College of Computing
Yonsei University

Department of Computer Science and Engineering
Department of Artificial Intelligence
School of Integrated Technology
Today’s society has been witnessing how computing technologies and artificial intelligence have brought a flurry of transformative breakthroughs which revolutionized all areas of life. This worldwide phenomenon spans multiple disciplines from social science to public health, promising to improve our lives in new ways beyond traditional science and engineering. Today, more than ever, there is a clear need for new kinds of talents who must be equipped with diverse skills, influential minds, and a strong sense of responsibility.

College of Computing at Yonsei University has been newly established in 2022 to meet the need and take the lead. With more than 20 faculty members, the Department of Computer Science & Engineering and the Department of Artificial Intelligence commit to delivering world-class research and learning experience to about 500 undergraduate and 300 graduate students. Our core Computer Science research areas include computer networks, computer graphics, computer architecture and systems, databases, and data engineering. The core Artificial Intelligence research topics include computer vision, machine learning, data mining, natural language processing, etc. Together, our College achieves a unique interdisciplinary research thrust via LEAP program: LEarning, Architecture, and Perception.

College of Computing at Yonsei University commits to cultivating new, modern experts who will become renowned leaders in academia and industry with the fundamental knowledge and advanced skillsets in Computer Science and Artificial Intelligence. Students may design their own unique academic curricula to meet their interests under the guidance of faculty members in related areas. They will be prepared to tackle real-world challenges in the industry, advance science through research, and, most importantly, help people. Our College sincerely dedicated to ensuring our students can achieve and thrive as global leaders in this new era of advanced information technology, and we sincerely invite you to join us.

Hojung Cha
Dean
College of Computing, Yonsei University
Organization

College of Computing

Dean
Administration Team

Computer Research Institute (CRI)
National Program of Excellence in SW

Department of Computer Science and Engineering
Department of Artificial Intelligence

School of Integrated Technology

Micro Major
AI Concentration Major Program

Computer Science and Engineering
Digital Analytics
Mobility Systems Engineering (Hyundai Motors)
Intelligence Engineering (LG Electronics)
Artificial Intelligence
Integrated Technology

Computer Software Major
Artificial Intelligence Major

Graduate School
Graduate School of Engineering

Mission

Development of Global SW/AI Convergence Talent for All Students

- Educate 100+ SW/AI Global-Standard Professionals per year
- Focus on Developing Interdisciplinary Talents with AI knowledge (Interdisciplinary studies with diverse fields including Medical, Humanities and Social Studies, etc.)

Education

- Basics on SW/AI for All Students
  - ‘AI Bi-linguality’

Maximizing the Capability of SW/AI within the University

- College of Computing: in Charge of Core Technology (Software and AI)
  - Other Colleges: applying domain-specific knowledge on AI

Research

- Leading AI core research
- Establishing SW/AI Convergence
- Support Unicorn Start-ups
History

**College of Science**

1983.03
Dept. of Computational Science

1988.03
Graduate School Opened

1994.03
Renamed to Dept. of Computer Science

**College of Engineering**

1988.03
Graduate School Opened

1994.03
Renamed to Dept. of Computer Science

1996.03
Moved to the College of Engineering

2002.02
Separated into Computer and Industrial Engineering

2004.03
Separated into Computer Science Major

2005.03
Renamed to Computer Science Department

2008.03
Separated into the Department of Mechanical and Electronic Engineering

**College of Computing**

2020.03
Graduate School of AI Established

2021.08
College of Computing Provisional Committee Established

2022.03
College of Computing Established

2023.03
School of Integrated Technology joined College of Computing
Department of Computer Science and Engineering
Hyung-Chan An

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology

College of Computing Yonsei University

Education
- Ph.D. in Computer Science, Cornell University, 2012
- BS in Computer Science and Engineering, Seoul National University, 2006

Experience
- 2016 – Present: Associate Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2012 – 2016: Postdoctoral Researcher, École Polytechnique Fédérale de Lausanne

Research Areas
- Approximation Algorithms and Online Algorithms:
  Design and analysis of algorithms for combinatorial optimization problems
  Algorithms with provable performance guarantees
- Computational Application of Optimization Algorithms:
  Practically efficient implementation of optimization algorithms
  Theoretical tools to evaluate practical implementations

Publications
- Making Three out of Two: Three-Way Online Correlated Selection, ISAAC, 2021
- Constant-Factor Approximation Algorithms for the Parity-Constrained Facility Location Problem, ISAAC, 2020
- LP-based algorithms for capacitated facility location, SIAM J. Comput., 2017

Approximation / Online Algorithms
- Design and analysis of approximation/online algorithms for combinatorial optimization problems
- Approximation algorithms: efficient algorithms that find near-optimal solutions with provable performance guarantees
- Online algorithms: algorithms that produce their outputs “in real time” without waiting to read the entire input

Computational Applications of Optimization Algorithms
- Formulation of the search of optimal decisions as concrete mathematical problems
- Practically efficient implementation of optimization algorithms
- Theoretical tools to evaluate practical implementations

A design-time LP that optimizes adaptive stochastic soft-error hardening policies for real-time systems
Embedded Systems Languages and Compilers Lab.

