

## Professor John E HOPCROFT

Citation

John Edward Hopcroft is known to the computer world, and the world at large, as an American theoretical computer scientist. But in fact, modesty prevents him from claiming a share of status as a pioneer in computer science when it was not even recognized as an academic discipline. Fortunately for the discipline, Prof Hopcroft was there from the time when computer science was little more than just a gleam in the eyes of its creators. He has undeniably played a significant role in helping it to become a mature discipline with a solid basis in science.

According to his own account, when he received his PhD in electrical engineering from Stanford University in the early 1960's, his academic program included only one course in computing, a basic introduction to switching circuits, logic design and the theory of computation. It was pure happenstance that he was recruited by Princeton University where he stayed for three years to develop a course in automata theory. Into this challenge he poured his energies, although he did so, like other brave souls, without a clear and full understanding of the course content. In other words, he plunged into this undertaking before knowing the boundaries of the subject. That is the excitement of being a young scientist when the future was so open-ended, and the discipline very much in its formative years. The coming of age of computer science as a distinct discipline was the work of specialists from diverse fields, from neurophysiology, and linguistics, specifically from the context-free grammar developed by Noam Chomsky, and also from automata theory. In his words, it evolved through the synergistic interactions of "a confluence of ideas" from various specialties.

Today, computers are an indispensable tool in nearly every facet of human pursuit — from education to medicine, from agriculture to food production, and from weather forecast to car manufacturing. The computer is not just a tool that helps us to do our job better and faster, but is also a generator of new knowledge and a force in revitalizing the economy. In Prof Hopcroft's view now universally shared, computers have "made a major impact on the way we think and live" and "will take us to a higher plane of knowledge about the world", helping us to gain a greater understanding of the intellectual and learning processes, and indispensable in the exploration of our intellectual universe and the manipulation of knowledge. With the advent of the computer, humanity has embarked on a new era, an era of explosive growth in knowledge. There is no telling where it will eventually take us. But Prof Hopcroft is fully aware that there is currently a global competition for technological and economic leadership, in which computing will play a key role. He is a strong advocate of a full-scale public commitment to computer science.

Given the critical and ubiquitous presence of computers in modern life, Prof Hopcroft's contributions to this discipline cannot be overemphasized. His books on the theory of computation and data structures are held up as standards in their fields, giving direction to others that follow. Similarly, his books on algorithms and formal languages coauthored with two other scientists are embraced as classic texts in these domains. Those who teach computer science academically have used them to guide themselves and their students in how to think about the subject.

He received the highest honor in his field when in 1986 he was jointly awarded with Robert Tarjan the Turing Award, otherwise known as the “Nobel Prize of Computing”. The award was given to him “for fundamental achievements in the design and analysis of algorithms and data structures.” In fact, he has an algorithm named after him alongside Richard M Karp, known as the Hopcroft-Karp algorithm. Throughout his career, honors and awards were showered on him. 1994 saw his induction as a Fellow of the Association for Computing Machinery. In 2005, he was bestowed the Harry H Goode memorial Award “for fundamental contributions to the study of algorithms and their applications in information processing.” Significantly, as a lecturer who speaks eloquently and in a language that his students find attractive, Prof Hopcroft won the Karl V Karlstrom Outstanding Educator Award “for his vision of and impact on computer science”, giving us field-defining textbooks that continue to influence those who come after him four decades later. The doctoral students under his tutelage, some 30 of them, are themselves now original contributors to computer science, holding influential positions in industry and academia, among them the president of a university in Israel, and the vice president of a computing research firm, not to mention various chair professors. They learned how to do research from the master and internalized his standard of discriminating excellence, as well as a sense of service to the wider community. Prof Hopcroft’s leadership in the field extends far and wide, nationally in the US and internationally across the globe. In Chile and Vietnam, for example, he has worked hard to improve their science and technology education.

In 1992, President George H W Bush nominated him to the National Science Board which advises the President and the US Congress on national science policy. He had also served on several committees of the National Research Council. In 2009, the Saint Petersburg State University of Information Technologies, Mechanics and Optics paid tribute to him with an honorary doctorate. This year, he is a

co-recipient with Jeffrey Ullman of the IEEE John von Neumann Medal “for laying the foundations for the fields of automata and language theory” as well as for seminal contributions to theoretical computer science.

Prof Hopcroft is a scientist with adventure in his heart and a sense of service in his soul. As theory turns to applications, he was the man who has helped to lay the foundations of computer science, a modern marvel that has fundamentally changed the way we live, work and socialize. He has worked hard to consolidate the science base so that the technological base can broaden and grow. For a science that has many putative fathers but no mother discipline, we are thankful that Prof Hopcroft was there to help nurse the science to maturity.

Mr Pro-Chancellor, on behalf of the Council of the Hong Kong University of Science and Technology, I have the high honor to present to you Prof John E Hopcroft, Professor of Computer Science at Cornell University, for the award of Doctor of Engineering *honoris causa*.