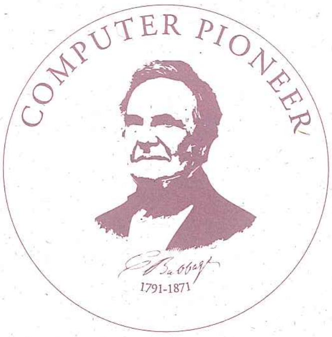
IEEE COMPUTER SOCIETY

Computer PIONEER

Hungary



THE AWARD

The Computer Pioneer Award was established in 1981 by the Board of Governors of the IEEE Computer Society to recognize and honor the vision of those people whose efforts resulted in the creation and continued vitality of the computer industry. The award is presented annually to outstanding individuals whose main contribution to the concepts and development of the computer field was made at least fifteen years earlier.

Until recently, scientists and engineers from Central and Eastern Europe have been under represented in this roster. Prior to the recent political changes, we in the West did not have access to the details of the work or the significance of that work in their countries. In order to redress this disparity, the Computer Society mounted a special effort during 1996, as a part of its own 50th anniversary celebration, to identify candidates from Central and Eastern Europe.

The recognition is engraved on the Computer Pioneer medal specially struck for the Society.

The Board of Governors of the IEEE Computer Society
is proud to recognize the following as Computer Pioneers:

1996
Laszlo Kalmar
Laszlo Kozma

COMPUTER PIONEER AWARD SUB-COMMITTEE

John A. N. (JAN) Lee, *Chair*
All living Computer Pioneer medalists are members.

IEEE Computer Society

recognizes

Laszlo Kalmar

"for development of a 1956 logical machine and the design of the MIR computer in Hungary"

Laszlo Kalmar was born on 27 March 1905 in Edde, a Hungarian village in Somogy County. After finishing at the University of Budapest, he went to the Bolyai Mathematics Institute of Szeged University, where his work helped pave the way for the development of computer science in Hungary. He became a professor in 1947, and was promptly elected a corresponding member of the Hungarian Academy.

At the end of the 1920s Kalmar became interested in the central, most challenging problems of mathematical logic and set theory. Hardly any research in this area had been done in the previous 15 years in Hungary. The studies were of decisive importance in the foundations of mathematics as a whole, and also had some weighty philosophical ramifications.

In the spring of 1956 the idea of building a "logical machine" developed. It could evaluate, for a given variable value-range, the truth-value of formulae containing logical variables. The logical operations (conjunction, disjunction, negation, etc.) were performed using an electric circuit made solely of switching elements. The design realization was constructed from spare "3 core" elements, suitable for error signalling as well. Formula entry was accomplished using plugs, or turning switches to set the value range of the variables, and signal lamps for the output. A supplementary relay memory was added to store formulae, and thus permitted one to inspect several formulae simultaneously. The machine, which was built by 1958, could deal with formula containing no more than 8 variables and 6 logical operations.

By the end of the 1950s it became apparent that so-called high-level languages should be employed to program computers. While this increased the efficiency of programming, having to translate the program and use low-efficiency target codes adversely affected the speed of execution. Between 1957 and 1960 several persons (including Kalmar in 1959) came up with the idea of constructing a computer that could directly perform a program written in a high-level programming language. Kalmar called his concept a "formula-directed machine" and worked out its design in great detail. Although Kalmar's device was not built owing to the predicted high cost, a similar design was assembled in Kiev named MIR for the language ALGOL-60 that incorporated many of his design ideas. V.M. Gluskov and his colleagues had frequent personal contacts with the Szeged research group, especially with Kalmar. In 1973 Kalmar, with the assistance of a large research team, improved the designs of a formula-directed computer, mainly in the area of handling multiple-variable functions and data structures, which had advanced considerably in the meantime.

Naturally (especially during further developments in 1973), a number of details had to be resolved to arrive at an "acceptable" language for the formula-directed device. Only by simplifying, synthesizing, and integrating the solutions could the design of detailed, technically realistic plans be implemented. Kalmar's training and wealth of experience in machine design ensured this result.