Bernd Burgstaller

Education
- Ph.D. in Computer Science, Vienna University of Technology, 2005
- MS in Computer Science, Vienna University of Technology, 1997

Experience
- 2007 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2005 – 2007: Postdoctoral Researcher, The University of Sydney
- 2000 – 2004: Predoctoral Researcher, Vienna University of Technology

Research Areas
- Programming Languages & Software Engineering:
  Validation and test of smart contracts; Blockchain virtual machines; performance profiling,
  modeling, and simulation of heterogeneous systems
- Compilation for Novel Hardware Architectures:
  Orchestrations for multi-cores and the cloud, persistent memory, near-data processing,
  heterogeneous memory architectures, and AI accelerators

Publications
- Bespoke software countermeasures against soft errors, LCTES 2022
- Scalable off-the-chain transaction testing and profiling for the Ethereum blockchain, USENIX ATC 2021
- Non-blocking synchronization primitives and a high-level language memory
  consistency model for Ada, JSA 2020

Software Validation for Safe and Efficient Smart Contract Execution
- Validation of smart contracts and compiler toolchain
- Validation of smart contract execution on clients and VM
- Scalable testing environment on distributed multicore systems

Processsingin Memory (PIM)
- Reduce bottleneck from memory-intensive computations
- Code partitioning and orchestration between CPU and PIM
- Language with sufficient abstraction and PIM support
Mobile Embedded System Lab.

Hojung Cha

Education
- Ph.D. in Computer Science, The University of Manchester, 1991
- MSc in Computer Engineering, Seoul National University, 1987
- BSc in Computer Engineering, Seoul National University, 1985

Experience
- 2001 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University

Research Areas
- On-device Machine Learning:
  Designing efficient and flexible machine learning systems that meet resource constraints of target devices
- Cross-device Web for Heterogeneous Devices:
  Developing web-based platforms for enabling new cross-device user experience
- Intermittent Computing for Batteryless IoT System:
  Developing system software and constructing energy harvesting hardware for batteryless IoT systems

Publications
- Optimizing Energy Consumption of Mobile Games, IEEE TMC, 2022.

On-device Machine Learning
- Real-time 3D object detection on 360-degree videos
- Adaptive super-resolution for 360-degree video live streaming
- Multi-task neural network for virtual youtubers

Cross-device Web
- Platforms for cross-device user interfaces of web applications
- Web-based systems for cross-device I/O sharing
- Applications with cross-device web techniques

Batteryless IoT
- RL-based energy management in batteryless applications
- Multi-exit DNN on energy harvesting devices
- Digital twin for batteryless IoT management

Contact:
hjcha@yonsei.ac.kr
https://mobed.yonsei.ac.kr
+82-2-2123-5711
Education

- Ph.D. in Computer Science, KAIST, Korea, 1993
- MS in Computer Science, KAIST, Korea, 1990
- BS in Computer Science, Yonsei University, Korea, 1988

Experience

- 1995 – Present: Underwood Distinguished Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2020 – Present: Director, AI Graduate School, Yonsei University
- 2022: Service Merit Medal, Korean Government
- 2020 – 2021: Vice President, Korea Information Science Society
- 2016 – 2017: President, Korea Data Mining Society
- 2005 – 2006: Visiting Professor, Univ. of British Columbia, Canada
- 1993 – 1995: Researcher, ATR HIP Labs, Japan

Research Areas

- Hybrid Neuro-Symbolic AI: Realizing ultimate AI by combining several disciplines based on modularity
- Explainable Fair AI: Devising accountable fair learning algorithms with adversarial regularization
- Industrial Applications of AI: Solving real-world problems such as cyber security, fault diagnosis, life logging, VQA, etc.

Publications

- 1,500+ Papers, 18,000+ Citations, H-index 62
- Ranked #5 in South Korea among Top Scientists, Research.com
- Human activity recognition with smartphone sensors using deep learning neural networks, Expert Systems with Applications, 2016 (Citation:1056)
- Predicting residential energy consumption using CNN-LSTM neural networks, Energy, 2019 (Citation:739)
Mobile Networking Lab.

Seung-Jae Han

Education
- Ph.D. in Computer Science & Engineering, University of Michigan, Ann Arbor, MI, USA, 1998
- MS in Computer Engineering, Seoul National University, 1991
- BS in Computer Engineering, Seoul National University, 1989

Experience
- 2005 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 1999 – 2005: Member of Technical Staff, Bell Labs, Murray Hill, NJ, USA

Research Areas
- IoT (Internet of Things) Networking:
  Efficiently providing Internet connectivity to IoT devices via various wireless networking technologies
- Mobile Edge Cloud Computing:
  Managing the limited resources of edge cloud servers to accommodate various computing offload demands

Publications
- "Hidden terminal-aware access point selection for IEEE 802.11ah networks", Computer Communications, Elsevier, March, 2021
- "Data-bundling proxy to aggregate transmissions for energy-constrained devices", Computer Communications, Elsevier, Jan, 2019

IoT Energy efficient configuration
- Reduce energy consumption based on DNN in IoT device
- Minimize data delivery delay and reduce collision in wireless network

Mobile Edge Cloud Computing
- Load balancing and scaling for latency & resource
- Efficient resource management between edge and cloud
- Distributed edge deep learning for massive data and privacy
Yo-Sub Han

Education
- Ph.D. in Computer Science and Engineering, HKUST, 2006
- MPhil in Computer Science and Engineering, HKUST, 2002
- BS in Computer Science and Engineering, POSTECH, 2000

Experience
- 2009 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2005 – 2009: Senior Researcher, Korea Institute of Science and Technology

Research Areas
- Theory of Computation
- Automata Theory and Formal Languages
- Algorithm Design
- Information Retrieval, NLP
- Neural-Symbolic Models

Publications
- Journals: Information and Computation, Theoretical Computer Science, Fundamenta Informaticae, Natural Computing
- Conferences: AAAI, ACL, CIAA, DCFS, DLT, EMNLP

Language Similarity
- Measure similarity between string/tree languages
- Design finite automata for computing similarity
- Implement efficient algorithms for computing similarity

Formal grammar Inference
- Design effective grammar representations for massive data
- Infer grammars from practical datasets
  - Identify hidden structural information
  - Find and merge similar structures
- Constructs probabilistic finite automata via grammar weights

Information Retrieval using Automata Theory
- Extract knowledge from structural grammars of documents
- Design specialized query-matching algorithms on weighted automata
- Similarity matching algorithms

Neural-Symbolic Models
- Formal Grammars vs Natural Language Descriptions
- Neural Model Representation using Weighted Automata
- Code Summary and Generation Models

Neural Models via Weighted Automata
- Encoding
- Decoding

Finite Automata
Structured Data

Unstructured Data

Formal Grammars

Code Analysis

Program Synthesis

Code Summary and Generation

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Scalable Systems Software Lab.

