

An Zou

Ph.D. Candidate

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EDUCATION

- Washington University in St. Louis** St. Louis, MO, U.S.
 - *Ph.D. student in Electrical Engineering; GPA: 3.9/4.0; Advisor: Prof. Xuan Zhang* Aug. 2016 – present
 - M.S. in Electrical Engineering; Advisor: Prof. Xuan Zhang* Aug. 2016 – May. 2019
- Harbin Institute of Technology** Harbin, China
 - *M.S. in Automation; GPA: 93/100, Rank: 1/161; Advisor: Prof. Hui Zhao* Aug. 2013 – July. 2015
- Harbin Institute of Technology** Harbin, China
 - *B.S. in Automation; GPA: 91/100, Rank: 10/123* Aug. 2009 – July. 2013

RESEARCH INTERESTS

High performance low power heterogeneous computer architecture.

Tools and automation for computer hardware design.

Parallel and real-time computing for cyber-physical system.

Power management for autonomous system and robotics.

RESEARCH EXPERIENCE

- XZ Group** Washington University in St. Louis
 - *Research Assistant on computer architecture, embedded system* Aug. 2016 - Present
- 1. **GPU Real-time Scheduling for Parallel AI and ML Tasks (June 2018 - Present)**

GPU accelerated AI and ML applications are widely adopted in emerging autonomous systems, such as self-driving vehicles and collaborative robotics. These applications are respect to various timing constraints. We design real-time scheduling for the real AI and ML applications with timing constraints, such as neural network based real-time object detection (YOLO), on both embedded NVIDIA Jetson TX2 and large GTX1080TI GPU systems. (**Publication:[1]**)
- 2. **Meso Scale Cyber-Physical System Power Management (April 2017 - Present)**

Meso-scale platforms (e.g. autonomous cars, drones) face design limitations and power constraints. To understand their power constraints, we start with developing a mobile robot platform PiCar based on a 1/18 scale RC car chassis. RaspberryPi 3 / NVIDIA Jetson Tx2 are used in upper level intelligence algorithms like CV and SLAM. Arduino is used for the lower level motor feedback control. YDLIDAR F4 Lidar and Pi cameras are sensing elements. (**Publication:**)
- 3. **Voltage Stacking Power Delivery for Manycore (GPU) System (Mar. 2017 - Aug. 2018)**

Voltage stacking (VS) fundamentally improves power delivery efficiency for manycore systems by series-stacking multiple voltage domains but suffers from aggravated supply voltage noise. Using GPGPU as an example of manycore system, we employ hybrid circuit level charge recycling and control theory driven architecture level (GPGPU-Sim3.0) power management to successfully guarantee supply voltage and an efficient power delivery. (**Publication:[2,3]**)
- 4. **Integrated Voltage Regulator Modeling and Power Management (May 2016 - Present)**

Integrated voltage regulators move the voltage step-down conversion from PCB board to silicon chip and enable a high efficiency power delivery. We develop a modeling and simulation tool for integrated voltage regulators with C++. Analytic formulas are adopted to find the optimal quiescent operating point. SPICE3 based circuit simulation is used to evaluate the dynamic response under load fluctuation and interference in the power delivery system. (**Publication:[4]**)
- Control and Simulation Center** Harbin Institute of Technology
 - *Research Assistant on high precision servo robot system* Sep. 2012 - July 2015
- 1. **High Precision Angle Measurement System for Servo Robot (Sep. 2012 - July 2015)**

We design angle measuring systems for servo robots based on inductosyn and photoelectric encoder. With a resolution of 1/3600 degree. It includes signal processing PCB board with FPGA/DSP and upper computer interface program. PCB board and upper computer communicate through ISA/PCI bus. Finally, an air bearing rotary stage, based on Delta PMCA motion control board, is used to test and compensate the angle measuring errors. (**Publication:[5,6]**)

HONORS AND AWARDS

<i>DAC Best Paper Nomination</i>	2017
<i>Graduate Fellowship The Ohio State University</i>	2015
<i>China National Scholarship</i>	2014
<i>First Level Graduate Student Scholarship</i>	2014,2013
<i>People Scholarship</i>	2013,2012,2011,2010
<i>Outstanding Student</i>	2012
<i>88412 Scholarship</i>	2011
<i>Individual Scholarship</i>	2011
<i>Student Travel Award</i>	DAC 2017, Micro 2018

COMPETITION AWARDS

<i>2014 National Postgraduate Mathematic Contest in Modeling(China)</i>	<i>The Second Price</i>
<i>2011 National College Mathematical Contest in Modeling(MCM, U.S.)</i>	<i>Meritorious Winner Prize</i>
<i>2010 Zhejiang Undergraduate Student Physics Competition</i>	<i>The Third Prize</i>

PUBLICATIONS

1. **[Submitted] An Zou**, Yijie Zhang, Christopher D. Gill, Jing Li, Xuan Zhang. RTGPU Real-Time GPU Scheduling for Parallel AI and ML tasks. (*Double-blind conference*).
2. **An Zou**, Jingwen Leng, Xin He, Yazhou Zu, Christopher D. Gill, Vijay Janapa Reddi, Xuan Zhang. Voltage-stacked GPUs: A Control Theory Driven Cross-Layer Solution for Practical Voltage Stacking in GPUs. *IEEE 51th Annual IEEE/ACM International Symposium on Microarchitecture (MICRO 2018)* Fukuoka, Japan, Oct 20 - 24 2018.
3. **An Zou**, Jingwen Leng, Xin He, Yazhou Zu, Vijay Janapa Reddi, Xuan Zhang. Efficient and Reliable Power Delivery in Voltage-Stacked Manycore System with Hybrid Charge-Recycling Regulators. *The 55th Design Automation Conference (DAC 2018)*. San Francisco, CA. U.S. June 24-28 2018
4. **An Zou**, Jingwen Leng, Yazhou Zu, Tao Tong, Vijay Janapa Reddi, David Brooks, Gu-Yeon Wei, Xuan Zhang. Ivory: Early-Stage Design Space Exploration Tool for Integrated Voltage Regulator. *The 54th Design Automation Conference (DAC 2017)*. Austin, TX U.S. June 18-22 2017 (**Best Paper Nominations**)
5. **An Zou**, Hui Zhao, Yehan Ma and Da Li. Analysis Calculation and Testing of Rotary Inductosyn Angle Measuring Errors. *The 33rd Chinese Control Conference (CCC 2014)*. Nanjing, China, July 28-30 2014.
6. Da Li, Hui Zhao, Honglin Xue and **An Zou**. The Design and Implementation of Universal Interface Circuit for Photoelectric Encoder. *The 11th World Congress on Intelligent Control and Automation (WCICA 2014)*. Shenyang, China, June 29-July 4 2014.

PROFESSIONAL SERVICE ACTIVITIES

<i>DAC External Reviewer</i>	2018,2019
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MENTORED STUDENTS

Master students: Adith Jagadish Boloor, Duhong Xu, Yunshen Huang

Undergraduate students: Feiyang Jin, Shadi Davari, Hayden Sierra, Shuhe Tian, Chenyang Wang

TECHNIQUE SKILLS

Programming Languages: C/C++; CUDA; Verilog; M language; Python; Latex

Software: MATLAB; Cadence tools; Synopsys tools; SPICE; CCS; Quartus2; Altium Designer

Operating System: Linux; Windows