



Curiosity in Science and Technology

In this issue of *IEEE Signal Processing Magazine (SPM)*, we introduce to our readers a special article written by Dr. Jim Flanagan titled “Curious Science.” It contains one dozen topics or stories, with a set of valuable and historical photos, about pro bono, “extracurricular” work at Bell Labs (during its heyday) in response to government’s requests outside the Labs’ mainstream research on voice- and telecommunications.

When the initial draft was received and read in April 2008, I was genuinely impressed by the rare historic insights and pioneering wisdom that Dr. Flanagan has kindly shared in his write-up. While

the initial intended audience was his three sons, the then-EIC Prof. Shih-Fu Chang and I are both of the view that this piece will also provide excellent sources of ideas and motivations for our fellow members in the Signal Processing Society (SPS). After the decision was made to publish the manuscript in *SPM*, Dr. Flanagan had, with my coordination, been working steadily and sometimes painfully on the copyright issues related to a collection of historical photos contained in the manuscript. (In his own words, “... This has almost turned into a career... It turns out that copyrights are sold and exchanged like currency, so they can go through many hands. Discovering and threading the way to the current holder is torturous and expensive—in

time and astronomical phone bills.”) With final success in this endeavor, here is the full article in your hands. I would like to express sincere appreciation to Dr. Flanagan for not only sharing his stories and insights but also dedicating incredible effort to securing the copyrights, thus enabling our readers to enjoy the stories and photos. I also thank our Associate Editor Prof. George Moschytz who provided a review of this article.

I thought there would be no need to introduce Dr. Flanagan; after all, he is a former president of SPS and a pioneer in signal processing, voice processing in particular. But for our younger generation of readers, especially those not specialized in audio or speech processing, a few words/quotes may help put the reading of

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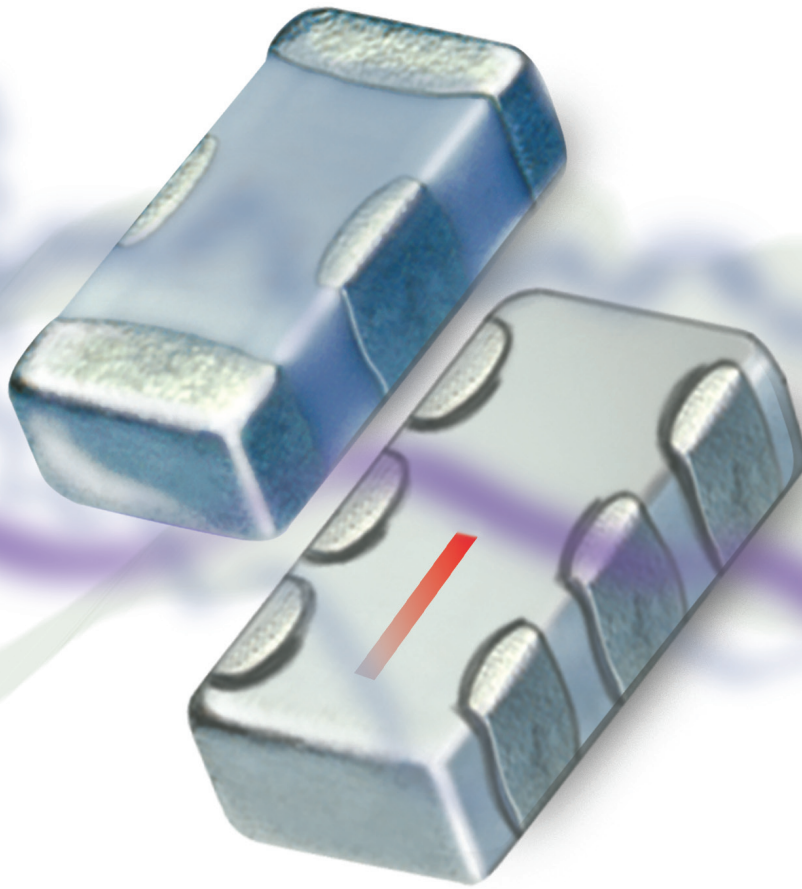
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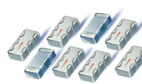
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“Curious Science” in better context. Dr. Flanagan’s scientific awards include the 1996 National Medal of Science and the 2005 IEEE Medal of Honor. To summarize his technical contributions, let me quote from the cover page of *IEEE Spectrum* (May 2005): “James Flanagan’s inventions set the stage for MP3 players, voice over IP, and realistic speech synthesis.” Also I would like to quote from the subtitle of the article “Sultan of Sound” in the same issue of *IEEE Spectrum*, which honors his IEEE Medal of Honor: “Voice mail, speech recognition, the artificial larynx, packet-switched voice—these commonplace applications build on the pioneering research of James L. Flanagan.”

In “Curious Science,” you will read some of the following scientific content:

- early computer simulation of basilar membrane behavior in the inner ear
- binaural effect via masking release

- early use of spectrography for speech signal visualization
- early search for the efficient descriptors of the information in speech signals in developing aids for human communication
- audio and speech analysis associated with the Watergate investigation
- early work of voiceprints for person identification and its initial exploratory applications by the government.

The activities and stories connected with such scientific content are labeled as “curious” by the author since they were “frequently unusual and mainly outside the main telecommunications mission.” It is also obvious that these activities were driven by scientific curiosity and by the desire to push forward the scientific forefront as well as the state of the art in technology. Reading the manuscript and communicating with the author while performing the editing

task over a few months of time impressed me that without such curiosity and drive, the state of science and technology, audio, and speech processing in particular, would be difficult to advance to the current modern age. The advancement may also be attributed to the freedom enjoyed by the researchers described in Dr. Flanagan’s article to pursue the curiosity-driven and pro bono projects as assistance to the government rather than being confined within the direct mission. In today’s world, we need such curiosity in science and technology to push the state of the art to further higher levels. Hopefully, this article can serve as one source of inspiration.

We invite you to delve into the exciting article of “Curious Science.” **[SP]**



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