PIEAS COLLOQUIUM

PAKISTAN INSTITUTE OF ENGINEERING AND APPLIED SCIENCES

Science & Tech. Series

Budget Based Static Schedulability Analysis of AUTOSAR Application Model (online)

Mr. M. Tanveer Ali Ahmed

PhD Scholar TU Graz (Austria)

Lecturer DEE, PIEAS

TCH (PIEAS) | **1.30 PM, Wed 24 Apr 2024**

Contact: Dr. Muhammad Shafiq Siraj, Coordinator PIEAS Colloquia

Phone: +92-51-959-3062, +92-332-894-1945

Email: mssiraj@pieas.edu.pk

Presenter Profile and Abstract of the Talk

Muhammad Tanveer Ali Ahmad, is a faculty member of the Department of Electric Engineering, PIEAS. His areas of expertise are real-time operating system design, embedded software validation and verification, data structure analysis and design, compiler design, object-oriented programming and system programming. Currently, he is pursuing his PhD in TU Graz. In his Ph.D., he is working on the project Compositional Embedded Automotive System (CompEAS) jointly funded by Elektrobit GmbH, Infineion GmbH, Pro2Future GmbH and TU Graz. His topic of PhD is Generic Non-Function Requirement Support in the Automotive Software.

In his talk, he will briefly:

i. introduces the world of AUTOSAR (AUTomotive Open System ARchitecture). AUTOSAR is a global development partnership that brings together vehicle manufacturers, suppliers, and other companies from the electronics, semiconductor, and software industries. The primary goal of AUTOSAR is to enable software standardization, reusability, and interoperability in the automotive domain.

ii. present one of his research contributions "Budget Based Static Schedulability Analysis of AUTOSAR Application Model". In the state of the art, schedulability analysis is commonly performed considering that all instances of a task (jobs) run with a fixed execution time, i.e., the WCET and have a fixed deadline, i.e., period of a task. This strategy can be overly pessimistic because (a) not all jobs need the entire WCET to finish or (b) all jobs consider fixed deadline, even when some jobs might have greater deadlines than others. In the AUTOSAR context, the so-called sequencer tasks consist of runnables, which are elementary execution units of an application. Sequencer tasks are of two types, i.e., basic and extended. In this research, we propose an explainable budget-based schedulability analysis approach for AUTOSAR application model with mix types of sequencer tasks. Our approach focuses on the Fixed-Priority Preemptive Scheduling (FPPS) policy. This budget-based explainable schedulability analysis approach precisely identifies the task, the job, the point in time when a schedulability violation occurs, and the additional budget requirement. For a schedulable system, our results are beneficial for software extensions, e.g., the remaining budget can be used to add a runnable or task without reanalyzing the schedulability of the entire system.