Job Opportunity

Research Domains	Research Areas
① Future IT	□ **Multimedia Processing** - Image Capturing · Image Sensor Architecture Design, Image Sensor Signal Processing, Calibration for Multi-sensors, Depth Image Processing(Noise Reduction, Super-sampling, etc.), Color/Depth Joint Image Processing, Multi-lens Array Architecture Design, Multi-lens Array Signal Processing, Computational Photography - Photorealistic Graphics · 3D Object Surface/Volume Segmentation & Modeling, Geometry/Mesh Processing, 3D Animation Processing, Physics (Continuum, Fluid Dynamics)-Based Modeling, Advanced Global Illumination (Real-time Ray Tracing, Radiosity, Photon Mapping, etc), Graphic/Real Object Registration, Modeling and Rendering for Mixed Reality - Visual Processing · Depth Estimation, Stereo/Multiview Synthesis, Light Field Rendering, Feature Extraction, Motion Estimation, Super Resolution, Video Signal Processing, Computer Generated Hologram, Display Optics, 3D Display Architecture Design, Human Visual Perception - Pattern Recognition · Object Segmentation & Tracking, Object Recognition, Face Recognition, Eye/Gaze Tracking, (Big Data-driven) Machine Learning, (Full-body/Hand) Pose Estimation, 3D Feature Descriptor, 3D Vision Processing, 3D Modeling and Motion Graphics, Strong coding skills in C/C++ required
	□ **Communication & Network** - Wireless communication · information theory on wireless network, . advanced channel/network coding for interference management, . signal processing for cooperative communication . distributed resource management on ad-hoc multi-hop networks . wireless communication system design and development - Information-centric networking (ICN) . theory, design, prototpying, and simulation . name-based networking protocol . device/content mobility-support . network resource monitoring and management . network/content/device security algorithm . SDN (Software Defined Network)

Research Domains	Research Areas
① Future IT	□ **RF & Power Conversion Technology** - Wireless Power Transmission · Passive / active electromagnetic structure · Analytical analysis & electromagnetic simulations · Electromagnetic resonance / inductive coupling analysis and optimization · Broadband / multiband antennas & matching · Rectenna / Resonator / RF shielding · Fundamental research on electromagnetic coupling enhancement - RF & Power Stage / System · RF power amplifier / Rectifier · RF-DC conversion · Power electronics devices & modules (H/W, S/W, F/W) · High-power inverter / converter topology, circuit, system · Power management / conversion technology and systems · Efficient power / energy conversion & storage topology · RF analog circuit modeling, design, measurement (RFIC, RF front-end) - Control & Communication · Design and prototyping of control and communication systems (Zigbee, UWB, Bluetooth, etc.) · Micro-Control Unit (MCU) coding
	□ **Wearable device** - Ultra low power system design . Analog/RF architecture for communication and bio-signal sensing . Digital logic / processor design . Real time system / OS / Application - Signal processing and modeling . Algorithm optimization for low power operation . Mathematical channel modeling
	□ **Bio-medical Engineering** - Bio-signal sensing/acquisition . Analog Front End & Digital Logic Design . Non-invasive/Implatable bio-signal Sensing - Bio-signal processing/analysis . Feature extraction using Signal Enhancement & Pattern classification . ADF design for noise reduction - Sensor/system architecture . Sensor Hardware Design & Implementation . Embedded system and Firmware development - Physiological Analysis . Healthcare management tech. based on physiology . Sports science & physiological modeling

