CHANG GAO

Ph.D. Student at the Institute of Neuroinformatics
University of Zurich & ETH Zurich

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✉ INI-UZH, Winterthurerstrasse 190
📍 Zurich, Switzerland

EDUCATION

Ph.D. in Neuroscience

Institute of Neuroinformatics, University of Zurich & ETH Zurich

📅 Jan 2017 – Ongoing   📍 Zurich, Switzerland

- Focused on designing **energy-efficient** recurrent neural network (**RNN**) accelerators for **edge** inference & training.
- Published in **FPGA** & **ICRA**, top conferences in the field of FPGA and robotics.
- **FPGA development experience** from RTL design to implementation and hardware debugging.
- **ASIC development experience** from RTL design to layout and GDS.
- Have used my accelerators to solve challenging **real-time tasks**, i.e. **speech recognition** and **human-in-the-loop control**.

MSc in Analog and Digital Integrated Circuit Design

Imperial College London

📅 Sept 2015 – Sept 2016   📍 London, United Kingdom

- Distinction Degree; GPA: 4.00 out of 4.25; Rank in program: Top #1
- **Full-custom design experience** of mixed-signal circuits.
- Thesis on full-custom design of a mixed-signal random number generator using sense-amplifiers using 350 nm tech node.
- Thesis scored the highest in my MSc program and a related paper published in ISCAS 2017.

BEng in Electronics

University of Liverpool & Xi'an Jiaotong-Liverpool University

📅 Sept 2011 – June 2015   📍 Liverpool, United Kingdom

- First Class Honor Degree; GPA: 4.00 out of 4.25
- Joint bachelor degrees from both universities
- Thesis on establishing mathematical models to predict voltage-current characteristics of thin-film transistors

SELECTED PUBLICATIONS

DeltaRNN: A Power-efficient Recurrent Neural Network Accelerator

ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA 2018), as the first author

- Google Scholar Citation: 55
- First hardware accelerator to exploit temporal sparsity of RNNs.
- Achieved 1.2 TOPS throughput and 166 GOPS/W energy efficiency without batching in GRU-RNN inference, which is the state-of-the-art at the time.

Recurrent Neural Network Control of a Hybrid Dynamic Transfemoral Prosthesis with EdgeDRNN Accelerator

BASIC INFORMATION

Nationality:	Chinese
Date of Birth:	22/04/1992
Marital Status:	Single
Mobile:	+41 78 652 66 72
Skype:	chang.gao1992
LinkedIn:	https://cutt.ly/oyLmLmu
Google Scholar:	https://cutt.ly/vyLmSLN
Personal Website:	https://changgao.site

PERSONAL STATEMENT

I am a fourth-year PhD student at the Institute of Neuroinformatics, UZH & ETHZ supervised by Prof. Dr. Shih-Chii Liu and Prof. Dr. Tobi Delbruck. I am working on the Neuromorphic Processor Project sponsored by the Samsung Advanced Institute of Technology. My research interest is on hardware acceleration of deep neural networks computation and its applications on edge devices.

STRENGTHS

Hard-working   Self-motivated
Problem Solving   Time Management
Good Presenter   Teamwork   Leader

AWARDS

🏆 **GRC Travel Grant**
1,900 CHF travel grant for participating in the 2019 Telluride Neuromorphic Cognition Engineering Workshop in Telluride, Colorado, USA.

🏆 **Outstanding Achievement in MSc Analogue and Digital Integrated Circuit Design**
To acknowledge the top 1 student in the MSc program by Imperial College London

🏆 **Scholarship from University of Liverpool**
50% discount of the tuition fees (£8,000) awarded to the top student in the program

🏆 **XJTLU Progression Scholarship**
Academic Excellence Award for Top 5% students in Xi'an Jiaotong-Liverpool University

IEEE International Conference on Robotics and Automation (ICRA 2020), as the co-first author

- Google Scholar Citation: 1
- End-to-end RNN control of a robotic prosthesis functioning with a human in the real-world
- First work to use a hardware-accelerated RNN for real-time control

Real-Time Speech Recognition for IoT Purpose Using a Delta Recurrent Neural Network Accelerator
IEEE International Symposium on Circuits and Systems (ISCAS 2019), as the first author

- Google Scholar Citation: 10
- The first instance of a continuous speech recognition system using event-drive silicon cochlea based audio front-end.

EdgeDRNN: Enabling Low-latency Recurrent Neural Network Edge Inference
IEEE International Conference on Artificial Intelligence Circuits and Systems (AICAS 2020), as the first author

- Google Scholar Citation: 4
- A delta GRU-RNN accelerator for edge applications
- Achieved sub-millisecond latency for large multi-layer GRU-RNN inference; faster with low power versus various commercial products including NVIDIA Jetson Nano, Jetson TX2, Google Edge TPU & Intel Neural Compute Stick.

On-chip ID generation for multi-node implantable devices using SA-PUF
IEEE International Symposium on Circuits and Systems (ISCAS 2017), as the first author

- Google Scholar Citation: 1
- Paper based on my MSc thesis.
- Design of a physical unclonable function mixed-signal circuit using sense-amplifiers for identifying implantable chips.

REVIEW APPOINTMENTS

Journals

- IEEE Transactions on Circuits and Systems I: Regular Papers
- IEEE Transactions on Very Large Scale Integration (VLSI) Systems
- Neural Networks

Conferences

- IEEE International Symposium on Circuits and Systems
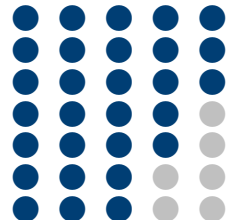- IEEE International Conference on Artificial Intelligence Circuits and Systems

SKILLS

Hardware

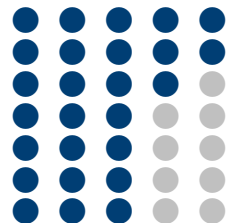|	
FPGA	●●●●●
Microcontroller	●●●●○
PCB	●●●○○

Coding

SystemVerilog	●●●●●
Python	●●●●●
PyTorch	●●●●●
C/C++	●●●●○
MATLAB	●●●●○
VHDL	●●●○○
TensorFlow	●●●○○

Tools

Linux	●●●●●
Xilinx Vivado	●●●●●
ModelSim	●●●●○
Xilinx HLS	●●●○○
Synopsys DC	●●●○○
Cadence Virtuoso	●●●○○
KiCad	●●●○○

Languages

Chinese	●●●●●
English	●●●●●

REFEREES

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