Justin Li Ting

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Education

Georgia Institute of Technology, Atlanta, GA   August 2016 – December 2020
Bachelor of Science in Electrical Engineering | GPA: 3.80
Minor in Computer Science

Publications

J. Ting, Y. Fang, A.S. Lele, A. Raychowdhury, "Bio-inspired Gait Imitation of Hexapod Robot using Event-Based Vision Sensor and Spiking Neural Network," ***IEEE World Congress on Computational Intelligence/International Joint Conference on Neural Networks, Glasgow 2020***

A. Amaravati, S.B. Nasir, **J. Ting**, I. Yoon, A. Raychowdhury, "A 55nm time-domain mixed-signal neuromorphic accelerator with stochastic synapses and embedded reinforcement learning for autonomous micro-robots," ***IEEE Journal of Solid-State Circuits 2019/ IEEE Solid-State Circuits Conference, San Francisco 2018***

A.S. Lele, Y. Fang, **J. Ting**, A. Raychowdhury, "Learning to Walk: Spike Based Reinforcement Learning for Hexapod Robot Central Pattern Generation," ***IEEE Artificial Intelligence Circuits and Systems, Genoa 2020***

N. Cao, **J. Ting**, S. Sen, A. Raychowdhury, "Smart Sensing for HVAC Control: Collaborative Intelligence in Optical and IR Cameras." ***IEEE Transactions on Industrial Electronics 2018***

Experience

Machine Learning and Robotics Research Assistant   May 2017 – Present
Georgia Tech, Integrated Circuits and Systems Research Lab (ICSRL) | Atlanta, GA
ICSRL, a lab in Georgia Tech's Electrical and Computer Engineering department, explores mathematical models of computation and information processing, as well as fundamentally new design paradigms.
Training Robots with Event-Based Vision
For this project, I created a low-power learning model so that a six-legged robot could watch a video of itself and copy whatever it sees. The videos were recorded using state-of-the-art Event-Based Cameras.
- Assembled and calibrated a Hexapod Robot so that Central Pattern Generation (CPG) could be easily programmed
- Processed event-based visual data with MATLAB using filters based off of simple logic gates
- Created a custom one-layer Spiking Neural Network in MATLAB to simulate real-time and dynamic learning
- Tuned model parameters so the robot converged onto the solution within 2 minutes
- Calculated computation energy to be 60nJ per CPG cycle
- Accepted into World Congress on Computational Intelligence (WCCI) 2020

On-Chip Reinforcement Learning for Robots
For this conference demonstration, I wrote a reinforcement learning algorithm to fit the parameters of the hardware that drove a small three-wheeled disaster relief robot.
- Built a three-wheeled robot and connected a socket programming interface so the robot could receive data from the sensors
- Developed a learning algorithm with the Keras library that successfully optimized the robot's real-time path-planning policies
- Reduced training time from 15 hours to 3 hours and improved learning by 60%
- Demonstrated project at International Solid-State Circuits Conference (ISSCC) 2018 using a physical robot playground

Advanced Analytics Intern   May 2019 – August 2019
Intel Corporation, Advanced Analytics | Folsom, California
Advanced Analytics is a subgroup of Intel NSG that proposes statistics and machine learning models for both Intel's customers and internal groups in order to predict how the Intel SSDs (Solid-State Drives) will behave. My job was to propose a way of structuring workload data (latencies, average block sizes, etc.) to optimize SSD read/write policies.
- Represented SSDs as probability distributions in Python so that a multi-drive system's failure rate could be simulated
- Automated the extraction and clustering of workload data using Flexible IO Tester (FIO), Linux subprocesses, and Python
- Improved the accuracy of customer workload analysis

SSD Validation Engineer Intern   June 2018 – December 2018
Intel Corporation, Non-Volatile Memory Solutions Group (NSG) | Folsom, California
NSG is an Intel group that develops both NAND and 3DXP Solid-State Drives (SSD). My job was to improve and develop tests that would expose and fix bugs in the firmware for Intel's 3D NAND products.
- Replaced unreliable firmware-corruption tests with ones that can test all NSG products
- Generalized firmware update tests to accommodate various firmware structures
- Polished a script to automatically fix bricked drives

Projects

Underwater Acoustic Modem | Senior Design   August 2019 – May 2020
Underwater modems on the market are expensive (~$1000) and large. Our team of 6 people designed a modem that is low-cost (~$200), and small so that information and data can easily be sent through networks of robots under ice shelves.
- Researched effects of underwater signals to extrapolate how much power was necessary (~30W Transmit, <1W Receive)
- Designed the transmit and receive circuits from the FPGA to the transducer using a Class D amplifier
- Selected parts to order so that power specs could be met and the cost is kept under ~$200
- Completed schematic and PCB board in EagleCAD

Antenna Design | Circuit Analysis   March 2017
This class assessment was graded competitively based on the group that designed the cheapest circuit while delivering the most power to a load resistance within a certain range of incoming signals.
- Successfully created the second-best circuit in the class, keeping the cost as low as $0.80
- Simulated the design with whole range of component values so the circuit could meet specifications in worst-case scenarios

Rube Goldberg Sensor Machine | Introduction to Audio Technology   September – November 2017
The final project of the Audio Technology course was to integrate electrical sensors within a musical Rube Goldberg Machine.
- Assembled a catapult and rotating apparatus that would trigger pressure sensors
- Attached the sensors and wrote the code so that the sensors would trigger the correct sounds

Skills

Coursework: Nonlinear/Linear Systems (Graduate courses), Analog Electronics, Computer Vision/Deep Learning, Robotics
Programming: ROS, MATLAB, Python (Pytorch, Keras, Tensorflow), C++, Mathematica, Verilog, Assembly, Java
Hardware: Microcontrollers, Bench-Level Test Equipment, FPGAs
Software: LT Spice, EagleCAD, NI Labview, ModelSim, Androids Studios, LiberoSoC, Github, Linux
Communication: Research Proposal, Technical Report, Presentations (large audiences and teams), Video presentation

Leadership

President of GT Tekstyles   January 2018 – Present
Tekstyles is a student organization at Georgia Tech that provides a space for students to deepen their understanding of the techniques, history, and culture of street dance. In addition, we seek to bring together the Atlanta Dance community and Georgia Tech students.
- Hosted a semesterly dance competition where dancers from Atlanta and Georgia Tech battle and cypher
- Organized performances for various on-campus student events (~5 per semester)
- Scheduled practices (3-5 per week) and workshops, taught fundamental techniques to all new students
- Grew the club from 4 to 20 students
- Member of Creation Global international dance crew

President of GT Bahá'í's   January 2018 – Present
The Bahá'í Faith is a world religion that works towards the oneness of humanity through study and service. At Georgia Tech, we simultaneously participate in the activities of the Atlanta community, as well as host our own on-campus activities.
- Founded the Georgia Tech Interfaith Initiative, bringing together the Christian, Muslim, and Secular groups of Georgia Tech to serve and socialize together
- Involved other students in off-campus activities organized by the Atlanta Bahá'í community
- Maintained weekly general meetings for both logistics and meaningful conversations