

# TOMOMASA YAMASAKI

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## PROFESSIONAL EXPERIENCE

**Agency for Science, Technology and Research, IHPC - Computer Scientist; Singapore** *October 2022 - Present*

- Hardware-software co-design middleware for AI accelerator
  - For software design, I developed a training-free neural architecture search (NAS), which evaluates candidate networks without training in a few seconds with one GPU. Our NAS outperforms state-of-the-art zero-cost NAS on the final accuracy of the best network by 104%. Also, our NAS can work for the design space with various types of activation functions 252% more accurately than state-of-the-art zero-cost NAS.
  - We have developed algorithms for hardware optimization and co-design. Our co-design middleware would provide faster and more accurate analysis because of the training-free NAS that we proposed.
  - Skills: Machine learning, optimization, kernel method

**AI Dynamics - Artificial Intelligence Engineer; Washington, US**

*August 2021 - March 2022*

- AI applications for industrial business
  - Developed image creation algorithm for digit recognition AI model, automatic recording system for the moves of Japanese chess, and counting car system, programmed on Python and MATLAB.
  - Skills: Machine learning, Signal Processing

**Maris Creative Design - Firmware Engineer; Tokyo, Japan**

*February 2020 - July 2021*

- An algorithm for a glasses-type walking assist device for the visually impaired, named SEEKER
  - Developed the prototype SEEKER with Kyushu Institute of Technology. The algorithm consists of recognizing tactile paving, assisting walking, and recognizing traffic lights, programmed by C++. Used an RZ/A2M micro-computer from Renesas.
  - Skills: Machine learning, Signal Processing
- Funding collection for SEEKER
  - Talked with municipal government, venture capitalists and angel investors in Japan to fund this company's growth. As a result, the Tokyo and Kitakyushu governments agreed to support our business.

## EDUCATION

**PhD - Singapore University of Technology and Design; Singapore**

*September 2021 - Present*

AI accelerator simulator, Neural Architecture Search, On-device AI | GPA: 4.5 / 5.0 | until May 2025

- A member of the Graduate Student Association Exco
  - Worked as 6<sup>th</sup> media director, organized some events for graduate students such as BBQ, Halloween, and matriculation ceremony and managed the Instagram account to provide valuable information. I increased followers for the GSA Instagram by 125% in one year.

**Master of Engineering - Aoyama Gakuin University; Tokyo, Japan**

*April 2019 - March 2021*

Biomedical Engineering, Machine learning, Signal processing | GPA: 3.8 / 4.0

**Bachelor of Engineering - Aoyama Gakuin University; Tokyo, Japan**

*April 2015 - March 2019*

Industrial engineering, Biomedical engineering, Machine learning | GPA: 3.4 / 4.0

## PUBLICATIONS

**LAXOR: A Bit-Accurate BNN Accelerator with Latch-XOR Logic for Local Computing**

ACM/IEEE International Symposium on Low Power Electronics and Design, 2023

- The paper proposes a box to fuse data storage and computation with bit-accurate inference beyond In-Memory-Computing. This accelerator achieved 3.4x higher energy efficiency than the digital state-of-arts.
- Developed a Python-based BNN simulator that enables fast design analysis for optimal design points and flexible mapping for a variety of BNN models. This simulator runs  $8 \times 10^6$  times faster than the Cadence Spectra tool when simulating a 1024-bit binary convolution. **Best Paper Award.**

**Model of Urine Accumulation in the Bladder and Method for Predicting Unconstrained Urine Volume Based on Absorption Spectrum of Urine**

IEEE Access, 2020

- Proposed a macroscopic model for urine accumulation in a bladder and an unconstrained prediction system for a patient's urine volume, outperforming the volume measured by ultrasonic sensors by 1.3x.

**Classification System for Golf Ball Initial Conditions using CNN Based on High-Time Resolution Images**

The 8th IIAE International Conference on Industrial Application Engineering, 2020

- Used a convolution neural network (CNN) model to estimate a golf ball's initial velocity, angle, and spin. Built a golf ball simulator to generate training images for the CNN. **Best Student Paper Award.**

I have another 3 papers in terms of an unconstrained urine volume estimation (SICE 2020), a golf ball condition estimation (AROB 2020), and a blood pressure estimation (APSIPA 2018).

## AWARDS & NOMINATION

- **Global Young Scientists Summit 2024 (GYSS) nominated participant** *October 2023*  
I've been nominated by the Singapore University of Technology and Design as one of 10 graduate students, then the organising committee of GYSS officially selected me as a participant for GYSS 2024
- **Best Paper Award** *August 2023*  
Issued by ACM/IEEE International Symposium on Low Power Electronics and Design
- **Graduate Student Service Award** *June 2023*  
Issued by Singapore University of Technology and Design
- **The 1<sup>st</sup> Prize** *January 2023*  
Issued by SUTD Graduate Student T-shirt Design Competition
- **Start-up KYOCERA Corporation Award** *November 2021*  
Issued by Sony Startup Switch 2021
- **Ministry of Education PhD Fellowship** *September 2021*  
Issued by Singapore Ministry of Education
- **Best Student Paper Award** *January 2020*  
Issued by the 8th IIAE International Conference on Industrial Application Engineering

## SKILLS & INTERESTS

**Interests:** Running (Full marathon: 3:56, Half marathon: 1:26), Beach volleyball (26<sup>th</sup> place in U-23 Japan in 2017), Cycling, Travel

**Languages:** Native Japanese speaker, Fluent in English

**Coding language & Technical:** Python (2 years), MATLAB (4 years), C++ (3 years), illustrator