

Summary 15 years research experience in R&D at six research institutes. Worked on projects such as quantum computer, networked tactile sensor for robots, on-skin ultrasonic sensor, and wearable physiological sensor. Development of sensing system from material level to user interface level with multidisciplinary background in EE, ME, and CS.

Work Experience **Research Engineer** Honda Research Institute Inc. USA
San Jose, California 2018 – Present

- Led a development of wearable physiological sensor (EMG, ECG, Oximeter, GSR, etc.) and calibration system for emotion detection. Worked cross-functionally with robotics for human-machine-interaction study ([Link](#)).
- Managed team of scientists, external collaborators and interns to develop textile-based touch sensor with the scalable analog-front-end. Prototyped E-textile system with wireless and battery powered electronics ([Link](#)).

Assistant Research Scientist University of California, San Diego
San Diego, California 2014 – 2018

- System engineering lead of on-skin ultrasonic blood pressure sensor (Battery operation, Bluetooth, phased array). Proof of concept and system demonstration. Featured in Nature Biomedical engineering in 2021 ([Link](#)).
- Became principal investigator of MEMS-based non-contact voltage sensor with Fuji Electric for monitoring of power modules. Designed a multi-mode resonator to compensate soft/hard spring effect with electric field.

Postdoctoral scholar University of California, Berkeley
Berkeley, California 2013 – 2014

- Led a team of six for an experimental proof of concept of a pipeline repairing technology in collaboration with Saudi Arabia. Achieved a 3MPa bonding strength of Al/Ni self-reactive particle with pipe wall.

Industry-academia-government collaboration researcher Tohoku University
Sendai, Miyagi, Japan 2011 – 2013

- Completed an initial proof-of-concept for nerve-mimicking tactile sensor network system involves 3D integration of MEMS-CMOS and wafer-level packaging. Closely worked with Toyota Motor and ASIC designers.
- Demonstrated a system-level functionality by developing FPGA-based realtime packet receiver, bus analyzer (Asynchronous, 45Mbps) and GUI software. Maximum bandwidth is validated with a network simulator.

Education **Ph.D. in Mechanical Engineering** Tohoku University, Japan
Thesis : "MEMS-CMOS integration technology for artificial skin for humanoid robots" 2008 – 2011

M.E. in Electronics and Applied Physics Tokyo Institute of Technology, Japan
Thesis : "Carbon nanotube quantum dot on GaAs/AlGaAs substrate toward Qubit read-out" 2006 – 2008

B.E. in Electronics and Computer Science Hosei University, Japan
Thesis : "Measurement automation of carbon nanotube quantum dot using LabVIEW" 2002 – 2006

Skills **Electrical engineering:**

System design for wearable device (Lithium battery management, Low power design (few mW), Bluetooth Low Energy) / *PCB design* (OrCAD-Allegro, KiCAD) / *Microprocessors* (nRF51, MSP430) / *FPGA* (Cyclone) / *Firmware coding* (Keil, Segger) / *Analog circuit design* (physiological sensor, ultrasonic AFE, resistive gas sensor) / *Op-amp and In-amp* (MHz, pA, uV) / *Voltage regulation* (DC-DC converter, Linear regulator) / *Signal integrity* (LVDS, microstrip line design, grounding, filtering) / *Board level interface* (USB, I2C, SPI, UART) / *High voltage electronics* (full-bridge for ultrasound, Xe flash) / *Lab equipments* (Oscilloscope, Network analyzer, LCR meter, Lock-in-amplifier, Switcher, LSI tester, etc.)

Computer-aided engineering:

Data analysis and numerical modeling (Python, C, C#, Excel, MatLab) / *Circuit simulation* (LTSpice for analog circuit, Model-sim for RTL) / *Finite element simulation* for mechanical, electromagnetic, acoustic, thermal, and antenna design (COMSOL, ANSYS) / *Graphical interface development* (Visual C#, LabVIEW with API level driver for High-speed USB, BLE, or Serial Port) / *Instrument control* (GPIB, IVI, DDE on Windows) / *CAD* (Solidworks, AutoCAD, Layout Editor, FreeCAD)

Mechanical engineering:

Wearable electronics prototyping (PCB with Silicone stretchable material or textile, Copper trace transfer, lamination and bonding) / *Micro-Nano fabrication* (10years in MEMS, custom sensor from a bare wafer) / *Material analysis* (SEM, FTIR, Adhesion strength, Dielectric) / *Rapid prototyping tool* (3D printer, laser cutting, silicone molding, screen printing, PCB prototyping) / *Semiconductor instruments* (PVD, CVD, Lithography line, plasma etcher, electroplating, wirebonding, etc.) / *Lab management* launch of cleanroom (Class 1,000 and 1,700sqft), facility, safety and waste management.

Publication 28 Peer-reviewed papers and 18 patents. Full list of journal articles and patents are in [portfolio](#).