Dear IEEE Members,

The following announces five lectures are to be given by IEEE Signal Processing Society Distinguished Lecturers.

Prof Robert Gray from Stanford University will deliver two lectures on
Friday, 24 March 2006, and Monday, 27 March 2006.

Prof C.C. Jay Kuo, from the University of Southern California, will deliver three lectures on
Wednesday, 5 April 2006, and Thursday, 6 April 2006.

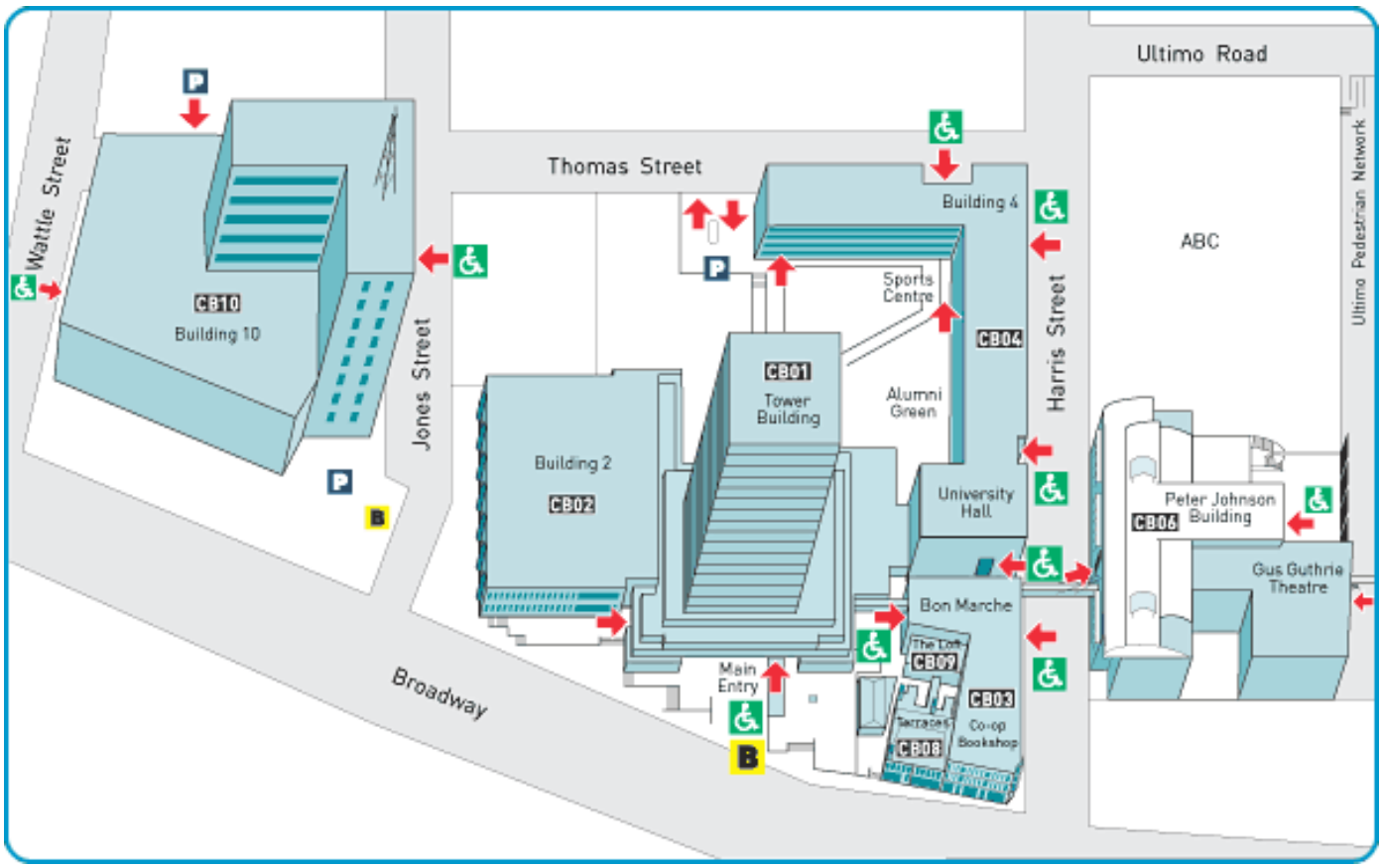
The venue is the University of Technology, Sydney. 1 Broadway, Broadway NSW 2007

These lectures provide excellent opportunities to hear two outstanding researchers in the field of Signal Processing. Please attend if possible.

