



**Universität Stuttgart**

Fakultät für Informatik,  
Elektrotechnik und  
Informationstechnik

Abteilung  
Hardwareorientierte  
Informatik (HOCOS)

## **Einladung zum Informatik-Kolloquium**

Im Rahmen des Informatik-Kolloquiums spricht

**Prof. John P. Hayes  
University of Michigan  
Ann Arbor, MI, USA**

**am Donnerstag, den 7. Juni 2018 um 10:00 Uhr  
im Fakultätssitzungssaal 2.013 des Informatikgebäudes  
Universitätsstr. 38, 70569 Stuttgart**

### **Computing with Randomness: The Stochastic Circuit**

Stochastic computing (SC) is an approximate computing technique that processes data represented by pseudo-random bit-streams. SC enables complex arithmetic operations to be performed using extremely small, low-power and error-tolerant circuitry. It has applications in several important areas, including image processing and the design of artificial neural networks. However, accurate results are hard to achieve and tend to require excessively long bit-streams and run-times. This talk reviews the basic concepts of SC and its applications, and discusses recent research results with a focus on the accuracy problem. Among the major sources of inaccuracy are random fluctuations in individual bit-streams, correlations between bit-streams, and inadequate randomness sources. For example, input bit-streams denoting constant stochastic numbers play an essential role in SC, but are a significant source of random fluctuation errors. It has been shown that it is possible to completely remove all error-inducing constant inputs from stochastic circuits by resorting to a new class of sequential designs.

**Die Dozenten der Informatik**

### **Author's Biography:**

John P. Hayes is a Professor of EECS at the University of Michigan where he holds the Claude E. Shannon Chair of Engineering Science. Prior to joining the University of Michigan, he was a faculty member at the University of Southern California. His teaching and research interests include computer-aided design and testing, computer architecture, and unconventional computing methods. He has a B.E. degree from the National University of Ireland and M.S. and Ph.D. degrees from the University of Illinois. Professor Hayes received the Alexander von Humboldt Foundation's Research Award in 2004. He is a Fellow of both IEEE and ACM.