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LinkedIn

http://www.linkedin.com/pub/lixun-xia/1b/212/219

工作经验

2014.6 - 2015.4　　高级DSP工程师，哈曼汽车电子系统有限公司，苏州，中国

负责欧洲及北美市场车载音频功放的软件的开发及维护。
数字音效处理软件框架(Audio Framework)的实现和维护。
通过DSP算法实现高效电源(H-Class)的低成本控制。
有源噪声消除算法的移植以及应用相关，用于发动机谐波降噪。
基于功放的应用开发，例如汽车提示音等。
现有功放软件的改进与优化。
功放系统软件硬件专业的文档化工作。
协助系统工程师完成集成和测试。

2010.10 - 2014.3　　研发工程师，Acosense AB，哥德堡，瑞典

负责工业用非侵入式有源声频谱传感器产品开发。
传感器选型及系统规格定义。
信号调理电路及微处理器硬件原理图设计。
传感器数据采集软件设计和实现，包括基于FPGA的终端Firmware以及基于Linux的上位机软件开发。
上位机信号处理软件的设计及实现。
部分机器学习代码的实现和系统集成。
SCADA接口软件以及传感器网络的设计和实现。

教育经历

2008.9 - 2010.9　　硕士, 电子工程，查尔姆斯大学，瑞典。

2005.9 - 2008.6　　硕士, 控制科学与工程，中南大学，中国。

2001.9 - 2005.6　　学士, 自动化，中南大学，中国。

项目经验

音频处理软件框架(Audio Framework)　2014 - 2015

音频处理软件框架对任何功放产品而言是作为数据处理的"骨架"。它定义了数据流是如何被分流以及处理的。配合各个信号处理的功能模块作为"肌肉"，功放的基本功能就被定义好了。本人的贡献是在国内第一次系统的描述了软件框架的原理结构以及如何使用各个功能模块完成系统设计与调试。生成的文档被同事评价为能够为所有的功放DSP工程师提供设计参考。

有源噪声消除(ANC/EOC)　2014 - 2015

有源噪声消除是官方使用的基于最优估计的去除噪声的动态算法。在此的主要功能是消除载人汽车由于引擎的运转而传导到乘员舱的谐波噪声震动。本人主要贡献为完成了项目的本地化转移，建立了详细的系统描述文档，以及应用文档。同时开发了协同仿真工具帮助理解参数整定。这些文档与工具能够帮助开发人员迅速的将算法移植到各种嵌入式平台或产品。此外，本人还建立了一个实物验证环境，基于运行ANC算法的功法以及仿真车内环境的London BLU-80DSP处理器。

高效电源控制(Tracking Power Supply)　2014 - 2015

轨跟踪的电源(H-Class PSU)具有低压降的特点，用于大功率设备例如音频功放产品以提高效率降低散热。但是通常需要高精度DAC芯片的参与，来指定需要的轨电源大小。本人在此的贡献为创新的使用现有DSP芯片(Sigma300)的数字通信接口以及相应的DSP算法实现了同样效果，为功放产品降低成本做出了显著贡献。

基于块处理的提示音控制(Chime Control Via Block Based Processing)　2014 - 2015

车载功放的常用功能是为特定情况提供提示音，例如乘客未系安全带等场景。提示音的实现一般要求极低的延迟因为其与安全息息相关。所以传统的方法是将其放在音频信号单采样处理芯片(Sigma300)的最后一级。但是部分功放产品同时具有块处理芯片(SHARC)。对于硬件不可变系统而言，使用块处理芯片实现提示音能够解决单采样芯片资源不足的问题。本人在此的贡献为首先在SHARC上实现了低延迟的实用提示音功能。扩展了功放平台的应用范围。

***ACOspector*^{TM} – 非侵入式液体实时检测　2010 - 2014**

本人领导了工业用非侵入式有源声频谱液体流量监测传感器*ACOspector*^{TM}的设计及开发, 产品用于各类流体性质的实时监测。产品已部署在瑞典知名造纸化工企业。传感器基于高动态范围PCB加速度传感器。更多信息请访问`www.acosense.com`. 其基本概念在于将IoT与云计算的便利引入到工业应用中，帮助工厂实现智能监测，降低能耗。低成本的传感器终端群被安装部署在工厂的各个管道处用于震动采集。中央服务器与这些终端群保持通信，对采集的信号进行处理与建模。工厂SCADA系统能无缝联入此服务器获取流量监测信息。这些信息能帮助现代的数据驱动的工厂减少能量消耗，提高产品质量。这同时也是工业4.0中的必要环节。

