INDIAN INSTITUTE OF SCIENCE

INSTITUTE COLLOQUIUM

(Electrical Sciences)

Prof. Lawrence Jenkins

Chairman, Department of Electrical Engineering

will deliver a lecture
on

MEETING DEADLINES WHEN FAULTS OCCUR: REAL-TIME, FAULT TOLERANT SYSTEMS

on Tuesday, March 20, 2007
at 4.00 pm in the Faculty Hall

THE DIRECTOR
will preside

All are cordially invited

Coffee/Tea: 5.00 pm
Venue: Reception Hall

Abstract

In real-time systems, performance is measured in terms of the computational tasks meeting their deadlines. In hard real-time systems, where the missing of a deadline can be catastrophic, we will present bounds on the computational load of the tasks that can be accepted; the systems under consideration are uniform multiprocessors, when the individual machines are similar but have different clock rates. These bounds are derived through the branch-and-bound optimization technique. We will also consider an aerospace application, in which both real-time behaviour and fault tolerance are important. In this application, Petri Net analysis is the means by which we guarantee that in the presence of failure the back-up task will be able to meet its deadline. For soft real-time communication applications, we will present a routing algorithm to identify paths that can support the requested quality of service. This new algorithm is a hybrid of the source based and flooding approaches, and has lower overhead. We also examine soft real-time telecom switching applications, where a new architecture has been proposed to meet the objectives of high performance and high availability in the presence of faults. Finally, we will look at fault-tolerant processor mesh arrays, where we need to identify maximal fault-free sub-mashes in the presence of a given fault set.
