

## Kees A. Schouhamer Immink wins the 1999 Edison Medal

The IEEE Board of Directors has named Kees A. Schouhamer Immink, former research fellow at Philips Research Laboratories, and adjunct professor at the Institute for Experimental Mathematics, Essen University, Germany, the recipient of the 1999 Edison Medal “for a career of creative contributions to the technologies of digital video, audio, and data recording.”

Immink’s 30-year career with Philips Research Laboratories began in 1968. His work in consumer recording technology started in 1974 when he joined the Philips Optics Research Group. There he and his colleagues conducted pioneering experiments with optical video disc recording. The great success of the Compact Disc Digital Audio System (CD) and other digital recording systems owe much to the work of Kees Immink whose coding methods have had a great impact on data storage. The coding systems he developed are used in essentially all equipment for recording digital video, audio, or data, for example, CD, CD-ROM, CD-I, MiniDisc, CD-Video, DVD, Digital Compact Cassette (DCC), and Digital Video Recorder (DV). Immink has 36 patents, six of which were the basic patents in consumer digital recording products, covering such diverse topics as acoustics, optics, signal processing, servos and coding. He has written numerous articles and co-authored three books.

He is a member of the Royal Netherlands Academy of Arts and Sciences (KNAW) and is a Fellow of the IEEE, Audio Engineering Society (AES), Society of Motion Picture and Television Engineers (SMPTE), and the Institution of Electrical Engineers (IEE) of the U.K. He has been previously honored with the IEEE Masaru Ibuka Consumer Electronic Award, the AES Silver Medal, the IEE Sir J.J. Thompson Medal, and the SMPTE Poniatoff Gold Medal for Technical Excellence.

Immink received a bachelor’s degree from Rotterdam Polytechnic and master’s and doctoral degrees from the Eindhoven University of Technology, all in electrical engineering.

At the request of the Editor, Professor Han Vinck from the University of Essen held the following interview with Dr. Schouhamer Immink.

**Han:** First of all, congratulations with this high IEEE award. I hope that you can find a special corner for it in your office at our institute. I hope that this interview gives the IT readers some additional information about your personality and your remarkable career.



Kees A. Schouhamer Immink

**Han:** For our mostly “academic” type of members it is probably interesting to know why somebody from the industry is a member of the IEEE IT Society?

**Kees:** I joined the IT Society some 10 years ago after I published my first article (with Gerard Beenker) in the IT Transactions. I have been working with channel codes since 1978 when someone had to be found in the group Optics of Philips Research with some knowledge in that field. I was the only electronics engineer in that group, so the choice was easily made. Besides the compulsory lectures by Piet Schalkwijk at the Eindhoven University, I have no formal

training in IT. My first IT conference was Kobe or San Diego, I am not sure which one came first. I have enjoyed the friendly, “family” kind of atmosphere at the ISITs, and I did not find it difficult to make friends as the ISITs are very open to outsiders. The symposia and the Transactions are sources of new ideas for me. To be honest there are also presentations (this is not the monopoly of the ISITs) where I lose track after five seconds. This is not merely lost time, as these presentations give you the opportunity to think instead of work. This is also a source of new ideas.

**Han:** Today, we have a lot of discussions about the benefit of our society to industry. For which industry is, in your opinion, IT important?

**Kees:** Shannon worked at Bell Labs, and I think that since 1948 nothing significantly changed as IT still finds its ‘home market’ in the telecommunications industry. But interesting new markets were added such as for example consumer electronics. Since the digital audio and video revolution started in 1982 with the introduction of the Compact Disc, we see a major impact of IT in our living rooms. A ‘simple’ digital video recorder as DV has very sophisticated source coding, error correcting systems, and channel coding. Also PCs contain the fruit of 50 years of IT. Who could have imagined some 25 years ago that one could buy a portable CD player (with Reed-Solomon decoders!) for less than \$50.