Jinkyu Jeong

jinkyu@yonsei.ac.kr  https://cslab.yonsei.ac.kr  +82-2-2123-2717

Education

• Ph.D. in Computer Science, Korea Advance Institute of Science and Technology, 2013
• BS in Computer Science, Yonsei University, 2005

Experience

• 2023 – Present: Associate Professor, Dept. of Computer Science and Engineering, Yonsei University
• 2021 – 2022: Visiting Researcher, University of California, Irvine
• 2014 – 2023: Assistant, Associate Professor, Department of Semiconductor Systems Engineering, Sungkyunkwan University
• 2013 – 2014: Post-doctoral researcher, Sungkyunkwan University

Research Areas

• Operating Systems / Systems Software:
  Storage I/O stack for emerging high-performance SSDs
  System-driven artificial intelligence
• Cloud Computing:
  High-performance, secure cloud computing architecture
• Mobile Systems:
  Low-latency, energy-efficient, machine-learned mobile systems

Publications

• Z-Journal: Scalable Per-Core Journaling, USENIX ATC’21
• ASAP: Fast Mobile Application Switch via Adaptive Preparing, USENIX ATC’21
• D2FQ: Device-Direct Fair Queueing for NVMe SSDs, FAST’21
• A Case for Hardware-based Demand Paging, ISCA’20
• DMazeRunner: Executing perfectly nested loops on dataflow accelerators, TECS, 2019
Computational Intelligence & Photography Lab.

Seon Joo Kim

Education

- Ph.D. in Computer Science, University of North Carolina at Chapel Hill, 2008
- MS in Electrical and Electronics Engineering, Yonsei University, 2001
- BS in Electronics Engineering, Yonsei University, 1997

Experience

- 2022 - 2025: Underwood Distinguished Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2013 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2019 – 2022: Visiting Scientist, Facebook

Research Areas

- Computer Vision: Video Understanding, Video Processing
- Computational Photography: Capturing & Processing new types of images & videos
- Machine Learning: Employing deep learning for various tasks in computer vision & photography

Publications

- 22 Top Conference Papers from 2018-2022
- VISOLO: Grid-Based Space-Time Aggregation for Efficient Online Video Instance Segmentation, CVPR 2022
- Video Instance Segmentation using Inter-Frame Communication Transformers, NeurIPS, 2021
- Tackling the Ill-Posedness of Super-Resolution through Adaptive Target Generation, CVPR 2021

Computer Vision

We are working on understanding videos to enable practical use of video related applications.

- Video Recognition
- Video Segmentation

Computational Photography

We are also very interested in capturing new types of image & videos, as well as processing & editing images and videos.

- Video Super-Resolution
- Video Inpainting
- Color Processing
- Non-line-of-Sight Imaging

Machine Learning

We develop different types of deep learning algorithms to solve computer vision problems.
High Performance Computing Platforms Lab.

Youngsok Kim

Education
- Ph.D. in Computer Science and Engineering, POSTECH, 2017
- BSc in Computer Science and Engineering, POSTECH, 2012

Experience
- 2019 – Present: Assistant Professor, Dept. of Computer Science and Engineering, Yonsei University
  - 2017 – 2019: Postdoctoral Researcher, Seoul National University
  - 2016: H/W Engineering Intern, Consumer Hardware, Google Inc.

Research Areas
- Computer architecture:
  - Next-generation CPU and GPU microarchitecture design / Application-specific hardware accelerators
- System software:
  - Architecture-aware performance optimizations / Process scheduling for higher performance and fairness
  - Performance modeling:
    - Fast and accurate CPU and GPU performance modeling / Analytical CPU and GPU modeling

Publications
- GCoM: A Detailed GPU Core Model for Accurate Analytical Modeling of Modern GPUs, ISCA 2022
- GuardiaNN: Fast and Secure On-Device Inference in TrustZone Using Embedded SRAM and Cryptographic Hardware, Middleware 2022
- Dataflow Mirroring: Architectural Support for Highly Efficient Fine-Grained Spatial Multitasking on Systolic-Array NPUs, DAC 2021

Next-Generation Processor Microarchitectures
- Propose architectural support/enhancements/modifications
- Design the state-of-the-art CPU and GPU microarchitectures
- Performance improvement of the target applications

System-Level Performance Optimizations
- Propose System-level software method
- Optimization by the characteristics of underlying hardware
- Performance improvement of the target applications

Analytical Performance Modeling
- Propose fast analytical performance models
- Give detailed insights into performance bottlenecks
- Replace the long-running timing simulations

Processor Simulator

New Design Estimation

Next Generation Processor

Analytical Performance Modeling
- Propose fast analytical performance models
- Give detailed insights into performance bottlenecks
- Replace the long-running timing simulations

Simple Analytical Model

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Byungjoo Lee

Yonsei Esports Lab. (YES Lab)

Education

- Ph.D. in Mechanical Engineering, SNU, 2014
- MS in Mechanical Engineering, KAIST, 2010
- BS in Mechanical Engineering, KAIST, 2008

Experience

- 2021 – Present: Associate Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2020 – 2021: Associate Professor, KAIST
- 2016 – 2020: Assistant Professor, KAIST

