Shengjun Kris Dong

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Research Interests

A second-year Ph.D. student researcher dedicated to **computer architecture** and **hardware-software co-design** for autonomous robotics with current research focusing on domain-specific acceleration, infrastructure for design and evaluation of cyber-physical systems, and SoC design and integration.

Education

University of California, Berkeley: Ongoing
Ph.D. in Electrical Engineering and Computer Sciences

University of California, Berkeley: May 2022
Master. in Electrical Engineering and Computer Sciences

University of Massachusetts Amherst: May 2021
Bachelor of Science in Mathematics
Bachelor of Science in Computer Science
Bachelor of Business Administration in Finance

Publications

ISCA June 2023
IEEE International Symposium on Computer Architecture

- Dima Nikiforov, **Kris Shengjun Dong**, Chengyi Zhang, Seah Kim, Borivoje Nikolic and Yakun Sophia Shao. "RoSE: A Hardware-Software Co-Simulation Infrastructure Enabling Pre-Silicon Full-Stack Robotics SoC Evaluation." *In the 50th Annual International Symposium on Computer Architecture (ISCA)*, IEEE, 2023. **(ISCA Distinguished Artifact Award)**

LAD'24 June 2024
IEEE International Symposium on Computer Architecture

- Charles Hong, Sahil Bhatia, Altan Haan, **Kris Shengjun Dong**, Dima Nikiforov, Alvin Cheung, Sophia Shao "LLM-Aided Compilation for Tensor Accelerators." *In the 1st IEEE International Workshop on LLM-Aided Design*, IEEE, 2024.

Workshops and Tutorials

Toronto, Canada October 2023
MICRO 2023

- Dima Nikiforov, **Shengjun Kris Dong**, Chengyi Lux Zhang, Borivoje Nikolic, Yakun Sophia Shao. "Designing, Deploying, and Evaluating Full-Stack Robotics Systems With RoSÉ." Tutorial at MICRO 2023.
- Dima Nikiforov, **Shengjun Kris Dong** "Design, Simulation, and Evaluation of Hardware for Full Stack Robotics Systems." Oral Presentation, 2nd RoboARCH Workshop, MICRO, IEEE, 2023.

MICRO October 2022
IEEE/ACM International Symposium on Microarchitecture

- Dima Nikiforov, **Kris Shengjun Dong**, Borivoje Nikolic and Yakun Sophia Shao. "DryDock: A Co-Simulation Platform Enabling System-Level Pre-Silicon Evaluation of Robotics SoCs." *In the 55th Annual IEEE/ACM International Symposium on Microarchitecture* , 1st RoboARCH Workshop, MICRO, IEEE, 2022.

ILLIXR Consortium April 2022
University of Illinois at Urbana-Champaign

- Dima Nikiforov, **Kris Shengjun Dong**, Borivoje Nikolic and Yakun Sophia Shao. "A Co-Simulation Platform Enabling System-Level Pre-Silicon Evaluation of Robotics SoCs." *ILLIXR Consortium*, Oral Presentation, University of Illinois at Urbana-Champaign, 2022.

Research Experience

SLICE Lab 08/2021 – Present
Co-simulation Infrastructure for Pre-Silicon Evaluation of Robotics SoCs *UC Berkeley*

- Developed simulation infrastructure co-simulating drone robotic dynamics and sensing, along with an FPGA-accelerated cycle-exact RTL simulation of a robotics SoC.
- Developed a synchronizer between FireSim SoC simulator and Gazebo and AirSim robotics simulators.
- Designed and implemented a synchronization scheme for simulated data packets between simulators.
- Ported ROS1 libraries to RISC-V, enabling the generation of RV64G Linux images for robotics applications.
- Using co-simulation infrastructure to perform design space exploration for a robotic SoC tapeout.

Berkeley Wireless Center 08/2021 – Present
Prototyping, Benchmarking, and Evaluation of Robotics SoCs *UC Berkeley*

- Developed a flexible system-on-package research platform for designing, evaluating, and prototyping specialized robotics compute systems. Deployed representative robotics prototypes for evaluating the end-to-end application performance of the system architectures.
- Developed end-to-end applications and deployed them to open-source robot prototype platforms to evaluate robotic SoCs.
- Integrated and optimized robotic algorithms to a collection of hardware IPs. Designed a task-level end-to-end benchmark suite that evaluates the performance, power, and area (PPA) of robotic SoCs.