Looking at Kalmar's formula-controlled machine from the viewpoint of the end of the 20th century, who would have imagined that technological strides could produce speeds for which the same simple computer architecture still suffices, and which has been more or less the same for an assembly-level program for the last 50 years? The same goes for operator stacks, and the principle and practice of translating programs, thus making the normal system of translating-optimizing-running acceptable, right up to the present. On the other hand, the same overall purpose can still be discerned, although with other aims and considerations, in Kalmar's original concept. This was to design new computers, working on fresh principles which are better suited to solving the tasks of the present and future.

The Kalmar contribution is much wider than the sum total of his written works. He was a real public figure and an enthusiastic educator who always tried to involve students in the excitement of discovery. Rather than just leading them along the trodden path, he helped them learn how to avoid the sidetracks and cul-de-sacs that hinder the researcher. He also paid great attention to the needs of his immediate students and young colleagues, and was almost inexhaustible in recommending topics worth pursuing and advancing further.

In the last two decades of his life Kalmar channeled his energies into the study of cybernetics, and within this sphere launched the development of computer science in Hungary. He was a man who felt a great urge to stay in touch with events, to actively participate in solving the current problems and current issues. In short, he liked to be in the thick of things.

His primary reason for taking part in scientific public life was to urge more mathematicians to study computer science (and related mathematical fields) and direct their attentions to his research field, to campaign for the purchase and construction of computers, and to forward the application of these machines to theoretical and practical sciences. Almost every Hungarian expert who worked in the field of computer studies or science between the 1960s and 1980s, recalls Laszlo Kalmar as their mentor or great source of inspiration. Without exaggeration one can say that the advanced stage of the theory and practice of computer science in Hungary today principally stems from his life's personal endeavors.

IEEE Computer Society

recognizes

Laszlo Kozma

"for development of the 1930 relay machines, and going on to build early computers in post-war Hungary."

Laszlo Kozma was born in 1902 in Hungary. As a young electrical engineer in 1930, Laszlo Kozma arrived at the Bell Telephone Laboratories in Antwerp. His talent was quickly recognized and between 1934-1938 the company applied for 25 patents in which he played some part.

At the beginning of 1938 the laboratories development director entrusted him with the development of an electrically powered calculator which used components of telephone network equipment manufactured by the company. The machine counted in the decimal system, could add, subtract and multiply, but could not do long division.

Kozma's first calculator was finished in a very short time (by Autumn 1938), allowing him to design and build his next, faster device. His first Antwerp machine performed an addition in 1-1.5 seconds, and a multiplication in 5-10 seconds depending on the number of digits.

In the 1930s and 1940s the company took out 10 patents related to the Bell Telephone calculator, which were solely due to Laszlo Kozma's research work or his collaboration with others.

The first calculator used simple circuits, while the second contained an extraordinary device in those days. With the help of several data-input devices it could be connected up to the calculating machine via a switching system. The units of Laszlo Kozma's second calculator were completed by Spring 1939, and by the year's end the machine was operational. Like its predecessor it represented numbers in the decimal system, and could carry out long division as well.

Laszlo Kozma reduced the time of multiplication operations by assembling a "multiplication tables" circuit, which could perform multiplication in the time of two additions. It could handle 8-digit multiplication with a solution of 16 digits.

On 10 May 1940 when the Germans attacked Belgium, the works manager, W. Hatton, fled from Antwerp. Intending to send the No. 2 calculator developed by Kozma to the US, he packed and shipped it. However it never arrived in the US, the ship thought to be sunk by a German U-boat.

J. Kruithof, the new works manager, decided that they would continue developing the calculator in secret, under the very noses of the Germans. The No. 3 machine was built, which hardly differed from its predecessor. By 1940 it was operational. It could handle long division, and punched the results onto a paper tape.

In 1942 Laszlo Kozma left Belgium, returning to Hungary, to become works manager for a factory called Standard.