Research Areas

- Human-Computer Interaction (HCI):
  User performance and behavior modeling / Inverse user modeling / Computational interface design and optimization / Novel user interfaces / Esports data science / Esports performance engineering

Publications

- Published 16 regular CHI papers from 2016-2022 with 5 Best Paper Honorable Mention Awards
- Speeding up Inference with User Simulators through Policy Modulation, CHI’2022
- A Simulation Model of Intermittently Controlled Point-and-Click Behavior, CHI’2022
- Secrets of Gosu: Understanding Physical Combat Skills of Professional Players in First-Person Shooters, CHI’2021

User Behavior and Performance Modeling

- Cognitive model of user behavior system
- Deep-RL based simulation of user behavior
- Simulator-based inference of user characteristics

Esports Performance Engineering

- Analyzing behavior of esports players
- Model-based player performance evaluation
- Optimizing user interface design for esports

College of Computing Yonsei University

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Education

- Ph.D. in Computer Science and Engineering, POSTECH, 1997
- MS in Computer Science and Engineering, POSTECH, 1992
- BS in Computer Science, Yonsei University, 1989

Experience

- 2003 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2001 – 2003: Assistant Prof., Division of Media, Ajou University
- 1997 – 2001: Researcher, Institute of Geometry, Vienna, Austria

Research Areas

- Computer Graphics:
  - Physics based animation with AI based methods / Human and cloth modeling and simulation
- Virtual Reality:
  - Improving user experience in VR with AI-based methods / Redirected walking with AI-based methods

Publications

- Studying the Effects of Congruence of Auditory and Visual Stimuli on Virtual Reality Experiences, IEEE TVCG, 2022
- Optimal Planning for Redirected Walking Based on Reinforcement Learning in Multi-user Environment with Irregularly Shaped Physical Space, IEEE VR, 2020

Computer Graphics

- Physics based animation with AI based methods
- Human and cloth modeling and simulation using AI
- Emotion based Styilization of Image and Video
- Music-Synchronized Animation and Video

Virtual Reality

- Improving user experience in VR with AI-based methods
- Redirected walking with AI-based methods
- Motion Sickness Detection and Reduction in VR
- Avatars in Virtual Reality
Kyong-Ho Lee

Education
- Ph.D. in Computer Science, Yonsei University, 2001
- MS in Computer Science, Yonsei University, 1997
- BS in Computer Science, Yonsei University, 1995

Experience
- 2002 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2008 – 2009: Visiting Professor, UCI, USA
- 2002: Researcher, NIST, USA

Research Areas
- Knowledge Graph Representation and Reasoning:
  Handling complex reasoning with relational path and symbolic logic via deep representation learning techniques on knowledge graphs / Constructing and completing knowledge graphs by extracting and predicting factual knowledge from unstructured sources
- Knowledge-based Service & Applications:
  Utilizing knowledge graphs to a variety of downstream tasks like recommender systems and dialogue models / Injecting structural knowledge into downstream neural architectures such as graph neural networks

Publications
- Confident Action Decision via Hierarchical Policy Learning for Conversational Recommendation, WWW 2023
- CLICK: Contrastive Learning for Injecting Contextual Knowledge to Conversational Recommender System, EACL, 2023
- Persona Expansion with Commonsense Knowledge for Diverse and Consistent Response Generation, EACL, 2023
- Active Learning on Pre-trained Language Model with Task-Independent Triplet Loss, AAAI, 2022
- Active Learning for Knowledge Graph Schema Expansion, IEEE TKDE, 2022

Knowledge Graph Representation & Reasoning
- Representation learning on knowledge graphs
- Knowledge graph construction and completion

Knowledge Graph Completion by Context-Aware Convolutional Learning

Knowledge Graph Completion via Attentive Feature Aggregation

Knowledge-based Service & Applications
- Knowledge-aware recommendation systems
- Dialogue model with knowledge graphs
**Dependable Computing Lab.**

**Kyoungwoo Lee**

Education

- Ph.D. in Information and Computer Sciences, University of California, Irvine, 2008
- MS in Computer Science, Yonsei University, 1997
- BS in Computer Science, Yonsei University, 1995

Experience

- 2011 - Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2018: Visiting Researcher, Samsung Research

Research Areas

- Dependable System Design
- Internet of Things (IoT) Healthcare
- Optimizations for Machine Learning Accelerators

Publications

- CHITIN: A Comprehensive In-thread Instruction Replication Technique Against Transient Faults, DATE, 2021
- Continuous body impedance measurement to detect bladder volume changes during urodynamic study: A prospective study in pediatric patients, Neurourology and Urodynamics, 2021
- DMazeRunner: Executing perfectly nested loops on dataflow accelerators, TECS, 2019

College of Computing Yonsei University

**Dependable System Design**

Quantitative vulnerability estimation

- Vulnerability Estimation
- Write Read Read Write
- Target Component
- Vulnerable Safe
- Timeline

Redundancy-based fault detection / correction solutions

- Soft error
- $4 + 3 = 7$
- $0 + 3 = 3$
- $7 \neq 3$
- Fault detection

**IoT Healthcare**

IoT-based healthcare system

- Data Collection
- Data Processing, Analytics, Storage
- Data Service
- Edge server
- Cloud server
- User1
- User2

AI-based clinical decision and its support systems

- Wearable setting
- In-home monitoring
- Support system

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Wireless Networking Lab.