Research Domains	Research Areas
① Future IT	□ **Media Computing System** - Audio/Video · A/V codec and its implementation on embedded processor · 3D image/ultrasound medical image and its implementation - Intelligent image processing · Camera ISP(image signal processing), Computational Photography, Object/Gesture recognition, Robot vision & embedded vision processing - 3D Graphics · Design expert: Computer graphics(Rasterization, programmable Shader, Raytracing, Photon-mapping, Global illumination, Physics-based animation, etc.), low power/ high performance GPU design, graphics application engine · Direct3D, OpenGL, OpenCL, GLSL, HLSL, Verilog, C/C++, FPGA/ASIC/SoCs design/implementation/simulation/verification · Augmented/Mixed Reality, Feature Detection, Markerless registration, Composition - System SW · Heterogeneous multicore OS · Parallel programming language for CPU+GPU · Power/Performance estimation and prediction for CPU+GPU
	□ **Many-core Computing Architecture** - Processor Core Architecture and HW Implementation · Reconfigurable processor for multimedia/radio processing · 3D graphics core architecture supporting multi-threading · Highly parallel processor architecture - Many-core Processor Architecture and Implementation · Many-core processor supporting efficient synchronization mechanism · Interconnect architecture including Network-on-Chip · Memory architecture including hierarchy and coherency protocol · Data streaming architecture and HW task/thread scheduling · Many-core architecture supporting heterogeneous cores such as CPU+GPU · Heterogeneous memory architecture supporting efficient data transfer - Many-core Programming Model · Industry standard many-core programming model such as OpenCL · Core architecture specific programming model extension · 3D Graphics supporting programming model such as OpenGL - Software Development Tools · Compilers for single/many-core architecture supporting various parallelism · Simulators for architecture modeling and design space exploration · Profiler for analysis of application/architecture performance · Debuggers for increasing SW productivity - Processor Verification Framework · Single/Many-core processor verification tools such as random vector generator · Integrated verification framework from application to HW implementation · Automation and parallelization of verification process

Research Domains	Research Areas
① Future IT	□ **Intelligent Computing** - Machine Learning & Artificial Intelligence · Statistical Machine Learning, Hierarchical Learning, Deep Learning, Large-scale Machine Learning, On-line Learning, Brain Simulation, Graphical Models, Pattern Recognition, Inference, Reasoning, Natural Language Processing, Object Recognition, Scene Understanding - Data Mining · Data Mining Theory, High-dimensional Data Mining, Temporal Data Mining - Information Retrieval · Data Indexing, Web Search, Multimedia Search, Text Mining, Semantic Search - Large-scale Mathematical Analysis and Algorithms - Big Data Analytics · High-performance Distributed Computing and Data Analysis - Computer-Aided Diagnosis · Image Segmentation, Image Registration, Neuro Image Analysis 2D/3D Image Feature Extraction - Affective Computing · User Modeling & Understanding, Multi-modal Emotion Recognition, Novel Human-Computer Interaction, Mood Detection, Stress Monitoring
	□ **Distributed Data Management** - Large-Scale Distributed File System · Distributed node/data management, Fault-tolerance - Deduplication - Auto-tiering - Complex Data Management - Object storage - NoSQL Distributed Storage · Tabular store, Key-value store, Graph store, Object store - Distributed System Modeling & Simulation - NAND-Optimal System Software · NAND file system, Caching S/W, I/O virtualization
	□ **Intelligent Robotics** - Mechatronics · New Actuator (Shape Memory, Piezo, Artificial Muscle) · Bio-Mimetic System Design & Control · Ergonomic, Bio-Compatible Design - Optical System · High-Resolution Stereo Endoscope

Research Domains	Research Areas
① Future IT	□ **Medical** - X-ray / X-ray CT · Detector: Photoconductor material, readout circuit, calibration, detector physics modeling & simulation, validation · X-ray Imaging System: Imaging architecture, system integration, image processing - HIFU System design and signal processing research · HIFU System Arch.& Nonlinear Acoustics, HIFU Transducer Design · Beam Focusing Algorithm Design and Implementation - Ultrasound Imaging and System · 3D Imaging, Beamforming(High Resolution, GPU, etc.), US Image Pre-Post Processing,(3D) Thermometry and elastography Imaging/monitoring, Thermal Strain
	□ **Brain IT** - Neuromorphic System research · Spike code based information processing - theory, modeling, and simulation (sensory processing, pattern recognition, inference, learning, memory) · VLSI chip design (neuromorphic digital/analog circuit design) · Spiking neural network simulation/parallel computation · Neuro-informatics, and cognitive modeling and simulation/Connectome/ Brain map - Brain and cognitive engineering · Non-invasive brain-computer interface/Mind reading · Non-contact bio sensor · Transcranial electromagnetic stimulation
	□ **Green Communication and Networks** - Green Radio · Energy-efficient MIMO technology . Compact antenna module technology for multiple antenna system : High efficiency RFIC design

