 50–60 figures.

A final complete draft will be available in summer 2010 at the latest, and possibly considerably earlier.