

# COLLOQUIUM

## Center for Embedded Computer Systems

*Presents*

### **Tiptoe: A Compositional Real-Time Operating System**

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*Abstract*

This talk is about an open-source, hard real-time operating system called Tiptoe, which aims at providing a process model that is fully compositional and (constant-time) predictable in a temporal and spatial sense. The goal is to have Tiptoe processes read sensors, compute something, allocate and free memory, write actuators but also access disks and networks, all in real time, without affecting each others' real-time behavior. Moreover, the Tiptoe system is meant to predict in constant time remaining resource capacities such as the available memory and I/O bandwidth for end-to-end real-time guarantees on all relevant process activities. The strong temporal and spatial isolation of Tiptoe processes will enable more principled and scalable real-time and embedded software engineering. We have already obtained encouraging research results in our prototype implementation with a compositional and (constant-time) predictable, real-time memory management system, which, unlike existing approaches, also guarantees low bounds on memory fragmentation in real time. The talk will focus on the memory management but will also provide some general insight in the challenges of designing a compositional real-time operating system.

*Biography*

Christoph Kirsch received the Dr.Ing. degree from Saarland University, Saarbruecken, Germany, in 1999 while at the Max Planck Institute for Computer Science in Saarbruecken. He then worked as Postdoctoral Researcher at the Department of Electrical Engineering and Computer Sciences of the University of California, Berkeley. Since 2004, he is a full professor at the Department of Computer Sciences of the University of Salzburg, Austria. His research interests are in concurrent programming and systems, virtual execution environments, and embedded real-time software. Dr. Kirsch co-invented the Giotto and HTL languages, and leads the JAviator unmanned-aerial-vehicle project for which he received an IBM faculty award in 2007. He is a member of the ACM and IEEE, co-founded the International Conference on Embedded Software (EMSOFT), and is a general co-chair of the Embedded Systems Week (ESWEEK) in 2008. He has served on program committees of CASE, Coordination, DATE, EMSOFT, EuroSys, LCTES, OOPSLA, RTAS, and VEE.

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Donald Bren Hall (DBH) 3011

Talk begins at 11:00am; Refreshments at 10:30am

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