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Keynote Speech

A Hybrid Relational Modelling Language

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Abstract

Hybrid systems are composed by continuous physical component and discrete control component where the system state evolves over time according to interacting laws of discrete and continuous dynamics. Combinations of computation and control can lead to very complicated system designs. We treat more explicit hybrid models by inventing a hybrid relation calculus, where both clock and signal are present to coordinate activities of parallel components of hybrid systems. This paper proposes a hybrid parallel programming language with a set of novel combinators to model physical world and its interaction with the control program. We provide a denotational semantics (based on hybrid relation calculus) to the language, and explore healthiness conditions that deal with time and signal as well as the status of the program. We also investigate the algebraic properties of the language, and show how to use them in a case study.

About the speaker

Ji-Feng He is currently a professor of computer science at East China Normal University (ECNU). He is also the Dean of Software Engineering Institute, ECNU. He graduated from the Department of Mathematics, Fudan University in 1965 and then worked in ECNU. In 1986, he was promoted to the rank of Professor. He joined in Stanford University and San Francisco University, USA during 1980 to 1981 as a Visiting Researcher. He joined Computing Lab of Oxford University, U.K. during 1983 to 1998 as a Senior Researcher. From 1998 to 2005, he was a senior research fellow of International Institute for Software Technology, United Nations University (UNU-IIST), and Macau, China. In 2005, he was elected as CAS Academician. Recently, he was appointed as the Chief Scientist for the "Trusted Software Fundamental Research" as a major research plan launched by the National Natural Science Foundation of China (NSFC). And he was also appointed as the Chief Scientist for the "Theory and Practice on Coordination and Survivability for Massive Amount of Information" project as the National Basic Research Program ("973" Program) founded by the Ministry of Science and Technology (MOST).