Hybrid Systems Lab 02/2023 – Present
Workload Characterization of Robotics Systems *UC Berkeley*

- Designed and assembled a custom unmanned aerial vehicle and deployed Robot Operating System on an onboard companion computer.
- Integrated optical-flow-based pose estimation, occupancy grid mapping, and trajectory planning to achieve trajectory navigation experiments.
- Achieved Sim-to-real transformation of algorithms by investigating the inherent uncertainty in sensing, modeling, and actuation used for UAV control.
- Deployed the end-to-end robotic workloads including high-level control, mapping and localization, and other perception algorithms, in a closed-loop real-time simulation environment.

UMass Amherst 01/2021 – 05/2021
Autonomous grasping robot with Deep Reinforcement Learning

- Applied reinforcement learning for optimal control and planning with the aim of developing algorithms and techniques to endow machines with the ability to autonomously acquire the skills for executing complex tasks.
- Researched leveraging Q-learning algorithms to acquire complex behavioral skills, in order to endow machines with greater autonomy and intelligence.
- Executed grasp attempts, used to train a large convolutional neural network to predict grasp success given an image and a candidate grasp vector.
- Constructed a continuous servoing mechanism to continuously make decisions about the optimal motor command to maximize the probability of grasp success.

Work Experience

Tesla, Inc. 01/2022 – 08/2022
System Development Engineer

- Enabled vehicle remote control through a user interface, allowing long-distance tele-operation via a secured internet portal enriched with other confidential, unreleased features.
- Designed and implemented long-distance teleoperation of a vehicle, facilitating remote vehicle maneuvering, including operations like pulling over/out and parking from afar.
- Created an intuitive human-machine interface featuring vehicle commands and video telemetry.
- Developed range analysis, reporting and analyzing the vehicle's energy consumption across vehicle performance, driving behavior, and peripheral usage, comparing measured results to the vehicle EPA estimates.

Amazon, Inc. 06/2020 – 09/2020
Project Manager

- Initiated the Alexa for Warehouse project and coordinated the full project-development lifecycle.
- Collaborated with Amazon's Speech team to deploy Alexa's LLM model to a noisy warehouse environment with support for a wider range of warehouse workflow under various scenarios.
- Developed the project to 110 Fulfillment Centers nationally, improving nationwide Fulfillment Centers' production process and order distribution by 19%.

CERNET Education Development Co., Ltd. 05/2017 – 09/2017
Software Engineer

- Used ELK to target mobile users on the basis of demographics, location, behavior, device and service provider.
- Built an Elastic Search project to store user session data and process raw information before further analysis.
- Used Timelion timeline to identify peak seasons and periods for resource usage.
- Utilized geography location in Kibana to analyze the geographic distribution of new and returning users.
- Tested the geographic locations of 10k fake users with JMeter and delivered to 70 alpha test users.
- Designed a MapReduce program in MongoDB to aggregate time series data and predict peak seasons.

Professional Activities

Tesla Career Day 01/2022 – 08/2022
Organizer

- Organized career fairs and speed-networking events to promote company culture and career opportunities.
- Coordinated all communication necessary for building candidate pipelines and enhancing company culture.
- Established mentorship with students by presenting on professional experience and sharing career advice.
- Leveraged connections with local colleges and universities and community organizations, scheduling events to be present at career fairs, community outreaches, etc.

Women of Isenberg Conference 03/2019 – 05/2021
Vice President

- Led a team of nine students and four advisors for the 7^{th}- 9^{th} Annual Women of Isenberg Conference.
- Planned, organized and facilitated the Women of Isenberg Virtual Speaker and WOI Week Seminar.
- Built and fostered relationships with companies and exceeded the financial goal by raising $70,000 in 9 months.
- Achieved three conferences of approximately 900 attendees each, arranging 10 panels and 4 workshops.
- Upheld organization brand identity through virtual events, panel content programming, promotions and website maintenance.

