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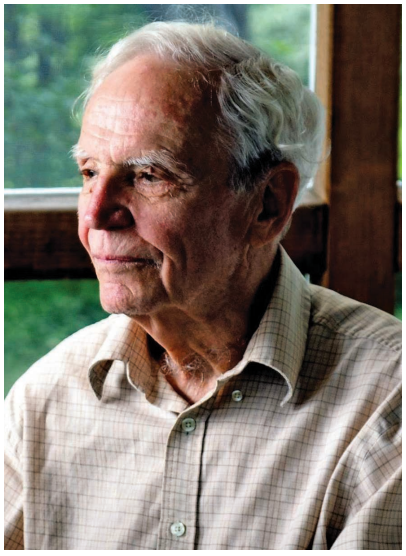
In Remembrance of Peter Schultheiss

On 23 February 2021, Peter Schultheiss died peacefully in his sleep in Hamden, Connecticut, at the age of 96. He had been a faculty member at Yale University since 1947, where he taught for more than 65 years and trained dozens of Ph.D. students, postdocs, and research collaborators. His research interests centered on problems in detection and estimation theory. He led the most significant contributions to the theory of source localization by an array of sensors and advanced its application in underwater acoustics.

Prof. Schultheiss's research was motivated by real-world problems with direct connections to the physical world. He identified many of these through collaborations with U.S. Navy research laboratories. He insisted on accurate modeling and accepted approximations only when they were well justified, and he introduced a systematic method for discovering insights through the use of theoretical performance bounds. Invariably, modeling imperfections, such as limited coherence and calibration, constrain the ability of sensing systems to achieve optimal performance. By including uncertainty in his models, Prof. Schultheiss provided benchmarks to which the performance of real systems could be realistically compared. Moreover, his insights focused attention on areas of system design that most critically limited performance. His early application of the Cramér–Rao lower bound, from statistics, to sensor array systems spawned its use as well as that of other bounds in a wide variety of signal processing applications.



Prof. Peter Schultheiss.

More specifically, Prof. Schultheiss was an early and consistent contributor to passive and active source localization and time delay estimation in underwater acoustics and sonar environments. Working with his many students and collaborators, he derived optimal and suboptimal estimators and developed Cramér–Rao bounds that established limits on expected performance under a variety of conditions, including randomly perturbed arrays, the presence of interference, multipath, and unknown noise statistics. One such example is his pioneering work on array shape calibration using sources in unknown locations, under which he first presented the concept of a hybrid Cramér–Rao bound and demonstrated how its analysis could be used for studying the inherent limitations in practical parameter estimation problems.

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Prof. Schultheiss was highly recognized as an excellent teacher. He taught linear algebra in the Department of Mathematics for decades, as students preferred his teaching style and clarity. For his graduate students, postdocs, and research collaborators, he was an excellent mentor and was involved in the details of their research projects. He was a great inspiration to many researchers and his former students. Prof. Schultheiss was a kind individual who was always open to support younger researchers and provide them with valuable career guidance. He was highly appreciated by colleagues in the signal processing community and will be missed by all of them.

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Digital Object Identifier 10.1109/MSP.2021.3065892
Date of current version: 28 April 2021