技术亮点:

- 至下而上的电路系统的设计，原理图开发，布线。系统包括一片中等规模的用于实现微控制器集群的FPGA芯片。用于高动态范围信号采集的ADC芯片(PCM4222)。用于高动态范围信号播放的DAC芯片(PCM1794A)。与FPGA接口的DDR2 DRAM芯片组用于提供MCU集群的程序空间。SPI Flash提供固件或软件的启动。三口以太网交换机芯片提供TCP/IP协议与Linux上位机通信，传输传感器数据。
- 硬件模块和原件的选择通过充分的论证，保证在性能，成本以及生命周期等各个方面能够取得最好的折中。
- 不同于使用实时操作系统和单片MCU，此项目中利用FPGA的特点实现了MCU集群的通信协议，能够让各个MCU运行各自进程并完成同步。同步通信基于FIFO队列。
- 所有软件模块使用单元测试，系统集成过程使用回归测试。测试过程脚本化以提高效率。

- 组内其他成员具有不同的开发技能，大家都使用敏捷开发模式。
- 代码和文档使用版本管理系统(GIT)
- 同瑞典客户紧密合作共同改进产品的质量和性能。
- 设计，原型机建造，组装，测试由同一个开发小组在公司车间完成。
- 开发小组在第三方机构完成了EMC/EMI测试。获得了CE认证。

矩阵电力变换器的设计与实现　　2007 - 2008

矩阵电力变换器相比于传统的背靠背式整流-逆变电力变换器具有高功率密度的优点。然而大量电力电子开关的同步控制使得控制算法异常复杂。在这个国家自然科学基金支持的项目中，矩阵变换器的理论通过了充分的研究与论证，并且造出了实验用工程样机。基于载波的调制算法也在样机上得到了验证。本人的贡献为，矩阵变换起中性电流最小化控制算法的设计人以及样机主要的实现人。

技术能力

Matlab/Simulink建模与仿真。

数字/统计信号处理。

C/C++语言。

GCC工具链以及Linux平台应用开发。

Microsoft Visual Studio以及Windows平台应用开发。

机器学习的实践知识(回归分析)

VHDL语言，熟悉相关验证方法。

数字通信原理。

Shell/Perl脚本语言开发。

基于FPGA/DSP/MCU的嵌入式系统的设计与开发。

能够使用SPICE工具进行电路系统设计与仿真。

电路原理图设计(Altium Designer/Eagle PCB)，简单布线及焊接。

熟练使用实验室仪器包括:示波器，信号源，频谱分析仪, UPV/UPL, Audio Precision等等。

压电陶瓷传感器以及换能器原理与应用。

产品的EMI/EMC测试流程经验。

专业的建立文档的经验，使用LaTeX和Microsoft Office。

熟悉敏捷开发流程和实践。

语言能力

普通话: 流利

英语: 流利

瑞典语: 入门

出版物

夏立勋, 廖斌, "基于有源声频谱的传感器硬件平台", 查尔姆斯大学, 2010.

粟梅, 夏立勋, 孙尧等"基于FPGA控制的四脚矩阵变换器的载波调制", 电机与系统, 2008. ICEMS 2008. IEEE国际会议. pp.1247-1250.

孙尧, 粟梅, 夏立勋等"基于最优马尔科夫链的四脚矩阵变换器的随机载波调制", 工业技术, 2008. ICIT 2008. IEEE国际会议. pp.1-6.

覃恒思, 粟梅, 夏立勋等"一种新颖的电力变换器控制器设计方法", IEEE第11届电力电子控制与建模研讨会, 2008. COMPEL 2008. 国际会议.

社会服务

参与翻译了**"6.334 电力电子"**课程。此课程为中国开源教育协会的开源课件项目(OCW)。

查尔姆斯大学，硕士课程

DAT091.电子系统设计引论

MCC090.CMOS大规模集成电路设计

DAT105.计算机体系结构

EDA222.实时系统

DAT095.电子系统设计实践项目

DAT110.EDA设计方法

MVE135.概率，随机过程及应用

SSY121.通信工程引论

SSY125.数字通信

SSY130.实用信号处理

TDA956.硬件描述及验证

EDA092.操作系统原理

ENM060.电力电子学

TIN092.算法

中南大学，本科课程

C语言

工科数学

复变函数与积分变换

大学物理及实验

数学实验及建模

电路理论

模拟电子技术

数字电子技术

金工实习

电子课程设计

电机与电力拖动

控制理论

微机原理与汇编程序设计

现代检测技术

过程控制与仪表

流体力学

计算机控制

电力电子学

多媒体技术

可编程控制器及应用

单片机技术

运动控制系统

计算机仿真

数字信号处理

智能控制

中南大学，硕士课程

现代控制理论

电力电子学

矩阵分析理论

泛函分析与最优化理论

系统辨识

Last updated: September 14, 2015

Xia Lixun（夏立勋)

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http://www.linkedin.com/pub/lixun-xia/1b/212/219

Work Experience

2014.6 - 2015.4 Sr. DSP engineer of Harman, Suzhou, China P.R.

