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DAVIES, DONALD WATTS (1924-2000), pioneer of digital computing, and of packet switching for data communication

Name: Donald Watts Davies
Date of birth: 1924
Date of death: 2000
Gender: Male
Occupation: pioneer of digital computing, and of packet switching for data communication
Area of activity: Science and Mathematics
Author: Mary Auronwy James

Donald Davies was born 7 June 1924 (with his twin sister Marion Ivey) at Treorchy, Rhondda Valley, Glamorganshire, son of John Davies (a clerk at a coal mine who died in July 1925), and Hilda (née Stebbens, from Portsmouth). The widowed mother returned to Portsmouth with the young twins. Donald went to Portsmouth Boys' Southern Secondary School; the school evacuated to Brockenhurst in 1939. At Imperial College of Science and Technology, London, and as an Associate of the Royal College of Science (ARCS) he graduated BSc (Physics, 1st class honours) in 1943.

He then had to commence his National Service and was assigned to a group under (Sir) Rudolf E. Peierls at Birmingham, working on the atomic bomb. His supervisor was the notorious Klaus Fuchs, and his duties involved him working at Imperial Chemical Industries (ICI) in Billingham, where a 235U separation plant was being developed. At the end of the war he used the remaining year of his State Scholarship to gain a BSc in Mathematics (1st class honours) in 1947 before obtaining a grant from the Department of Scientific and Industrial Research (DSIR) to work at the National Physical Laboratory (NPL) on the construction and use of the ACE pilot model electronic computer. He made numerous contributions, particularly to electromechanical components for input and output by means of Hollerith (punched) cards.

In 1954 he was awarded a Harkness Fellowship to study in the United States of America. Unfortunately he chose the Massachusetts Institute of Technology (MIT), and found that he was not allowed to attend to the classified computer work, so he went to India on behalf of the United Nations to investigate a request from the Indian Statistical Institute for funds to buy equipment from the Union of Soviet Socialist Republics (USSR). He returned in 1955 to NPL to work on the design and fabrication of cryotrons, namely, switching elements that exploited superconductivity to build very fast computers, but their efforts foundered on engineering problems. He was also to lead a small team developing progams to translate Russian, but text was not available in machine-readable form at the time, and it cost more to keypunch than translate directly.

In the 1960s the service for time-sharing on-line to a number of users of a large computer began. He noticed the mismatch between the messages which were at irregular intervals between the user and the machine, and the switched circuits of fixed bandwidth of the telephone network that carried the data. He considered that the kind of network needed would treat its traffic as short messages. He called this 'packet switching' and pioneering work in this field at NPL continued for 10 years.

He turned to the practical application of cryptography to computer security c.1975. He designed the basic security scheme and was concerned with the tamper-resistant modules for the storage and transport of cryptographic keys. In all he made significant contributions to the mechanization of thought processes, involving translation, retrieval, speech recognition, learning theory, pattern recognition, cybernetics and automated reasoning, and will be most remembered for the simple and eventually compelling idea of packet switching, for which he and his collaborators produced very early a rather complete design. He retired from the scientific civil service in 1984. For the next 15 years he practised as a consultant in security engineering for financial and media industries.

In 1969 he gave a series of nine three-hour lectures in Japan and received the John Player Award of the British Computer Society for his work on this project. He received many other honours and awards, including the Sir John Lubbock Prize in Mathematics (1946), John von Neumann Society's Award, Budapest (1985), the title of Dist. Fellow of the British Computer Society (1975), and Honorary DSc (Salford 1989). He was appointed CBE in 1983 and elected Fellow of the Royal Society in 1987.

He published *Digital Techniques* (1963); with Derek Barber, *Communication Networks for Computers* (1973) which became a classic; with Barber, Price and Solomonides, *Computer Networks and their Protocols* (1979), a major contribution in this field; *Security for Computer Networks* (1984; 1989); and other books and joint papers in various scientific journals.

He married in 1955 Diane Lucy E. (née Burton) and they had two sons and a daughter. He died 28 May 2000.

Author

Dr Mary Auronwy James

Sources

Who was who?, 1996-2000

Biographical Memoirs of Fellows of the Royal Society 2002, Vol. 48, 89-96

Further Reading

Wikipedia Article: Donald Davies

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