Sukyoung Lee

Education

- Ph.D. in Computer Science from Yonsei University, 2000
- MS in Computer Science from Yonsei University, 1995
- BS in Computer Science from Yonsei University, 1992

Experience

- 2005 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2003 – 2005: Assistant Professor, Computer Science and Engineering, Sejong University

Research Areas

- 6G Wireless Networks:
  - Machine Learning (ML)-based content request/traffic prediction for Mobile Edge Computing (MEC) / Real-time service for Internet of Vehicles (IoV) / Dynamic network configuration using Software Defined Network (SDN)
- AIoT-based System:
  - Distributed deep learning system and AI-based network resource optimization / Fault-tolerant service management and real-time prediction for Digital Twin (DT)

Publications

- Partition Placement and Resource Allocation for Multiple DNN-based Applications in Heterogeneous IoT Environments, IEEE IoT Journal, 2023

6G Wireless Networks

- ML-based content request/traffic prediction
- Network resource management
- Dynamic network configuration

AIoT-based System

- AI-based IoT system network resource optimization
- Real-time prediction for user context in IoT
- Fault-tolerant service management in smart home/farm, IoV, and Industrial IoT
Database Lab.

Won Suk Lee

Education
- Ph.D. in Computer Science, Purdue University, 1990
- MS in Computer Science, Purdue University, 1987
- BS in Computer Science, Boston University, 1985

Experience
- 1993 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2019 – 2021: Professor, Digital Analytics, Yonsei University

Research Areas
- Edge based real-time situation engine:
  - Self-learning and situation detection by analyzing skeleton, CCTV images, computer logs, etc.
  - Real-time anonymity synthetic data:
  - Big-data parallel processing and distribution hub System:
  - Parallel processing algorithm for optimization / Establishment of synthetic data hub system for distribution

Publications
- Matrix-based continuous query evaluation for multisensor data streams in IOT environments
- Finding context association rules instantly over data streams of sensor networks for human life
- Adaptive run-time overhead adjustments for optimizing multiple continuous query processing

Edge Based Real-time Situation Engine
- Technique of synchronizing time and position coordinates by analyzing image meta-logs
- Detects and learns and analyzes movement situations through human skeleton information

Real-time Anonymity Synthetic Data
- Data distribution applying differential privacy model
- Personal information anonymization and de-identification algorithm
- Re-identification verification

Big-data Parallel Processing and Distribution Hub System
- Support the combination of anonymous data and pre-analysis
- Parallel processing algorithm for optimization
- Establishment of synthetic data hub system for distribution

Contact Information
- leewo@Yonsei.ac.kr
- http://database.yonsei.ac.kr
- +82-2-2123-2716

College of Computing Yonsei University
Big Data Systems & AI Lab.

Kwanghyun Park

Education
- Ph.D. in Computer Science, University of Wisconsin-Madison, 2016
- M.Sc. in Computer Science, University of Wisconsin-Madison, 2013
- B.S. in Computer Science and Applied Mathematics & Statistics, State University of New York at Stony Brook, 2010

Experience
- 2023 - Present: Assistant Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2016 - 2023: Senior Research Engineer, Microsoft Gray Systems Lab
- 2013, 2014: Research Intern, Samsung Research America

Research Areas
- Systems for ML
- Instance-optimized (learned) systems
- H/W and data platform co-design

Publications
- Pushing ML Predictions into DBMSs, TKDE, 2023
- End-to-end Optimization of Machine Learning Prediction Queries, SIGMOD, 2022
- VIP Hashing - Learning the Skew in Popularity, VLDB, 2022
- Query Processing on Tensor Computation Runtimes, VLDB, 2022
- NyxCache: Flexible and Efficient Multi-tenant Persistent Memory Caching, FAST, 2022

Co-design H/W and data platform per workload/application
- Understand characteristics of H/W and workloads/applications
- Build an optimized end-to-end system

The best-performing hardware for scoring a RandomForest model depends on the model complexity and data size
Data Engineering Lab.

Sanghyun Park

Education
- Ph.D. in Computer Science, UCLA, 2001
- MS in Computer Engineering, Seoul National University, 1991
- BS in Computer Engineering, Seoul National University, 1989

Experience
- 2003 – Present: Professor, Dept. of Computer Science and Engineering, Yonsei University
- Aug. 2002 – Aug. 2003: Assistant Professor, POSTECH

Research Areas
- Autonomous Database Tuning System:
  Deriving the optimal configuration for various workloads in the DBMS that user wants to tune
  - AI-based drug discovery:
  - To learn about pharmacology and drug development process, and development compounds defective for targeted therapy
  - Video anomaly detection:
  - Analyze the divided frames using various computer vision techniques to detect outliers

Publications
- DeepGate: Global-local decomposition for multivariate time series modeling, Information Sciences, 2022
- MV-FTL: An FTL that Provides Storage-Level Multi-Version Management, IEEE Transactions on Knowledge and Data Engineering, 2018

Autonomous Database Tuning System
- Build dataset for parameter tuning such as MySQL, PostgreSQL
- Identify Knobs that have high impact on DBMS performance
- Recommend optimal configuration for various workloads

AI-based drug discovery
- Process through which potential new drugs are identified
- Deep generative model research that can represent molecular
- Generate compounds effective for targeted therapy

Video anomaly detection
- Detection of abnormal samples in video datasets
- Anomaly detection using CV methods in divided frames
- Analyze the movement of an object through object detection
Application-aware System Optimization Lab.

