



# MIT and the Birth of Digital Signal Processing (Scientist and Science series) (Volume 4)

*Enders Anthony Robinson*

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In the late 1950s, the first transistorized digital computers were manufactured. As a result, the decade of the 1960s saw the conversion of the oil exploration industry from analog filtering to digital signal processing. Digital signal processing and deconvolution made it possible to explore successfully in all areas of the Earth including the areas under the seas. Deconvolution requires massive parallel processing. The computer industry accommodated and developed special-purpose digital signal processing (DSP) computers, which at the time were called array processors (also known as vector processors). As time went on, these DSP computers were replaced by microchips, as were all digital computers. In 1986 the National Academy of Engineering (NAE) of the United States of America elected Enders Robinson as member with the citation: "For pioneering contributions that have led to the evolution of seismic processing from hand digitization of the 1950s to today's custom deconvolution chip." The hand digitization of the 1950s was the forerunner of what was to come. Practically all communications today are done with digital data. The telephone is digital, the television is digital, the cinema is digital, the music is digital, the camera is digital. Now in the second decade of the twenty-first century, DSP chips are everywhere. The deconvolution chip is the prototype digital signal processing (DSP) chip. Usually the NAE credits new members for such things as "innovative research" or "revolutionary discoveries." Certainly such chips are vital, but why would the NAE mention a chip and not mention seemingly more important mathematical research? The National Academy foresaw what many others did not foresee. In 1986 the Academy realized that the era of mathematical numeral analysis was losing its position at the forefront of computing. Instead the era of communication was at the beginning of its meteoric rise to ascendancy. Communication requires a massive use of digital signal processing. Today in 2014, digital signal processing is a powerful technology used everywhere. This technology is universally possible because of inexpensive and tiny DSP (Digital Signal Processing) chips. DSP chips are an integral part of audio and video systems, television, telephones, cameras, radar, sonar, transmission fiber cable, automobiles, airplanes, ships, space vehicles, programmable heart pacemakers, other medical devices, and all types of automation in manufacturing and logistics. Digital Signal Processing (DSP) chips are used to satisfy the insatiable needs for communication among people and for the regulation and control of machines and devices. DSP chips take real-world signals like position, voice, audio, video, pressure, temperature, and medical readings to process them digitally in order to produce the desired results. Every time you use a mobile phone, you are using a DSP chip. Every time you drive an automobile, you are using several dozen DSP chips. The new medical devices that monitor your health all use DSP chips. The birth of digital signal processing took place in the MIT Mathematics Department from 1950 to 1952 under the guidance of Prof. Norbert Wiener. The DSP chip uses the methods of digital signal processing that were run for the first time on the Whirlwind computer at MIT in 1952. This book takes you on a journey showing how this development evolved and led to the DSP chip. This development took place because MIT President James R. Killian challenged the conventional analog thinking of the time. He stepped in and put up his presidential funds to support the DSP project that otherwise would have perished.

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