Research Domains	Research Areas
② Device	□ **Holographic Display** - Optical devices (Spatial Light Modulator) for 3D · OASLM, EASLM, Acuostic Optical Modulator - Optical Device/Element/Component · Back Light Unit · HOE (Holographic Optical Element), Diffractive Optics · SAW Filter
	□ **Medical Device** - Flat Panel X-ray source based on CNT · X-ray optics engineering · Anode architecture for flat panel source - Ultra Low dose Stationary CT · X-ray optics engineering
	□ **Compound Device** - High Performance Device using New Material · III-V Nanowire on Si · Topological Insulator - High Electronic Mobility Material/Device · Oxide TFT, Layered Structure Tr. - Device Archtecture (Oxide Device, Compound Device) - Device Physics - Simulation & Modeling
	□ **Optoelectronics** - Optoelectronic Device Physics · Device modeling & analysis - GaN Device Fab. · fab unit process set up. - Light Modulation Technology · Optical Device · Theory for Light control - Waveguide optics - Optoelectronic System Integration - Semiconductor Laser · Laser Physics · Silicon Photonics · Hetero Epitaxy

Research Domains	Research Areas
② Device	□ **Hybrid Si Device Technology in Common** - Heterogeneous integration - Interface engineering based on Device Physics - Defect Engineering - Atomic layer Engineering - Simulation & Modeling for Hybrid Si Device
	□ **Power Device** - GaN Power Device · GaN-on-Si epitaxial growth · High voltage & high power design, CMOS compatible process · Package design & evaluation · Device characterization, reliability, device physics & mechanism · Designing gate driving scheme and evaluation for converter and/or inverter with GaN power device - Power System · Topology Simulation/Design(Converter/Inverter) · Topology Simulation/Design(Converter/Inverter) · Power Driver Design(Circuit, PMIC) · Inverter/Motor Control(IPMSM, IM, SRM) · Digital Power Control(MCU, DSP) · Passive Simulation/Design(Magnetics, EMI) · Package Design(IPM, Integrated Magnetics)
	□ **Materials & Devices in common** - Nano Fabrication technology (Nanoimprinting) · Large Area Uniformity control · UV curable Stamp/resist Material · Light Modulation (Nano structure, Optics) - Motor Design · Electromagnetic Design, Circuit coupled analysis - Soft Electronics · Material/Device for Bendable & Stretchable Electronics - Sensor · Si, Plasmonics, Metaphotonics, etc. · Array sensor, Sensor/circuit Design (System Level) · 3D-based Sensor - Nano Device · Carbon-based Nano Device · Bandgap Engineering - Advanced Device using new technology · New concept, New Architecture for Next Generation Device · Plasmonics, metaphotonics.. etc

Research Domains	Research Areas
③ Material [Materials Technology]	□ **Electro Luminance materials for OLED** - Electro active materials design and synthesis - Device fabrication and evaluation - Device Physics
	□ **Organic Electronic materials** - Polymer chemistry and physics - Reaction kinetics, monomer design & synthesis - Electronic optical property control, thermo-mechanical property control
	□ **Optical Films for Display** - Polymers for optical applications - Film fabrication and coating technology - Optical polarization and retardation materials
	□ **Inorganic Electronic Materials** - Solid state physics, intermetallic compound, magnetic material, DOS engineering, nano-structure - Development & fabrication of metal alloy powder. - Hard and soft magnetic materials - Nano structured materials and applications · Quantum dot, Metal, Magnetic nano structure synthesis/characterization
③ Material [Optics]	□ **Optical device design and characterization** - Optics computer simulation : Ray optics, Wave optics, FDTD and Thin film optics - Evaluation & characterization of optical materials, devices and display components in large
③ Material [Energy]	□ **Battery Materials** - Advanced Li-ion, Post Li-ion and novel energy storage/conversion - Inorganic, nanocomposite and metal alloy for ion storage - Organic/polymer design, synthesis and ionic liquid for ion transport - Electrochemical analysis and modeling
	□ **Battery System** - Electrochemical reaction mechanism and thermal/fluidic behavior analysis - Multiscale modeling and simulation of electrochemical cell - Design of electrochemical cell and battery management system