**Han:** Do you think that more people from industry should join the activities of the IT Society?

**Kees:** My answer is a very careful yes, because they may find some interesting topics. There are many IEEE conferences every year and the traveling budgets, even in industry, are limited, and thus people have to make a selection. Some people prefer the ICC, Globecom, or related telecom conferences, where they can, for example, see the latest hype of the

Internet or learn the coolest buzzwords. There is a shift in electronics industry in the world from long term research to short term “problem solving”, and this is reflected in ISIT participation by industry people. Industrial participation of the ISITs has been very thin during the last 10 years. I did not conduct a formal poll, but I think that during the last 10 years or so participation was less than 15-20 (a few percent) persons. In the upcoming years there will be one less, as I left industry last year to join academia.

**Han:** To see the impact of Information Theory, I wonder in which of your inventions IT was involved?

**Kees:** My inventions cover areas such as mechanics, optics, electronics and also coding. In my patents that describe “coding methods and apparatuses” you will find IT as its basis. Most of the ideas described in these patents were published later as Transactions papers.

**Han:** Many young scientists in Europe have the idea that they can benefit from having a patent on their work. At university level, these ideas also are sometimes in the heads of administrators that want to make money out of science. In this respect your opinion whether researchers at universities should apply for patents instead of trying to publish their results could give some more eye opening information.

**Kees:** A very careful YES to this question. I do know what this involves: One must invest the time to describe the invention and talk to an attorney, a publication can only be presented after the application (this may result in a significant delay), and there is a price tag to a patent application. The cost might not be that high if the inventor is doing some of the work, like literature search regarding prior art etc. her(him)self. I believe part of the writing of an application can be done without an attorney. Universities in Germany and The Netherlands, and may be many others, provide legal assistance and financial support. The Dutch patent law offers a free-admission procedure if the inventor can show he/she does not have the financial means. But why should you do all this work and take the risk? There are several paths to obtain revenues. Probably, the simplest route is selling the patent (application) outright. It is simple, but selling the invention might mean you lose a great fortune. A second route in the commercialization of your idea is licensing, through which you retain ownership of your patent while allowing another party to make, use or sell the invention. May be the application of a patent is not always a good idea, but it is always worth while, unless of course the study is pure analysis, to use the patent literature as a source of information. Patent literature used to be inaccessible for workers in academia, but that drastically changed a few years ago, when IBM and others started WEB pages that provide access to virtually all patent literature. There are some difficulties that have to be overcome, in particular related to the titles of the inventions as some patent attorneys try to disguise patents by using ambiguous titles. A



whistling kettle is, for example, “A device and/or apparatus for boiling water or other liquids with acoustic signaling”. But after a while, you learn to live with that, and the revenue is great as each patent offers by definition a precise description of the new technique.

**Han:** We just finished a period of 50 years of Information Theory. We all hope that we will have a flourishing new period of 50 years. Do you think that there is a future for IT, and in which areas is there room for new developments? I sometimes have the impression that we are working in the margins.

**Kees:** I think there will always be research in new coding techniques as channels are changing and competition will be stronger. These new channels and codes require a solid understanding and therefore IT will exist as long as electronics will exist. Margins between proposed codes are indeed becoming smaller and smaller. For example, in 1979, during the Philips/Sony discussions that eventually led to the CD we talked about claimed differences between code performance of 20%. Five years ago, during the DVD standardization, the difference between the two competing code proposals was 6%. The code proposed by Toshiba c.s was a rate 8/15, RLL code while Philips/SONY’s code was a rate 8/16, RLL code. The latter, EFMPlus, was adopted. This resulted in a decrease of storage capacity from the proposed 5 to 4.7 GByte. Thus the 6% rate difference resulted in a loss of 300 MByte per disc layer, that is half the storage capacity of the classic CD. As the standard allows up to four layers per disc, the loss in disc capacity is twice the CD capacity. In other words, small ‘marginal’ differences can make a world of difference. During the last year of my Philips career we discussed codes with SONY engineers for a new product, “to be seen soon”, where eventually a code with a 0.2% better rate was adopted. So I agree the differences are getting smaller and smaller, but the impact —royalty income— for industry is still significant.