In 1955 at the Circuit Department of the Budapest Technical University, Kozma started designing his next (in Hungary, the first) electromagnetic relay calculator, which could be employed as a tool to demonstrate technical connection tasks to his students. He believed that this machine would also help solve calculating problems at the Budapest Technical University.

The MESZ-I (Technical Univ. Calculator) was assembled by Kozma from the cheapest Hungarian-made relays, so-called R-type signal relays. He designed the circuits himself, the planning work taking until Spring 1957. Assembly was completed by the beginning of 1958. By the end of 1958 the device was operational, and in 1959 was regularly utilized in teaching and counting tasks. The MESZ-I was a program-driven, automatic digital calculator/computer, built from electromagnetic relays, which worked in the binary system. It was not a stored program machine, as the program was stored on a large-sized punch card. A data-storer fed data into the computer through a "program scanner". The input decimal data had to be keyed into the machine. Results were printed on a standard Mercedes typewriter, the keys of which were operated by electromagnets.

The computing apparatus was housed in three cabinets, the computing and programming tasks being performed by 2000 relays. The masterful design and Laszlo Kozma's excellent engineering qualities are apparent from the fact he used only 10 different types of relays. The machine was powered by a 60 V DC source, and consumed some 600-800 Watts.

Laszlo Kozma was awarded the Kossuth Prize, and in 1961 elected corresponding member of the Hungarian Academy of Sciences. In 1976, Kozma became a regular member of the Academy. In 1964 Laszlo Kozma and his colleagues built a special computer for the Hungarian Academy's Linguistics Institute, which could be employed for language-statistics investigations.

In his final years, Kozma grappled with the problem of telephone networks. He studied the question of building a national direct-dialing (trunk-call) system, the importance of subcenters, and the growing increase in telephone subscribers.

Laszlo Kozma passed away at the age of 81 on 9 November 1983.

Recognized Pioneers

1981
Jeffrey Chuan Chu
Early Work in Electronic Computer Logic Design

1982
Arthur Burks
Early Work in Electronic Computer Logic Design

Harry D. Huskey
First Parallel Computer SWAC

1984
John Vincent Atanasoff
First Electronic Computer with Serial Memory

Jerrier A. Haddad
Lead IBM 701 Design Team

Nicholas C. Metropolis
First Solved Atomic Energy Problems on ENIAC

Nathaniel Rochester
Architecture of IBM 702 Electronic Data Processing Machines

Willem L. van der Poel
Serial Computer - ZEBRA

1985
John G. Kemeny
BASIC

John McCarthy
LISP and Artificial Intelligence

Alan Perlis
Computer Language Translation

Ivan Sutherland
Sketchpad

David Wheeler
Assembly Language

Heinz Zemanek
MAILUEFTERL

1986
Cuthbert C. Hurd
Contributions to Early Computing

Peter Naur
Computer Language Development

James H. Pomerene
IAS and Harvest Computers

Adriann van Wijgaarden
ALGOL 68

1987
Robert E. Everett
WHIRLWIND

Reynold B. Johnson
RAMAC

Arthur L. Samuel
Adaptive Non-numeric Processing

Nicklaus E. Wirth
PASCAL

1988
Freidrich L. Bauer
Computer Stacks

Marcian E. Hoff, Jr.
Microprocessor on a Chip

1989
John Cocke
Instruction Pipelining and RISC Concepts

James A. Weidenhammer
High-Speed I/O Mechanisms

Ralph L. Palmer
IBM 604 Electronic Calculator

Special Award for the Office of Naval Research
Mina S. Rees
Marshall C. Yovits
E. Joachim Weyl
Gordon D. Goldstein

