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**THE DEPARTMENT OF COMPUTER SCIENCE & THE COMPUTER SCIENCE
GRADUATE STUDENT ORGANIZATION (GSOCS) PRESENT**

INVITED SPEAKER SERIES

Dr. James Anderson
University of North Carolina at Chapel Hill

Friday, 10/28 at noon. EB-110, Engineering Building (Main Campus)

Title: The One-Out-Of-*m* Multicore Problem

Abstract: The multicore revolution is having limited impact in safety-critical application domains. A key reason is the "one-out-of-m" problem: when validating real-time constraints on an *m*-core platform, excessive analysis pessimism can effectively negate the processing capacity of the additional $m - 1$ cores so that only "one core's worth" of capacity is utilized even though m cores are available. Two approaches have been investigated previously to address this problem: mixed-criticality allocation techniques, which provision less-critical software components less pessimistically, and hardware-management techniques, which make the underlying platform itself more predictable. A better way forward may be to combine both approaches, but to show this, fundamentally new criticality-cognizant hardware-management tradeoffs must be investigated. To enable such an investigation, my research group has developed a mixed-criticality scheduling framework called MC^2 that supports configurable criticality-based hardware management. This framework allows specific DRAM memory banks and areas of the last-level cache (LLC) to be allocated to certain groups of tasks. A linear-programming-based optimization framework is available for sizing such LLC areas. In this talk, I will discuss the design of MC^2 and the analysis that underlies it and present the results of an experimental study conducted to evaluate its efficacy. This study shows that mixed-criticality allocation and hardware-management techniques can be much more effective when applied together instead of alone.

Bio: James H. Anderson is a Kenan Professor in the Department of Computer Science at the University of North Carolina at Chapel Hill. He received a B.S. degree in Computer Science from Michigan State University in 1982, an M.S. degree in Computer Science from Purdue University in 1983, and a Ph.D. degree in Computer Sciences from the University of Texas at Austin in 1990. Before joining UNC-Chapel Hill in 1993, he was with the Computer Science Department at the University of Maryland between 1990 and 1993. In 1995, Dr. Anderson received the U.S. Army Research Office Young Investigator Award, and in 1996, he was named Alfred P. Sloan Research Fellow. He won the Computer Science Department's teaching award in 1995, 2002, 2005, 2012, 2014, and 2016. He is also a 2012 Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and a 2013 Fellow of the Association for Computing Machinery (ACM). He is currently chair of the IEEE Technical Committee on Real-Time Systems. He has served as program chair and general chair of several conferences and symposiums, including the Annual ACM Symposium on Principles of Distributed Computing, the IEEE International Real-Time Systems Symposium, the Euromicro Conference on Real-Time Systems, the IEEE Real-Time and the Embedded Technology and Applications Symposium. Dr. Anderson's main research interests are within the areas of concurrent and distributed computing and real-time systems.