

Name	Hidetsugu Irie	Location	Hongo	Research Field	Computing Systems
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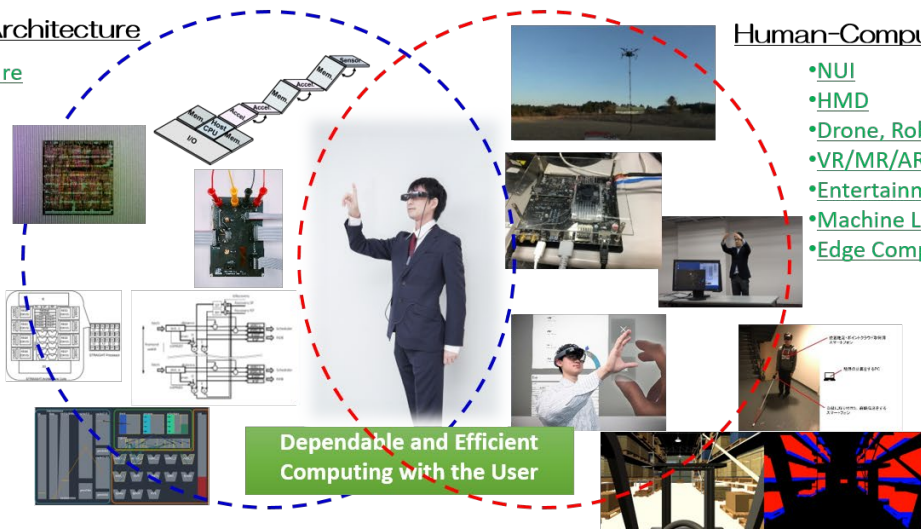
## Build and Utilize the Future Computer Systems

The central theme of the laboratory is “computing for the future.” Our target involves faster and smarter computers, innovative computers that have novel forms or functions, and user-friendly computing that is realized by using such advanced computer systems. We are focusing on a wide range of technologies such as processor architecture, hardware design, compiler, OS, distributed processing, machine learning, and human-computer interaction. Please refer to our web page for further information.

<http://www.mtl.t.u-tokyo.ac.jp>

### Computer Architecture

- CPU Architecture
- SiP, ASIC
- Hardware
- FPGA
- Accelerator
- Memory
- Approximate Computing



### Human-Computer Interaction

- NUI
- HMD
- Drone, Robot
- VR/MR/AR
- Entertainment Computing
- Machine Learning
- Edge Computing

### Computer Architecture

Computer architecture is a vital technology for determining the grand design of computers through interface design for programmers/ OSs or processing flow design such as parallelization and pipelining. Based on the latest device technologies and application trends, we are conducting the following research to support further computer growth.

- A new instruction set architecture enabling performance breakthrough, and development of CPU/ ML accelerator chip and the compiler framework for the architecture
- Shape-changeable computer system composed of ultra-small wireless chips
- Ultra-efficient computing framework that automatically adapts computation accuracy and microarchitectural parameters in real-time according to the user demand
- Development of a high-performance RISC-V processor provided with the state-of-the-art microarchitectural technologies

### Human-Computer Interaction

It is necessary to develop a novel interface and computing for fully utilizing enormous computing devices surrounding users. We are conducting the following research by utilizing advanced computing platforms such as custom drones, HMD, various sensors, edge computers, and various learning data such as the actual logs in the industry. Moreover, our target is to realize novel real-time interactions by cooperating with novel computer architecture technologies.

- Walking Support technology for visually impaired people by utilizing drone, 3D sensing, and wearable computer.
- Natural gesture interfaces for AR/VR
- Driving accident prevention system by utilizing edge computers and machine learning
- Motion generation algorithms for VR communication