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Special Guest Lectures

Design of Embedded Media

Edgar Berdahl, Stanford University

Experimental Music and Digital Media Faculty Candidate

Johnston Hall 338
April 12, 2013 - 09:00 am

Abstract:

Embedded microprocessors are becoming more powerful, more efficient, and more interconnected with media content, yet they are becoming smaller and less expensive. Many challenges lie in determining how to harness the power of embedded signal processing in the design of future media products, and audio applications provide a compelling test area.

This talk begins by presenting new work in audio programming paradigms for embedded media. For example, Synth-A-Modeler is a modular tool for designing physical models for sound synthesis. To create a physical model, a user specifies interconnections of virtual mechanical elements and their physical parameters. Then Synth-A-Modeler compiles the model into a Faust DSP module, which can be compiled further into a wide range of floating-point targets. Example physical models will be presented in Synth-A-Modeler, which is the first tool to integrate the digital waveguide, mass-interaction, and modal synthesis paradigms.

Together Synth-A-Modeler and embedded microprocessors are enabling novel realizations of high-quality haptic feedback. Haptic feedback has many unique properties. For example, haptic feedback based on force-sensitive detents can enable a user to operate a user interface more accurately. Also, haptic feedback is shown to enable musicians to make gestures that would otherwise be difficult or impossible. Finally, an overview will be given of how Edgar Berdahl is disseminating this work through his teaching activities, which include a series of international workshops using the Raspberry Pi running Satellite CCRMA, a custom distribution of embedded Linux.

Speaker's Bio:

Edgar Berdahl is a Humboldt Postdoctoral Fellow at the Technical University of Berlin and a lecturer at the Center for Computer Research in Music and Acoustics (CCRMA) at Stanford University. He studies the design of embedded media, with a particular focus on making digital interactions seem more "analog," and he is the first person to teach designers and artists how to prototype using embedded Linux. He received his PhD degree in Electrical Engineering at Stanford University for his PhD thesis on "Applications of Feedback Control to Musical Instrument Design." Over the years, Edgar Berdahl has worked on larger and smaller projects in collaboration with the Grenoble Institute of Technology, the Center for New Music and Audio Technologies (CNMAT) at UC Berkeley, Sennheiser Electronic, Moog Music, and Bose Corporation. Berdahl's further academic interests include functional programming for signal processing, acoustics, sensing and actuation, context-aware signal processing, audio engineering, stompbox design, suppression of acoustic howling/feedback, human gesture, the human motor control system, and music information retrieval.

