

# ECE Distinguished Seminar

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## The interplay of theory and technology in the communication sciences

Robert G. Gallager, Professor Emeritus, M.I.T.  
Friday, October 16<sup>th</sup>, 1:30 pm,  
Dreese Lab 113, Marlin Thurston Auditorium

**Abstract:** Modern communication theory was essentially created in 1948 by Claude Shannon's landmark papers on the mathematical theory of communication (information theory). Many learned papers at that time argued that this Shannon's would revolutionize not only communication technology but also the way we think and talk. The applications, however, were quite limited for over 30 years. There were exciting mathematical developments, but little coupling to actual systems.

In the last 30 years, the coupling of theory and technology has become closer and closer. The information theoretic notion that virtually any kind of communication can be viewed as a string of bits and that these bits can be sent reliably over virtually any communication medium is commonplace to teenagers.

Information theoretic principles (perhaps without all the mathematics) are now central to all communication system design.

We discuss this transition from theory to practice, using personal anecdotes, various landmark events, and a fair amount of speculation. We then discuss how this enormous success story is breeding an impatience with the slow, uneven, and unpredictable pace of basic research. Finally we suggest that the enormous success of information age technology has been accompanied by some not yet understood costs.

**Bio:** Professor Robert G. Gallager is well known for his fundamental work on Information Theory over the last 50 years, including the noisy channel coding theorem, the invention of low density parity check codes, and his textbooks on Information Theory, Data Networks, Discrete Stochastic Processes, and Principles of Data Communication. He is the recipient of the IEEE Medal of Honor (1990), the Technion Harvey prize (1999), the Eduard Rhein prize (2002), the Marconi prize (2003), and many other awards. He is a Fellow of the IEEE. and a member of the U.S. National Academy of Engineering, the U.S. National Academy of Sciences, and the American Academy of Arts and Sciences. He has been a faculty member of EECS at M.I.T. since 1960, and is now retired but still active in research and teaching.

**Host:** Emre Koksal

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