INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	**Lalatendu Behera**
Roll Number	:	**11610110**
Programme of Study	:	**Ph.D.**

Thesis Title: **Time-triggered Scheduling Algorithms for Mixed-criticality Systems**

Name of Thesis Supervisor(s)	:	**Prof. Purandar Bhaduri**
Thesis Submitted to the Department/~~Center~~	:	**Computer Science and Engineering**
Date of completion of Thesis Viva-Voce Exam	:	7th May 2019
Key words for description of Thesis Work	:	Time-triggered Systems, Mixed-criticality Systems, EDF-VD, OCBP, MCEDF, Energy-efficient, Real-time scheduling, TT-Merge

SHORT ABSTRACT

Designing efficient scheduling algorithms which can be used to meet the certification requirements of safety-critical systems is challenging. Our research considers the time-triggered approach to scheduling of mixed-criticality jobs with two criticality levels. In the first contribution, we propose an algorithm which directly constructs two scheduling tables for the two criticality levels without using a priority order. Furthermore, we show that our algorithm schedules a strict superset of instances which can be scheduled by two current approaches -- the OCBP-based algorithm as well as by MCEDF. In the second contribution, we propose a time-triggered dynamic voltage and frequency scaling (DVFS) algorithm for uniprocessor mixed-criticality systems and show that our algorithm outperforms the predominant existing algorithms which use DVFS for such systems with respect to minimization of energy consumption. We prove an optimality result for the proposed algorithm with respect to energy consumption. Finally, we propose time-triggered scheduling algorithms for both independent and dependent mixed-criticality jobs on an identical multiprocessor platform. We show that our algorithm is more efficient than the Mixed criticality Priority Improvement (MCPI) algorithm, the only existing such algorithm for a multiprocessor platform.