Best regards,

Sam

A/Prof Sam Reisenfeld, *Chairman, IEEE Communications and Signal Processing Chapter, NSW Section*
ICT Group
Faculty of Engineering
University of Technology, Sydney, Australia



UTS Broadway Campus Plan

Prof Robert Gray, Stanford University

Robert M. Gray is the Lucent Technologies Professor of Engineering at Stanford University, where he teaches and does research in information theory, signal processing, and data compression. He received his BS and MS degrees in EE at MIT in 1966 and the PhD from the University of Southern California in 1969. He was Editor-in-Chief of the IEEE Transactions on Information Theory (1980-1983), Co- General-Chair of the 1993 IEEE International Symposium on Information Theory, and Program co-Chair of the 1996 and 2004 IEEE International Conferences on Image Processing. He has authored or coauthored nine books, including Vector Quantization and Signal Compression, Kluwer (1992), by Gersho and Gray. He received the 1976 IEEE Information Theory Group Paper Award, the 1983 IEEE ASSP Senior Award, the 1993 Society Award and the 1997 Technical Achievement Award from the of the IEEE Signal Processing Society, and a Golden Jubilee Award for Technological Innovation from the IEEE Information Theory Society. He is the recipient of IEEE Centennial and Third Millennium medals and a 2002 Presidential Award for Excellence in Science, Engineering, and Mathematics Mentoring (PAESMEM).

Lecture 1

Prof Robert Gray, Stanford University
24 March 2006, Friday, 2-4 PM
UTS, Broadway Campus, Building CB06, Level 3, Room 320

Extracting discrete information from a continuous world: Quantization, Compression, and Classification

Abstract: Scientists and engineers often seek to measure, communicate, store, process, reproduce, or analyze signals encountered in the real world. Most such signals are inherently continuous or analog in nature, yet increasingly the means for communicating, storing, and manipulating such information are discrete or digital. Generally something is lost when continuous information is converted into discrete approximations, so a natural goal is to preserve as much of the original information as possible. This is the general problem of quantization, a technique that historically has cropped up in a variety of branches of signal processing, taxonomy, physics, mathematics, and statistics as well as playing a key role as the interface between a continuous world and digital processing. Quantization traditionally has been used to model analog to digital conversion, Shannon source coding, and data compression. Viewed generally, quantization also models the extraction of information from signals, including statistical classification, clustering methods, and machine learning. This talk will describe the fundamentals of quantization along with examples and recent research topics in theory and application.

Lecture 2

Prof Robert Gray, Stanford University
27 March 2006, Monday, 2-4 PM
UTS, Broadway Campus, Building CB06, Level 3, Room 320

Packet speech on the Arpanet: A history of early linear predictive coded (LPC) speech and its accidental impact on the Internet Protocol

Abstract: The early history of both linear predictive coding (LPC) of speech and of network protocols for realtime low bitrate speech coding for the ARPANet is sketched. Beginning with a brief technical survey of the many approaches and developments of LPC, most of the talk is a narrative of the history of LPC and of the first real time successful packet speech demonstration on the ARPANET in 1974 and its impact on the development of the Internet protocol (IP). The talk expands on the the article ``Digital Speech and the Internet Protocol: The 1974 Origins of VoIP," *IEEE Signal Processing Magazine,* Vol. 22, July 2005, pp. 87--90.

The subject matter is expanded to sketch the historical and technical threads of the California portion of the story of the development of linear predictive methods for speech coding along with joint and parallel work in Japan, New Jersey, Massachusetts and Texas. The focus is on the 1970s, but the story begins earlier and the narrative covers through the early 1980s. Personalities, institutions, and milestones are considered along with technical developments and interpretations. With the benefit of hindsight, a brief technical tour of the basics of linear predictive coding is provided to provide context for the history. The primary personalities considered are Glen J. Culler, John Parker Burg, John D. Markel, A.H. (Steen) Gray, Jr., and Danny Cohen. The institutions emphasized include UCSB, SCRL, ISI, Culler Harrison Inc., and Time and Space Processing. The focal events are the first real time LPC speech communication on the ARPArnet in 1974, the first hardware LPC speech boxes, the book "Linear Prediction of Speech" by Markel and Gray, and the appearance of TI's Speak & Spell toy. The technical threads involve several variations and interpretations of LPC and the encounters of early LPC research with the origins of the ARPAnet and Internet and the precursors of wavelet analysis. Anecdotal stories of interactions among researchers in California and foreign (non-California) institutions such as NTT, Lincoln Labs, Bell Labs and TI are recounted. The talk is based on oral histories, the literature, email and conversations, and the author's memories as a peripheral participant.

