Computer Science Seminar Series

National Capital Region

Fault-Tolerant Energy Management for Real-Time Systems with Weakly Hard QoS Assurance

Speaker: Prof. Linwei Niu
Howard University
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11:15AM– 12:15PM, NVC 213

Abstract

While energy consumption is the primary concern for the design of real-time embedded systems, fault-tolerance and quality of service (QoS) are becoming increasingly important in the development of today's pervasive computing systems. In this work, we study the problem of energy-aware standby-sparing for weakly hard real-time embedded systems. The standby-sparing systems adopt a primary processor and a spare processor to provide fault tolerance for both permanent and transient faults. In order to reduce energy consumption for such kind of systems, we proposed two novel scheduling schemes: one for (1,1)-hard tasks and one for general (m,k)-hard tasks which require that at least m out of any k consecutive jobs of a task meet their deadlines. Through extensive evaluations, our results demonstrate that the proposed techniques significantly outperform the previous research in reducing energy consumption while assuring fault tolerance through standby-sparing.

Biography
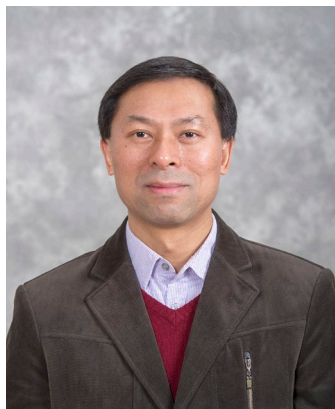
Dr. Linwei Niu received the B.S. in Computer Science and Technology from Peking University, Beijing, China, the M.S. in Computer Science from State University of New York at Stony Brook, and the Ph.D. in Computer Science and Engineering from University of South Carolina. He is currently an Assistant Professor in the Department of Electrical Engineering and Computer Science, Howard University, U.S.A. His research interests include power-aware design for embedded systems, design automation, real-time scheduling, and software/hardware co-design. His work has been sponsored by the National Science Foundation and Air Force Office of Scientific Research.