Yongjun Park

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Education

- Ph.D. in Electrical Engineering, University of Michigan, Ann Arbor, 2013
- MSE in Electrical Engineering, University of Michigan, Ann Arbor, 2009
- BS in Electronic and Electrical Engineering, POSTECH, 2007

Experience

- 2022 - Present: Associate Professor, Dept. of Computer Science and Engineering, Yonsei University
- 2017 - 2022: Associate Professor at Hanyang University
- 2014 - 2017: Assistant Professor at Hongik University
- 2013 – 2014: Software Architect at Intel, Santa Clara, CA, USA

Research Areas

- Compiler/Architecture Level Solutions for Performance and Energy-efficiency on Heterogeneous Systems (ILP (CPU, CGRA), DLP (SIMD, GPU), and NPU Accelerators)
- Compiler Optimization for Deep Learning and Big Data Processing Applications on CPU/GPU/NPU/PIM-based Systems
- Efficient Multitasking Support for Multiple Deep Learning Applications
- Compiler/OS Support for Neural Processing Units
- Compiler Support for Processing-in-Memory (PIM) and In-Storage Processing (ISP)

Publications

- Convergence-Aware Neural Network Training, DAC 2020
- Navigator: Dynamic Multi-kernel Scheduling to Improve GPU Performance, DAC 2020
- Optimization of a GPU-based Sparse Matrix Multiplication for Large Sparse Networks, ICDE 2020
- PreScaler: An Efficient System-aware Precision Scaling Framework on Heterogeneous Systems, CGO 2020
- GATE: A Generalized Dataflow-level Approximation Tuning Engine For Data Parallel Architectures, DAC 2019

Efficient AI Platform Development for Various HWs

- Propose system-level optimization techniques
- Optimization by considering the characteristics of underlying hardwares
- Performance improvement of target applications

Efficient Multitasking Support for Multiple Deep Learning Applications on Heterogeneous Architectures

- To achieve maximum efficiency through runtime and compilation level optimizations
Cyber Security Lab.

Dokyung Song

dokyungs@yonsei.ac.kr  https://cysec.yonsei.ac.kr  +82-2-2123-2715

Education
- Ph.D. in Computer Science, University of California, Irvine, 2020
- MS in Computer Science, University of California, Irvine, 2019
- BS in Electrical and Computer Engineering, Seoul National University, 2014

Experience
- 2021 – Present: Assistant Professor, Dept. of Computer Science and Engineering, Yonsei University

Research Areas
- Building Secure Systems:
  Designing and implementing software systems that provide high security guarantees at low overheads
- Vulnerability Scanning:
  Developing techniques to find vulnerabilities in low-level software systems such as OS kernels
- Binary Analysis:
  Developing techniques that can recover rich semantics information from binaries without their source code

Publications
- Improving Cross-Platform Binary Analysis using Representation Learning via Graph Alignment, ISSTA, 2022

System Software Vulnerability Scanning
- Accelerating kernel fuzzing with VM checkpoints
- Kernel fuzzing with two-dimensional record-and-replay
- Dynamic bug detection techniques

Binary Analysis using Machine Learning
- Unsupervised & supervised binary representation learning
- Graph-structured binary representation for using GNNs
- Cross-platform binary analysis using Siamese architecture

College of Computing Yonsei University

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Department of Artificial Intelligence
AI Powered Medical Imaging Systems Lab.

Jongduk Baek

Education

- Ph.D. in Electrical Engineering, Stanford University, 2009
- MS in Electrical Engineering, Stanford University, 2007
- BS in Electrical Engineering, Yonsei University, 2004

Experience

- 2022 - Present: Professor, Dept. of Artificial Intelligence, Yonsei University
- Aug. 2022 - : Founder and CEO, BareuneX Imaging Inc.
- Mar. 2019 - Feb. 2020: Visiting Professor at Stanford University, CA, U.S.A.

Research Areas

- Medical Image processing: CT artifacts correction, reconstruction
- Development of X-ray imaging system: Inverse geometry CT, semi-stationary CT system
- Image Perception: Recognition of lesion on medical images

Publications

- A streak artifact reduction algorithm in sparse-view CT using a self-supervised neural representation, Medical Physics (Editor’s Choice), 2022
- Weakly-Supervised Progressive Denoising with Unpaired CT images, Medical Image Analysis, 2021
- Rigid and non-rigid motion artifact reduction in X-ray CT using attention module, Medical Image Analysis, 2021
- Geometry calibration and image reconstruction for carbon-nanotube-based multisource and multidetector CT, Physics in Medicine and Biology, 2021
- Evaluation of human observer performance on lesion detectability in single-slice and multislice dedicated breast cone beam CT images with breast anatomical background, Medical Physics (Editor’s Choice), 2018

jongdukbaek@yonsei.ac.kr  https://sites.google.com/view/yonsei-medisyslab  +82-2-2123-5737

College of Computing Yonsei University
Vision and Learning Lab.
Jonghyun Choi

Education
- Ph.D. in Electrical and Computer Engineering, University of Maryland, College Park, 2015
- MS, BS in Electrical Engineering and Computer Science, Seoul National University, 2008, 2003

Experience
- 2022 – Present: Associate Professor, Dept. of Artificial Intelligence, Yonsei University
- 2018 – 2022: Assistant Professor, GIST
- 2016 – 2018: Research Scientist, Allen Institute for AI (AI2)
- 2013 – 2015: Research Intern, Microsoft Research, Disney Research, Adobe Research

Research Areas
- Visual recognition on resource constrained scenarios: Learning with a few annotated samples / Learning a small model with high accuracy
- Continual learning: Continuously updating a recognition model with a streamed data
- Embodied AI for a robotic butler: Learning an embodied AI agent to do a household task by understanding visual input and natural language commands
- Multimodal recognition: Vision and language recognition system for video and text
- Neuromorphic (event) vision system: Building non-RGB vision system for superhuman visual capability

Publications
- Online Boundary-Free Continual Learning by Scheduled Data Prior, ICLR 2023
- Ask4Help: Learning to Leverage an Expert for Embodied Tasks, NeurIPS 2022
- Self-Supervised Learning for Binary Networks by Joint Classifier Training, CVPR 2022
- Online Continual Learning on a Contaminated Data Stream with Blurry Task Boundaries, CVPR 2022
- Online Continual Learning on Class Incremental Blurry Task Configuration with Anytime Inference, ICLR 2022
- Iconary: A Pictionary-based Game for Testing Multimodal Communication with Drawings and Text, EMNLP 2021 (oral)

Embodied AI
- Learning a robotic AI agent that can understand the environment and language directives
- Learning common sense without direct supervision

Few-shot, Continual Visual Recognition
- Learning a high-performance AI models with a few labeled data
- Continually update already learned model with a streamed data

College of Computing Yonsei University

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Medical Imaging & Computer Vision Lab.