Prof C.C. Jay Kuo, University of Southern California

Dr. C.-C. Jay Kuo received the Ph.D. degrees from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as Professor of EE, CS and Mathematics. His research interests are in the areas of digital media processing, multimedia compression, communication and networking technologies, and embedded multimedia system design. Dr. Kuo is a Fellow of IEEE and SPIE. He received the National Science Foundation Young Investigator Award (NYI) and Presidential Faculty Fellow (PFF) Award in 1992 and 1993, respectively. Dr. Kuo has guided 64 students to their Ph.D. degrees and supervised 15 postdoctoral research fellows. Currently, his research group at USC consists around 40 Ph.D. students and 5 postdoctors (please visit website http://viola.usc.edu), which is one of the largest academic research groups in multimedia technologies. He is a co-author of more than 700 technical publications in international conferences and journals as well as seven books. Dr. Kuo is Editor-in-Chief for the *Journal of Visual Communication and Image Representation*, and Editor for *the Journal of Information Science and Engineering*. He was on the Editorial Board of *the RURASIP Journal of Applied Signal Processing* and *the IEEE Signal Processing Magazine*. He served as Associate Editor for *IEEE Transactions on Image Processing*, *IEEE Transactions on Circuits and Systems for Video Technology* and *IEEE Transactions on Speech and Audio Processing*.

Lecture 3

Prof C.C.Jay Kuo, The University of Southern California
5 April 2006, Wednesday,7:00-8:30 PM
UTS, Broadway Campus, Building CB06, Level 3, Room 320

Digital Media Revolution- How the Digital Technology Impacts Our Daily Life?

Abstract: Digital technologies have been widely applied to speech, audio, video and graphics in various commercial applications today. Digital media offer great advantages over the traditional analog media for their ease of high accuracy computation (e.g. compression and encryption) and great freedom in media integration and delivery (e.g. VoIP). The availability of broadband wired/wireless Internet infrastructures and new technologies such as peer-to-peer networking and grid computing has increased the impact of digital media. This lecture will provide some important lessons learned from the history of digital media revolution, and provide an outlook to future business opportunities and R&D directions for digital media integration, distribution and management. Especially, we will discuss the mergence of 4C (Computer, Communication, Consumer Electronics and Content industry segments) and the value shift from the hardware/software products to service and content industry. The successful stories of Google and Skype will be explained.

Lecture 4

Prof C.C. Jay Kuo, The University of Southern California
6 April 2006 Thursday,3:00-4:30 PM
UTS Broadway Campus, Building CB02, Level 5, Room 533

Technologies for Movie Content Analysis, Summarization and Skimming

Abstract: The problem of automatically extracting the semantic structure from daily movies and summarizing it in a hierarchical manner will be addressed in this talk. Multiple media cues are employed in this procedure, including visual, audio and text information. The generated hierarchy provides a compact yet meaningful abstraction of video data similar to the conventional table-of-contents, which can facilitate user's access to multimedia contents including browsing and retrieval. We pay special attention to the detection and classification of important events, such as the 2-speaker dialog scene, the multiple-speaker dialog scene and the story progressing scene, from movies. After that, the problem of identifying speakers from a movie dialog scene will be examined. While most previous work on speaker identification has been carried out based on pure audio data, more robust results could be obtained by integrating the knowledge from multiple media sources such as visual and audio information when they are available. Experimental results will be given to show the performance of the proposed methodology.

Lecture 5

Prof C.C Jay. Kuo, The University of Southern California
6 April 2006 Thursday, 6:00-7:30 PM,
UTS Broadway Campus, Building CB02, Level 5, Room 533

Ubiquitous Multimedia Computing and Communication: Challenges and Future Trends

Abstract: With recent flourishing of embedded media applications such as MPEG-2, H.264 and VC-1 encoders/decoders and wireless broadband communication infrastructures such as 3G, WiMax and Wi-Fi, real-time multimedia computing and communications on embedded systems becomes a major focus for both software and hardware designers. In the first part of the talk, the tradeoff between several design choices is analyzed, including the RISC processor, the SIMD processor and the dedicated ASIC. Then, in the second half of the talk, three emerging R&D efforts will be highlighted. First, the design of a multi-format video codec to strike a balance between flexibility and performance is addressed. This is motivated by the observation that there are multiple audio/video compression formats to be adopted currently. The trend of embedded processors is to support a wide range of audio/video formats such as MPEG-2, H.264 and VC-1. The design of multi-format codec demands a careful architecture consideration. Second, we consider the design of low-complexity integrated encryption and compression speech/video coding algorithms, which can significantly lower the power consumption of mobile terminals for the digital rights management (DRM). This gives an example of lower power design from an algorithmic level. Third, the rate-distortion-complexity (RDC) optimized video coding techniques are discussed. We emphasize a concept called "decoding-friendly encoder design", where many computational heavy operations can be saved at the decoder end while high visual quality can still be preserved.