- Responsible for development of vehicle audio amplifiers for Europe and North America markets.
- Development and maintenance of Audio Framework.
- Cost-down design of amplifiers via novel control algorithm for high-efficient power supply.
- Porting and application of Active Noise Cancellation for engine order sound reduction.
- Feature application design for amplifiers, for instance, chime beeps etc.
- Bug shooting of existing amplifier software.
- Documentation of HW/SW design of amplifier products.
- Work with system engineers for feature validation and integration.

2010.10 - 2014.3 Research and development engineer of Acosense AB, Göteborg, Sweden

- Lead the development of active acoustic spectroscopic sensors for fluid measurement.
- Determine the specifications for the sensor system with customers directly.
- Design of signal capture/conditioning hardware as well as processor circuitry.
- Design and implementation of data capture firmware for the FPGA.
- Design and implementation of signal processing software for the Linux server.
- Implement part of the machine learning code for the Linux server.
- SCADA interface and networking software design between sensor terminal and the Linux server.

Education

2008.9 - 2010.9 M.Sc. Integrated Electronic System Design, Chalmers University, Sweden.

2005.9 - 2008.6 M.Sc. Control Science and Engineering, Central South University, China.

2001.9 - 2005.6 B.Sc. Automatic Control, Central South University, China.

Project Experience

Audio Framework 2014 - 2015

Audio Framework is the software "Skeleton" defined for any amplifier products on how the audio data are routed and processed. Together with signal processing building blocks as the "muscle", the core functionality of an amplifier emerges. My achievement is, for the first time, a systematic description of the working mechanism of the "skeleton" and "muscle" has been formed within the company. The resultant document is extremely useful for both novice and experienced amplifier design engineers.

Active Noise Cancellation 2014 - 2015

Active Noise Cancellation is a widely used technique to suppress unwanted noise in an optimal sense via dynamic algorithms. The main purpose is to reduce engine sound orders for quieter cabinet in passenger cars. My achievement is the successful transfer of the project to Suzhou site, build of the application document after code analysis, and creation of a simulation tool for cross-amplifier porting. A verification bench environment has also been set up. It consists of amplifier running ANC algorithm and London BLU-80 DSP running vehicle cabinet emulation algorithm.

Novel Control of Tracking Power Supply 2014 - 2015

Control of tracking power supply often requires high precision DAC chip for rail indication. My achievement here is the elimination of the DAC chip but utilizing the digital port alone of the DSP chip for rail indication. Cost down has been achieved thanks to this novel method of power rail control in H-class PSU.

Chime Control via Block Based Processing 2014 - 2015

Chime or beep sounds are often implemented in the rear stages of a fixed point DSP for short time latency in sample-based fashion. Sometimes however, minimal hardware change criterion implies an implementation on block based DSP such as $SHARC^{TM}$. The achievement here is such pilot implementation, showing acceptable latency in practice.

$ACOspector^{TM}$ **– non-invasive fluid measurement in real-time 2010 - 2014**

Lead the development of the industrial fluid property measurement sensor based on active acoustic spectroscopy measurement. Products have been deployed among pulp and paper, chemical factories in Sweden. Some information can be found in `www.acosense.com`. The concept is based on IoT and cloud computing — compact, robust and low-cost sensor terminal group paired with one centralized server for data processing in star-topology network. Machine learning running in the backbone builds regression models for fluid property estimation. Hence multiple measurement points can be monitored non-invasively at extremely low cost for modern data-driven factories. As the system designer and developer, my contribution: the path finder of such promising measurement method for the cloud computing age.