Seong Jae Hwang

Education

- Ph.D. in Computer Science, University of Wisconsin-Madison, 2019
- MS in Robotics, University of Pennsylvania, 2013
- BS in Computer Science, University of Illinois at Urbana-Champaign, 2011

Experience

- 2022 – Present: Assistant Professor, Dept. of Artificial Intelligence, Yonsei University
- 2019 – 2022: Assistant Professor, Dept. of Computer Science, University of Pittsburgh

Research Areas

- Brain Imaging Analysis: Predicting brain diseases and Alzheimer’s disease via computer vision and deep learning
- Domain Adaptation / Generalization: Training robust deep learning models under domain shifts in natural, medical, and NLP datasets
- Multi-site Neuroimaging: Combining multiple neuroimaging datasets for robust multi-site analysis and applications

Publications

- PAC-Bayesian Domain Adaptation Bounds for Multiclass Learners, UAI, 2022 [Best Paper Award]
- PAC Bayesian Performance Guarantees for Deep (Stochastic) Networks in Medical Imaging, MICCAI, 2021
- A multiscanner neuroimaging data harmonization using RAVEL and Combat, NeuroImage, 2021

Medical Imaging + Computer Vision

- Medical imaging analysis / application with computer vision
- Build generalizable deep learning models
- Detect brain lesions and predict Alzheimer’s disease

Multi-site Neuroimaging

- Combine multiple neuroimaging datasets
- Robust Alzheimer’s disease analysis
- Generalizable applications of deep learning models
### Data Intelligence Lab.

**Dongha Lee**

- Email: donalee@yonsei.ac.kr
- Website: https://diyonsei.notion.site
- Phone: +82-2-2123-5732

#### Education
- Ph.D. in Computer Science and Engineering, POSTECH, 2020
- BS in Computer Science and Engineering, POSTECH, 2015

#### Experience
- 2023 – Present: Assistant Professor, Dept. of Artificial Intelligence, Yonsei University
- 2021 - 2022: Postdoc Researcher, University of Illinois at Urbana-Champaign
- 2020 - 2021: Postdoc Researcher, POSTECH Institute of Artificial Intelligence
- 2018: Visiting Researcher, University of Texas Health Science Center at Houston

#### Research Areas
- Text Mining & NLP Applications,
- Reasoning over Knowledge Graph
- Information Retrieval & Recommendation

#### Publications
- TaxoCom: Topic Taxonomy Completion with Hierarchical Discovery of Novel Topic Clusters, WWW 2022
- Bootstrapping User and Item Representations for One Class Collaborative Filtering, SIGIR 2021
- Learnable Dynamic Temporal Pooling for Time Series Classification, AAAI 2021

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### Text Mining & NLP Applications
- Building structured knowledge from unstructured text corpora
- Enhancing language models to explicitly utilize external knowledge

#### Language Model
- BERT
- RoBERTa
- BART
- GPT-3

#### NLP Applications
- Concept taxonomy
- Topic model
- Relation triple
- Knowledge graph

#### Structured Knowledge
- Classification
- Entity typing
- Semantic similarity
- Question answering

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### Reasoning over Knowledge Graph
- Learning effective representations of knowledge graph
- Reasoning over knowledge graph using the representations

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### Information Retrieval & Recommendation
- Ranking documents by their semantic relevance to a query text
- Recommending items according to the preference of a user

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College of Computing Yonsei University

Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Big Data Analytics Lab.

Noseong Park

Education
- Ph.D. in Computer Science, University of Maryland, College Park, 2016
- MS in Information and Communications Engineering, KAIST, 2005
- BS in Computer Science, Soongsil University, 2003

Experience
- 2020 – Present: Associate Professor, Dept. of Artificial Intelligence, Yonsei University
- 2018 – 2019: Assistant Professor, George Mason University

Research Areas
- Generative Model:
  Generating fake data using deep generative models
- Time Series Processing:
  Time series forecasting / classification / Time series synthesis
- Differential Equation-inspired Deep Learning:
  Solving differential equations with deep learning
- Big Data Analytics:
  Real-world AI applications

Publications
- Jeongwhan Choi, Seoyoung Hong, Noseong Park, and Sung-Bae Cho, "GREAD: Graph Neural Reaction-Diffusion Networks," International Conference on Machine Learning (ICML), 2023
- Jeongwhan Choi, Hwangyong Choi, Jeehyun Hwang, Noseong Park, "Graph Neural Controlled Differential Equations for Traffic Forecasting," AAAI Conference on Artificial Intelligence (AAAI), 2022

Email: noseong@yonsei.ac.kr
Website: https://sites.google.com/view/npark
Phone: +82-2-2123-3286

Time-Series Task
- Change a discrete time-series to a continuous time-series
- Using the latest continuous models (ODE, CDE, RDE, etc.)
- Various time-series task

Data Generation
- Generating tabular (synthetic) data
- Using the latest generative models (GAN, Diffusion model, etc.)
- Dealing with oversampling issues
Education
• Ph.D. in Computer Science and Engineering, POSTECH, 2018
• BS in Computer Science and Engineering, Kyungpook National University, 2012

