

# Barr Systems Distinguished Lecture Series 2004-2005

**Eric Grimson, Bernard Gordon Professor of Medical Engineering, Computer Science and Engineering, Massachusetts Institute of Technology, Oct 29th, 2004, CSE E222, 4:05PM-4:55PM**

*Title: Shape Constraints in Computational Anatomy*

*Abstract:* Medical image analysis problems often include a need for the reconstruction and analysis of anatomical structures. In image guided surgery, precise detailed reconstructions of the surgical site and nearby anatomical structures are essential for surgical planning and for minimally invasive execution. In clinical studies of disease, precise detailed recovery of anatomical shape can be essential in the classification of diseased versus normal cases, and in the study of disease progression and development. We describe a set of methods that directly incorporate shape knowledge: segmentation methods that use learned models of standard shape and shape variation to extract subtle structures in new scans (including more than 30 subcortical structures in neural images); classification methods that learn common variations of shape within classes and use them to identify new instances; and analysis methods that isolate variations in substructure in populations of subjects.

**H. T. Kung, William H. Gates Professor of Computer Science and Electrical Engineering, Division of Engineering and Applied Sciences, Harvard University, Nov. 19th, 2004**

*Title: Impact of Wireless Local Networks to Telecoms: Why Integration is Inevitable*

*Abstract:* The rapid growth of wireless local networks (WLANs) will change the landscape of the telecom industry. This change will be in the form of integrating WLANs in telecom devices, systems, and services. The integration is unprecedented in the sense that it will be the first time that private networks (i.e., WLANs) are integrated into public networks (i.e., phone networks) in a large-scale manner. Among the early movers in the integration will be cellular handset manufacturers producing WLAN-enabled handsets. With these handsets, cellular phone users will have immediate and convenient access to a wide variety of cost-effective broadband WLAN applications and services, without having to rely on PDAs or PCs. In addition, ISPs, fixed-wire phone operators, and new WLAN service providers will use these handsets in voice-over-IP (VoIP) services. As WLAN-enabled handsets become more popular, cellular phone operators will increase their WLAN-related services. The integration of WLANs in telecoms is inevitable and will ultimately benefit both consumers and the industry.

**Fred Brooks, Kenan Professor of Computer Science, Department of Computer Science, University of North Carolina, Chapel Hill, Dec. 7th, 2004**

*Title: Measuring the Effectiveness of Virtual Environments*

*Abstract: TBA*

**Ken Kennedy, John and Ann Doerr University Professor of Computational Engineering, Department of Computer Science, Rice University, Jan 28th, 2005**

*Title: Generation of High-Performance Domain-Specific Languages from Component Libraries*

*Abstract: One way to increase national productivity is to broaden the community of programmers by making it possible for end users to develop applications for themselves. Indeed, many users today are producing highly functional applications using scripting languages and high-level problem-solving systems such as Matlab, Visual Basic, and S-PLUS. Unfortunately, the productivity gains are offset by the costs of rewriting these applications in "production" programming languages such as C or Fortran once they are determined to be useful. Eliminating the need for this rewriting step would bring about a dramatic increase in global programming productivity. This talk will describe an emerging research theme, called *telescoping languages*, that is exploring ways to generate optimized high-level problem-solving languages from annotated domain libraries. The strategy involves an extensive, compute-intensive preliminary analysis of the library, performed at language-generation time. The output of this process, which could take many hours, or even days, to complete, will be an efficient compiler for an extended scripting language in which calls to the underlying domain library are recognized and optimized as primitive operations. The talk will describe this strategy and its applications in detail and report on some preliminary experiments demonstrating its effectiveness in technical computing domains. The long-term goal of this effort is to make it possible for ordinary users, particularly scientists and engineers, to build their own high-performance applications, just as they were once able to do in the early days of Fortran. If this effort succeeds, it will facilitate a dramatic broadening of the community that can use high-performance computing platforms for problem solving.*

**S. S. Iyengar, Roy Paul Daniels Professor of Computer Science, Department of Computer Science, Louisiana State University, Feb 18th, 2005**

*Title: Fault - tolerant feature extraction algorithms in distributed sensor networks*

*Abstract: TBA*

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distinguished lecture series.