LI DU

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Summary

8+ years of experience in embedded system design and signal processing algorithm development
5+ years of experience in mixed signal, digital and sensing circuit design

Education

Doctor of Philosophy 06/2013 -06/2016
Department of Electrical Engineering, University of California, Los Angeles(UCLA)

Master of Science 09/2011- 06/2013
Department of Electrical Engineering, University of California, Los Angeles(UCLA)

Bachelor of Science 09/2007-06/2011
Department of Information Science and Engineering, Southeast University(SEU), China

Work Experience

UCLA Los Angeles
Visiting Scientist 03/2017- present
Kneron Inc. San Diego
Hardware Architecture Research Scientist 09/2016- present
Qualcomm Technologies Inc. San Diego
Senior Engineer 06/2016- 09/2016
Engineer 06/2013- 09/2016

Selected Projects

- **3D Touch Sensor SoC for Remote Gesture Recognition in Mobile Devices (UCLA)**
  - Bootstrapping technique to cancel display noise and channel interference.
  - Triangle-shaped electrodes for cost reduction; Center weighted algorithm for position calculation
  - Machine learning(SVM) enhanced remote finger position computation.
  - UART control between sensor and MCU; SPI interface between MCU and host.
  - Work involved from circuit and system design, algorithm development and system build up
  - Demo Video Link: https://youtu.be/djIDZVaYYxw
- **Energy-Efficient Deep Learning Processor for Image Signal Processing (Kneron)**
  - Develop compressed CNN hardware accelerator for ultra-fast image pattern recognition.
  - System-level optimization regarding of the data flow, energy cost and algorithm accuracy.
  - System Validation using Xilinx Zynq FPGA Platform; Demonstration of traffic sign recognition with a frame rate up to 100fps.
  - Demo Video Link: https://youtu.be/ttdSLXmBEWE?t=5
- **High Performance Mixed Signal Circuit for Cellular Communication (Qualcomm)**
  - Lead/Participate mixed signal IP design (DAC, Bandgap) and calibration algorithm development
  - Manage project progress and represent teams to discuss specs and interact with other team leaders in high-level meeting.
  - Collaborate with process and automatically test team to support high volume production.
- **Low-Power Chirp-Correlating Spectrometer Processor for Deployable Sensor (UCLA-NASA)**

- 4X-frequency oversampling technique to suppress the windowing effects
- 1.5 GS/s 7bit ADC, 165 mW, and 8192-point DDFS chirp generator

◆ **Spectrometer Processor for remote Spectrum Sensing (UCLA-NASA)**

- Poly-Phase Filter to achieve flat spectrum response and 6GHz 3-bit sampling ADC with 4K-points streaming FFT for spectrum sensing

Expertise Skills

- ◆ Design Tools: C++, Matlab, Verilog, Altium Designer, PADS, Cadence Virtuso, Cadence Encounter;
- ◆ Experience in Miccontroller control, FPGA validation, electronic system prototype development

Patent

"Voltage-to-Current Converter" Sept 25th 2014, **Granted** , US.No: 14/639,553

"Multi-Layer Neural Network" Aug 22nd 2016, **Filed** , US.No: 15/242,610

"Buffer Device and Convolution Operation Device and Method" March 15th 2017, **Filed** , US.No: 15/459,675

"Convolution Operation Device and Method" March 15th 2017, **Filed** , US.No: 15/459,737

"Convolution Operation Device and Convolution Operation Method" March 17th 2017, **Filed**, US.No: 15/461,928

“Grouping Algorithm For Touchscreen Finger Position Detection”, May, 20th,2016, **Filed**， US.No: 62/335,593

Invited Talk

"High Speed Mixed Signal System Design for Space Application", NASA Jet Propulsion Laboratory, July, 2014.

"The road to Intelligent Internet of Things ", Showcase meeting with Dr. Hung Duen Yang, Minister of Science and Technology, Taiwan (R.O.C.), University of California, Irvine, December, 2016

"Invited-Airtouch: A Novel Single Layer 3D Touch Sensing System for Human/Mobile Devices Interactions", 2016 Design Automation Conference, Session: Design Challenges in IoT World

Academic Activities

Technical Program Committee of the IEEE/ACM Design Automation Committee;

Technical Program Committee of IEEE 13th Conference on PhD Research in Microelectronics and Electronics;

Regular Journal Reviewers of IEEE Transaction on Circuits-and Systems I; IEEE/ACM Design Automation Conference; IEEE Transaction on Transactions on Computer-Aided Design of Integrated Circuits and Systems; ACM Journal on Emerging Technologies in Computing Systems; IET CyberPhysical Systems: Theory & Applications; Journal of Computers and Electrical Engineering; Integration, the VLSI Journal;

Media Reports

“JPL and UCLA Develop Spectrometer Chip Based on CMOS Smartphone Technology for Future NASA Instruments” **featured in NASA: Technology Transfer Program** in June, 2014.

Link: www.technology.nasa.gov/features/jpl-ucla-spectrometer.html,

“Breaking the “two-way foil” of the shackles, detailed three-dimensional touch technology” featuring Dr. Du’s Ph.D. research, **published in Leiphone Web** Magazine on December 6, 2016.