Hack(H)er413 03/2019 – 05/2021
Director

- Led a team of 18 student leaders and three advisors for the 2017-2019 Hack(H)er413 Hackathon.
- Organized diverse workshops and panels in a two-day hackathon to enable participants to learn and develop new technical skills, network with sponsor company representatives,
- Led the premier student organization that promotes and supports the growing community of 1300+ members women and non-binary people in technology at UMass Amherst.
- Outreached to major sponsors to raise over $6000 in funds.

Chinese Student and Scholars Association 09/2017 – 05/2021
President

- Led a team of 60 students to facilitate, support, and coordinate all activities of the student council.
- Planned and organized 19^{th} - 21^{st} Annual Chinese Spring Festival Gala and Voice of UMass Concert.

Teaching Experience

UC Berkeley Summer 2023
ROAR Academy Lecture Series– Introduction to Embedded Systems and Edge ML

- Led a full-day program for high school students with a lab section, introducing students to embedded systems, machine learning and robotic prototyping.

UMass Amherst 2020 – 2021
Head Teaching Assistant – *Mathematical Finance 422: Qualitative Finance* *Prof. Nikunj Kapadia*

- Lectured theoretical and practical aspects of creating and managing an investment portfolio.
- Organized weekly discussion sections and proctored and graded exams and papers.
- Held office hours, weekly reflection, and debriefing sections in the finance department.
- Served as a research fellow and domain-specific expert in financial engineering.

UMass Amherst 2018 – 2021
Head Teaching Assistant – *Mathematical Finance 304: Financial Engineering* *Prof. Mila Sherman*

- Planned and implemented course curriculum to integrate finance content and mathematical modeling techniques.
- Enabled students to utilize financial models in a realistic simulated trading environment.
- Developed students' practical use of spreadsheets and simulation packages in business analysis.
- Graded labs, discussions, homework, midterms, final projects, and exams.

UMass Amherst 2018 – 2019
Teaching Assistant – *Mathematics 235: Linear Algebra* *Prof. Inanc Baykur*

- Helped students establish a basic understanding of linear algebra. Matrices, determinants, systems of linear equations, vector spaces, linear transformations, and eigenvalues.
- Presented relevant concepts and real-life examples to help students build the connection between the coursework with applications to physics, chemistry, and engineering.
- Led discussion sections every week to help students review the course and assisted with labs, discussions, homework, final projects, and exams.

Volunteering Experience

Amherst Regional Middle School 2017 – 2021
Organizer of VELA Scholars Program

- Implemented an after-school tutoring program for students who are falling behind in classes, including one-on-one instruction, group teaching, homework help, and a small library.
- Collaborated with teachers, staff, and fellow volunteers to organize after-school clubs and activities.
- Established mentorship relationships with 5 students and helped students with special needs, including those with learning disabilities or who had language disadvantages.

Big Brothers Big Sisters Program of Hampshire Country 2017 – 2021
Peer Mentor

- Developed a one-to-one relationship with mentees by offering consistency, encouragement, and guidance.
- Planned visits to mentees' schools and joined mentees' after-school activities as well as homework workshops 2-3 times per week.
- Assisted teachers and program supervisors to monitor students' learning progress and recognizing students' achievements.

Honors

Distinguished Artifact Award 2023
ISCA 2023
Electrical Engineering and Computer Science Departmental Fellowship 2023 - 2024
UC Berkeley
Master of Engineering Departmental Grant 2022 - 2023
UC Berkeley
Master of Development Engineering Merit Scholarship 2021 - 2022
UC Berkeley
Magna Cumme Laude 2021
UMass Amherst
Dean's List All Semesters 2017 - 2021
UMass Amherst
Teaching Assistant of the Year 2021
UMass Amherst
Carney & Guo Scholarship 2020
UMass Amherst
Employee of the Month at Amazon 2020
Amazon, Inc.
Chinese Cultural Representative Scholarship 2017
UMass Amherst

Skillset

Programming:
C/C++, Java, Python, JavaScript, Go, Bash

Machine Learning:
PyTorch, TensorFlow, ONNX, SQL, R, SciPy, NumPy, MATLAB, Robot Operating System (ROS), OpenAI Gym

Hardware:
FPGA Prototyping and Emulation, HDL, CAD