Research Domains	Research Areas
④ Bio	□ In-vitro diagnosis - Cancer Biology - Molecular and Cell Biology - Biochemistry - Bioassay, immunoassay development - Microfluidics - Genetics, Genetic engineering - Bioinformatics
	□ Therapeutic Antibodies - Antibody/Protein engineering · Antibody production and purification including hybridoma technologies · Phage display technologies using Fab or ScFv libraries · Antibody affinity maturation and Fc engineering · Antibody humanization/deimmunization · Novel antibody platform development (bispecific antibody, domain antibody) - Mammalian expression vector & host cell line · Generation & engineering of host cell lines optimized for therapeutic antibody (including CHO cells) · Development & engineering of mammalian expression vector system - Protein/antibody production · Scale-up production and purification of proteins · Pre-clinical/clinical development · Protein aggregation/formulation · Culture media optimization · Bioanalysis (HPLC, LC/MS, etc.)
	□ Biotherapeutics - Cancer Biology · Signal transduction pathway analysis for cancer development · Cancer stem cell research · Gene / mRNA analysis from patient derived tumor sample · Bioassays development and validation · Various molecular biology, cell biology, biochemistry methods
	□ Biomaterials and Bio_based Products - Systems biology · Omics (Genomics/Proteomics/Metabolomics/Bioinformatics) · in silico modeling - Metabolic Engineering (Molecular Biology/Microbiology) · Strain development - Process engineering · Fermentation process · Chemical conversion process

Research Domains	Research Areas
④ Bio	□ **Drug delivery and medical technologies** - Biocompatible materials engineering · Drug carrier design and fabrication · Conjugation chemistry and purification · Bio-surface and interfaces - In-vivo evaluation and analysis · Animal test design, PK/PD, toxicity, therapeutic efficacy analysis - Diagnosis/therapy integration, Theranosis · Device-based drug/therapy delivery · Combination products · Molecular imaging, image guided therapy
⑤ Well-Aging Research	□ **Well-Aging research** - Neural system · Degenerative diseases · Stem cell · Molecular and pathological study - Musculoskeletal system · Muscle & bone regeneration · Cartilage · Stem cell · Molecular and pathological study - Immune system · Inflammatory response · Molecular and pathological study - System biology(omics) · Genomics/Epigenomics study · Proteomics/ Glyco-proteomics study · Matrix biology - Aging Model system · Cell and Animal model(biology and life span) · DNA damage repair and recombination · Autophagy and metabolism · Imaging tech.(TEM, FACS, Confocal) · Molecular and biological study - Pharmaceutical Manufacturing/Pharmacochemistry
	□ **Strategy, planning and sensing** - Biology + MOT (manage of technology) - Biology + MBA - Biology, Economics, MOT, MBA - Ph.D or Career for more than two years

Research Domains	Research Areas
⑥ Computational Science (Modeling/ Simulation)	□ **Computation approaches for materials/devices** - Atomistic modeling/simulation · First-principles, Molecular dynamics, Monte Carlo approaches - Meso-scale/Multi-scale modeling/simulation - Electronic/thermal transport modeling - Methods for simulation/analysis of device properties
	□ **Applications of computational approaches** - Computational materials modeling/design · LED/OLED, OPV, battery/energy materials, metal/alloys, etc. - Theoretical research on solid, optical, statistical physical/chemical science - Computational/data-driven systems research via learning, algorithms, optimization, and related mathematical methods
⑦ Analytical Science (Material & Device Analysis)	□ **Physics-based Surface/Interface Analysis** - Characterization of organic/inorganic materials & devices using in-situ surface analysis techniques - XPS/UPS, AES, SIMS, etc.
	□ **In-situ Electrochemical Analysis** - Elucidation of reactions in rechargeable batteries - Development of advanced spectroscopic methods coupled with electrochemistry
	□ **Study on The Structure and Impurity Analysis of Organic Materials/Thin Films** - Characterization of molecular structure and reaction dynamics study of materials/thin films for organic electronics - Quantitative analysis of trace level of impurities - HPLC, LC/MS, ICP-MS, ICP-AES, etc.