Publication

[1]. **L. Du**, C. Liu, A. Tang, Y. Zhang, M.-C. F. Chang, "Airtouch: A Novel Single Layer 3D Touch Sensing System for Human/Mobile Device Interactions", ACM/IEEE Design Automation Conference, June, 2016

[2]. **L. Du**, Y. Zhang, F. Hsiao, A. Tang, Y. Zhao, Y. Li, J. Chen, L. Huang, M.-C. F. Chang, "A 2.3mW 11cm Range Bootstrapped and Correlated Double Sampling (BCDS) 3D Touch Sensor for Mobile Devices", IEEE International Solid-State Circuits Conference, pp. 122-123, Feb. 22-26, 2015;

[3]. **L. Du,** Y. Zhang, C. C. Liu, A. Tang, F. Hsiao and M. C. F. Chang, "A 2.3-mW 11-cm Range Bootstrapped and Correlated-Double-Sampling Three-Dimensional Touch Sensing Circuit for Mobile Devices," in IEEE Transactions on Circuits and Systems II: Express Briefs, vol. 64, no. 1, pp. 96-100, Jan. 2017.
[4]. **L. Du**, C. Liu, Y. Zhang, Y. Li, M.-C. F. Chang, " A single layer 3D Touch Sensing System for Mobile Devices Application" IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, (Accepted).
[5]. **L. Du**, Y. Li, Y. Du, M.-C. F. Chang, " A Reconfigurable Streaming Deep Convolutional Neural Network Accelerator for Internet of Things", IEEE Transactions on Circuits and Systems I (Submitted)
[6]. Y. Du, **L. Du**, Y. Li, M.-C. F. Chang, " 'A Streaming Accelerator for Deep Convolutional Neural Networks with Image and Feature Decomposition for Resource-limited System Applications", IET Circuits, Devices & Systems(Submitted)
[7]. T. Zhang, **L. Du**, JJ. Lv, B. Zhou et al., "A Simple System for Measuring Antenna Radiation Patterns in the Wi-Fi Band," in IEEE Antennas and Propagation Magazine, vol. 55, no. 1, pp. 191-202, Feb. 2013.
[8]. A. Tang, Y. Kim, **L. Du**, T. Reck, "Chirp-Partition based Pre-Distortion for Reduced Carrier Leakage in Circulator-based Wide-band FMCW Radar System" IEEE International Microwave Symposium 2017
[9]. A. Tang, F Hsiao, Y. Kim, **L. Du**, L. Kong, G. Virbila et al., "A 95 GHz Centimeter Scale Precision Confined Pathway System-on-Chip Navigation Processor for Autonomous Vehicles in 65nm CMOS", IEEE International Microwave Symposium 2015
[10]. Y. Du; W. H. Cho; P. T. Huang; Y. Li; C. H. Wong; J. Du; Y. Kim; B. Hu; **L. Du**; C. Liu; S. J. Lee; M. C. F. Chang, "A 16-Gb/s 14.7-mW Tri-Band Cognitive Serial Link Transmitter With Forwarded Clock to Enable PAM-16/256-QAM and Channel Response Detection," in IEEE Journal of Solid-State Circuits , vol.PP, no.99, pp.1-12
[11]. A. Tang, N. Chahat, Y. Zhao, G. Virbila, C. Lee, H.Frank, **L. Du**, "A 65nm CMOS 140 GHz 27.3 dBm EIRP transmit array with membrane antenna for highly scalable multi-chip phase arrays," 2014 IEEE International Microwave Symposium (IMS2014), Tampa, FL, 2014, pp. 1-3.
[12]. J. Lv, **L. Du**, “Vehicular Collision Avoiding System Based On Two Ultrasonic Receiver” Journal of Value Engineering, pp. 148-149, Sept.2010
[13]. Y. Li, K. Dhwaj, C. Wong, Y. Du, **L. Du**, Y. Tang et al., "A Novel Fully Synthesizable All-Digital RF Transmitter for IoT Applications,” IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (accepted).
[14]. A. Tang, G. Virbila, Y.Wang, Q. Gu, Z. Xu, **L. Du**, N. Yan et al., "A 200 GHz 16-pixel focal plane array imager using CMOS super regenerative receivers with quench synchronization," 2012 IEEE/MTT-S International Microwave Symposium Digest, Montreal, QC, Canada, 2012, pp. 1-3.
[15]. S. Bu, T. Zhang and **L. Du**, "Approximations and Simulation of the Optimal Change Interval for Roundabout," 2010 2nd International Workshop on Database Technology and Applications, Wuhan, 2010, pp. 1-3.
[16]. A. Tang, M-C Frank Chang, G. Chattopadhyay, Z. Chen, T. Reck, H. Schone, Y. Zhao, **L. Du**, D. Murphy, N. Chahat, E. Decrossas, I. Mehdiet al., "CMOS (Sub)-mm-Wave System-on-Chip for exploration of deep space and outer planetary systems," Proceedings of the IEEE 2014 Custom Integrated Circuits Conference, San Jose, CA, 2014, pp. 1-4.
[17]. C Liu, Y Li, Y Du, **L. Du**, T Wang, “Hybrid thermal aware reconfigurable 3D IC with dynamic power gating architecture” IEEE Semiconductor Technology International Conference (CSTIC), 2017