Technical highlight:

- Circuit built from scratch, including design, schematic capture and layout, containing middle-scale FPGA chip for MCU cluster. ADC(PCM4222) for high-dynamic range signal capture. DAC(PCM1794A) for high dynamic signal playback. DDR2 DRAM interfacing with the FPGA as the program space. SPI Flash for system boot load. Tri-port Ethernet switch chip for sensory data transmission with the Linux server via TCP/IP.
- All hardware components of the circuitry are carefully determined, taking into account factors like availability, performance and costs.
- Realization of a MCU cluster communication protocol for multi-tasking and synchronization based on FIFO queue, rather than using real-time operating system and single MCU core. This allows taking full advantage of the resources of a FPGA chip.
- Unit tests for all software components. Integration tests at system level.
- Work with members of orthogonal skill sets in agile development style.
- All codes and documentations managed by GIT server.
- Work with customers in Sweden closely to improve product quality and performance.
- Design, prototyping, assembly and testing within our own office and workshop.
- Hands-on experience in hardware design for EMI/EMC tests. CE certification verified.

Matrix Power Converter Design and Implementation **2007 - 2008**

This is an academic project for my first graduate thesis. Matrix power converter has the merit of higher energy density compared to traditional back-to-back rectifier-inverter topology. Nevertheless the synchronized control of all semiconductor switchers poses harder control problem against the old. In this National Science Foundation project, theory of matrix converters has been studied and a prototype has been engineered. The novel prototype is based on four-leg structure thus allows for more intuitive implementation in a carrier-modulation style.

Technical Skills

Modelling and simulation using Matlab/Simulink.

Digital/Statistical signal processing.

Proficient in C/C++.

GCC tool chain for Linux platform.

Microsoft Visual Studio for Windows platform.

Applied knowledge in machine learning (Regression analysis).

Hardware description (VHDL) and verification (Testbench based).

Basic knowledge of digital communication.

Shell/Perl scripting language.

Embedded system design and development based upon FPGA/DSP/MCU.

Circuit simulation and analysis with SPICE tools.

Schematic capture, simple PCB layout (Altium Designer/Eagle PCB) and soldering.

Hands-on experience of workbench tools: oscilloscopes, function generator, spectrum analyzer UPV/UPL, AP etc.

Knowledge of EMI/EMC concept and test procedures for product design(Experience in CE certification).

Knowledge of piezoelectric sensors and actuators.

Professional documentation with LaTeXand Microsoft Office.

Knowledge of Agile Development.

Language Skills

Mandarin: native

English: proficient

Swedish: basic

Publications

Xia Lixun, Liao Bin, "Hardware Platform For Active Acoustic Spectroscopy Sensors", Chalmers University of Technologgy, 2010.

Su Mei, Xia Lixun, Sun Yao, et al "Carrier modulation of four-leg matrix converter based on FPGA", Electrical Machines and Systems, 2008. ICEMS 2008. IEEE International Conference on. pp.1247-1250.

Yao Sun, Mei Su, Lixun Xia, et al "Randomized carrier modulation for four-leg matrix converter based on optimal Markov chain", Industrial Technology, 2008. ICIT 2008. IEEE International Conference on. pp.1-6.

Hengsi Qin, Mei Su, Lixun Xia, et al "A novel controller design method for power converters", IEEE 11th Workshop on Control and Modeling for Power Electronics, 2008. COMPEL 2008. IEEE International Conference on.

Social Services

Translation of the *6.334 Power Electronics* of Open Courseware(OCW) Project for China Open Resources for Education(CORE).

MSc. Courses in Chalmers Univ.

DAT091.Introduction to Electronic System Design

MCC090.CMOS VLSI Design

DAT105.Computer Architecture

EDA222.Real Time Systems

DAT095.Electronic System Design Project

DAT110.EDA Design Methods

MVE135.Probability and Random Process With Applications

SSY121.Introduction to Communication Engineering

SSY125.Digital Communication

SSY130.Applied Signal Processing

TDA956.Hardware Description and Verification

EDA092.Operating System

ENM060.Power Electronic Converters

TIN092.Algorithms

BSc. Courses in Central South Univ.

C Programming Language

Engineering Mathematics

Complex Analysis and Integral Transform

Physics and Experiments

Mathematical Experiment and Modelling

Circuit Theory

Analog Circuits

Digital Circuits

Machinery Tool Education

Electronics Design Project

Electronic Rotating Machinery and Driving

Control Theory

Computer Architecture and Assembly Language

Modern Measurement Technology

Process Control and Instruments

Fluid Dynamics

Computer Control

Power Electronics

Multi-media Technology

PLC and Applications

Micro-Controller Unit Technology

Driving System Control

Computer Simulation

Digital Signal Processing

Intelligent Control

MSc. Courses in Central South Univ.

Modern Control Theories

Power Electronics

Matrix Analysis

Functional Analysis and Optimization

System Identification