1990
Werner Bucholz
Computer Architecture

C.A.R. Hoare
Programming Language Definitions

1991
Bob O. Evans
Compatible Computers

Robert W. Floyd
Early Compilers

Thomas E. Kurtz
BASIC

1992
Stephen W. Dunwell
Project Stretch

Douglas C. Engelbart
Human Machine Interaction

1993
Erich Bloch
High Speed Computing

Jack S. Kilby
Co-inventor of the Integrated Circuit

Willis H. Ware
Design of IAS and Johnniac Computers

1994
Gerrit A. Blaauw
IBM System/360 Series of Computers

Harlan W. Mills
Structured Programming

Dennis M. Ritchie
Development of UNIX

Ken L. Thompson
Development of UNIX

1995
Gerald Estrin
Significant Developments on Early Computers

David C. Evans
Seminal Work on Computer Graphics

Butler W. Lampson
Early Concepts and Developments of the PC

Marvin Minsky
Conceptual Development of Artificial Intelligence

Kenneth H. Olsen
Concepts and Development of Minicomputers

1996
Angel Angelov
Computer Science Technologies in Bulgaria

Richard F. Clippinger
Converting the ENIAC to a Stored Program Computer

Edgar Frank Codd
Invented the First Abstract Model for Database Management

Norbert Fristacky
Pioneering Digital Devices

Victor M. Glushkov
Digital Automation of Computer Architecture

Jozef Gruska
Computer Theory Contributions

Jiri Horejs
Informatics and Computer Science

Lubomir Iliev
First Bulgarian Computer

Robert E. Kahn
Co-invention of TCP/IP Protocols and Origination of the Internet Program

Laszlo Kalmar
Logic Machine & MIR Computer

Antoni Kilinski
First Commercial Computers in Poland

Laszlo Kozma
1930 Relay Machines

Sergey A. Lebedev
First Computer in the Soviet Union

Alexej A. Lyuponov
Soviet Cybernetics and Programming

Romuald W. Marczynski
First Digital Computers in Poland

Grigore C. Moisil
Polyvalent Logic Switching Circuits

Ivan Plander
Computer Hardware Technology

Arnols Reitsakas
Contributions to Estonia's Computer Age

Antonin Svoboda
Computer Research & Design of SAPO/EPOS

1997
Francis Elizabeth (Betty) Snyder-Holberton
Development of Sort-Merge Generator for Univac

Homer R. (Barney) Oldfield
Pioneering Work in the Development of Banking Applications/ERMA

Chartered Recipients

On the occasion of the initiation of the Computer Pioneer Award, the Board of Governors of the IEEE Computer Society has named, as charter recipients of this award, the following individuals who meet the Computer Pioneer Award criteria, and who also have received previous computer awards sponsored by the Society.

Howard H. Aiken
Large-Scale Automatic Computation

Samuel N. Alexander
SEAC

Gene M. Amdahl
Large-Scale Computer Architecture

John W. Backus
FORTRAN

Robert S. Barton
Language-Directed Architecture

C. Gordon Bell
Computer Design

Frederick P. Brooks, Jr.
Compatible Computer Family System/360

Wesley A. Clark
First Personal Computer

Fernando J. Corbató
Timesharing

Seymour R. Cray
Scientific Computer Systems

Edsgar W. Dijkstra
Multiprogramming Control

J. Presper Eckert
First All-Electronic Computer - ENIAC

Jay W. Forrester
First Large-Scale Coincident Current Memory

Herman H. Goldstine
Contributions to Early Computer Design

Richard W. Hamming
Error-Correcting Code

Jean A. Hoerni
Planar Semiconductor Manufacturing Process

Grace M. Hopper
Automatic Programming

Alston S. Householder
Numerical Methods

David A. Huffman
Sequential Circuit Design

Kenneth E. Iverson
APL

Tom Kilburn
Paging Computer Design

Donald E. Knuth
Science of Computer Algorithms

Herman Lukoff
Early Electronic Computer Circuits

John W. Mauchly
First All-Electronic Computer - ENIAC

Gordon E. Moore
Integrated Circuit Production Technology

Allen Newell
Contributions to Artificial Intelligence

Robert N. Noyce
Integrated Circuit Production Technology

Lawrence G. Roberts
Packet Switching

George R. Stibitz
First Remote Computation

Shmuel Winograd
Efficiency of Computational Algorithms

Maurice V. Wilkes
Microprogramming

Konrad Zuse
First Process Control Computer