**Han:** Continuing the future, the following question could give us some insight about your plans. If you could now choose a new education and a new career, what would you choose?

**Kees:** I find this question very difficult to answer. The question, I think, means that I am 17 years old again. Statistically speaking I will not choose engineering again as interest for it in the Netherlands, in the whole Western world in fact, is declining. In particular the hard core engineering fields such as mechanics and electrical engineering suffer most. So probably I will choose an education in economics, law, or may be science. I have worked quite intensively with patent attorneys and lawyers during the last six months as I was involved in various litigations. Among others, a litigation in Australia concerning value added tax on Compact Discs. To be honest, law and taxation are not at all as dull or intuitive as I had previously thought.

**Han:** You received many awards and honors. Which one gave you the most satisfaction and why?

**Kees:** Yes, I have been spoiled during the last years. I cannot say that award A or B gave me more satisfaction than others. They are all dear to me as they represent tokens of appreciation from my peers in Information Theory, audio and video engineering, and, this year, the Edison Medal by my peers in elec-

trical engineering at large. The Edison Medal, founded in 1906 by the AIEE, was awarded to the pioneers of the electrical arts. The greatest of all, Nicola Tesla, received this award in 1916. It must not have been Tesla's finest hour when he received the medal as the inventors Nicola Tesla and Thomas Edison were not really great 'friends'. According to some sources, Tesla refused to accept the Nobel prize as it would have to be divided with Edison, and it, therefore, remains a great mystery why he decided to accept the medal named after his adversary. The same sources on the Internet report that the only asset Tesla had left in a hotel deposit, when he died in 1942 (his patents on the AC motor and power distribution made him an extremely wealthy man in the late 1900s), was his Edison (gold) Medal. It was, however, not enough to settle his hotel bill. So, I learned from the above story to keep the medal at a safe place, but that I must try to stay away from expensive hotels.

**Han:** Speaking about electrical art. Your wife, Clazien, is a well-known painter and artist. Did your work influence her?

**Kees:** I don't know, but I do know that her work has a great influence on me. She makes terrific work, very colorful. I have the possibility to choose work for my office (for a while), and as a result it is always sunny, even when it rains.

**Han:** Thank you for your time and I hope that you stay in our community for a long time as a scientist, but also as a friend.

## Awards

### Sergio Benedetto Receives Italgas Prize for Research and Technological Innovation

In October 1998, the Prize Committee of the Italgas Prize for Research and Technological Innovation presented the 1998 Prize to Sergio Benedetto of Politecnico di Torino, Italy. The Italgas Prize is presented every year to two innovative research projects developed by scientists of the European Community in fields of Science and Technology for the Energy, for the Environment, and for Information Systems. It consists of a certificate, a silver plate, and 15 million Italian Lira (about \$90,000). The award has been assigned to Sergio Benedetto (and his research

partner Pierluigi Poggiolini) for the theoretical and experimental development of "The POLSK Project: Beyond the Limitations of Current Data Transmission Technologies over Optical Fibers," a new modulation technique to transmit information over optical fibers based on the polarization of light.



### Robert G. Gallager Wins 1999 Harvey Prize

The American Society for the Technion-Israel Institute of Technology has announced that Robert G. Gallager is the recipient of the 1999 Harvey Prize in the field of Science and Technology. The prize is one of two given annually, and consists of a cash award of 35,000 USD. The Harvey Prize, established in 1972 by the late Leo M. Harvey of Los Angeles, honors major contributions to progress in science, technology, and medicine, as well as contributions to peace in the Middle East. The first winner of this prize was Claude Shannon in 1972. The prize will be presented in Israel on June 16,

1999. Robert G. Gallager is a Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. An article on Professor Gallager in honor of his receipt of the prize will appear in a future issue of the newsletter.