Experience
• 2020 – Present: Assistant Professor, Dept. of Artificial Intelligence, Yonsei University
• 2018 – 2020: Research Scientist, SK T-Brain
• 2015 Winter, 2016 Summer: Research Intern, Adobe Systems

Research Areas
• Dialogue Generation:
  Building open-domain chatbots that are able to use different human-like communicative skills
• Commonsense Reasoning:
  Empowering machine to have human-like ability about commonsense knowledge
  Neural Information Retrieval:
  Ranking search results in response to query by using deep neural networks

Publications
• Modularized Transfer Learning with Multiple Knowledge Graphs for Zero-shot Commonsense Reasoning, NAACL, 2022
• Dual Task Framework for Improving Persona-grounded Dialogue Dataset, AAAI, 2022
• TrustAL: Trustworthy Active Learning using Knowledge Distillation, AAAI, 2022

Dialogue Generation
• Personalized dialogue agent
• Blending different dialogue skills into a single chatbot
• Long-term open-domain chatbot

Commonsense Reasoning
• Injecting commonsense knowledge into neural models
• Blending different types of reasoning abilities
• Open-ended commonsense reasoning

Context
Carson was excited to wake up to attend school.

Question
Why did Carson do this?

When I meet friends, it is exciting.

To say hello to friends at school.
Multimodal Intelligence Research Lab.

Youngjae Yu

Education

- Ph.D. in Computer Science and Engineering, Seoul National University, 2021
- BS in Computer Science and Engineering, Seoul National University, 2015

Experience

- 2023 - Present: Assistant Professor, Dept. of Artificial Intelligence, Yonsei University
- 2021 - 2023: Young Investigator/Postdoc, Allen Institute for AI & University of Washington
- 2018: Research Intern, Microsoft Redmond

Research Areas

- Computer Vision:
  - Video Understanding / Multimodal perception for machine (Video, Speech, Embodied AI, AR/VR)
- Natural Language Processing:
  - Perception $\cap$ Language (knowledge, society, mind) / Commonsense reasoning

Publications

- Prosocialdialog: A prosocial backbone for conversational agents, EMNLP 2022
- Merlot: Multimodal neural script knowledge models, NeurIPS 2021
- End-to-end concept word detection for video captioning, retrieval, and question answering, CVPR 2017

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Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Reinforcement Learning and Robot Learning Lab.

Youngwoon Lee

Education
- Ph.D. in Computer Science, University of Southern California, 2022
- MS in Computer Science, KAIST, 2013
- BS in Computer Science, KAIST, 2011

Experience
- Sep. 2023(expected): Assistant Professor, Dept. of Artificial Intelligence, Yonsei University
- 2022 – 2023: Postdoctoral Scholar, UC Berkeley (Prof. Pieter Abbeel)
- 2013 – 2017: Researcher, ETRI

Research Areas
- Reinforcement learning
- Unsupervised learning of skills, representations, models, and priors
- Robot learning and real-world decision making applications

Publications
- Skill-based Model-based Reinforcement Learning, CoRL 2022
- Generalizable Imitation Learning from Observation via Inferring Goal Proximity, NeurIPS 2021
- IKEA Furniture Assembly Environment for Long-Horizon Complex Manipulation Tasks, ICRA 2021
- Accelerating Reinforcement Learning with Learned Skill Priors, CoRL 2020
- FurnitureBench: Reproducible Real-World Furniture Assembly Benchmark for Long-Horizon Complex Manipulation, RSS 2023
- Controllability-Aware Unsupervised Skill Discovery, ICML 2023

Reinforcement Learning
- Reinforcement learning allows for finding solutions better than the ones from humans, like AlphaGo.
- Our lab works on scaling reinforcement learning to complex and long-horizon real-world tasks.

Unsupervised Learning
- Humans develop a repertoire of skills and general understanding of the world over the course of our lives.
- Our lab works on scalable approaches to autonomously learn this knowledge without labels.

Robot Learning
- Developing a general-purpose robot requires high sample efficiency, generalization, and safe exploration.
- Our lab focuses on leveraging huge online data (videos, text) to achieve intelligent robots.
School of Integrated Technology
Education
- Ph.D. in Electrical and Computer Engineering, The University of Texas at Austin, 2018

Experience
- 2011 - Present: Underwood Distinguished Professor, School of Integrated Technology, Yonsei University
- 2020: IEEE Fellow
- 2021 - Present: IEEE Distinguished Lecturer
- 2017: Visiting Professor, Stanford University, CA, USA
- 2009 - 2011: Member of Technical Staff, Bell Laboratories, Alcatel-Lucent, NJ, USA
- 2008-2009: Post. Doc./Lecturer, Harvard University, MA, USA
- 2005-2008: Research/Teaching Assistant, The University of Texas at Austin, TX, USA
- 2001-2005: Research Engineer, Telecommunications R&D Center, Samsung Electronics

Research Areas
- 6G/Future Communications and Networks
- Molecular Communications
- Brain Networking (Alzheimer’s treatment)
- Applied Mathematics/Applied Machine Learning

Publications
- Shifting the MIMO Paradigm, IEEE Sig. Proc. Mag., 2008 (Best Paper Award)
- A Comprehensive Survey of Recent Advancements in Molecular Communications, IEEE Comm. Surveys and Tutorials, 2016 (FWCI 0.1%)
- Prototyping Real-Time Full Duplex Radios, IEEE Comm. Mag., 2015 (world’s first real-time demo)
- Reconfigurable Intelligent Surface-based Wireless Communications: Antenna Design, Prototyping, and Experimental Results, IEEE Access, 2020 (FWCI 1%)
- Deep Learning-based mmWave Beam Selection for 5G NR/6G with Sub-6 GHz Channel Information: Algorithms and Prototype Validation, IEEE Access, 2020 (FWCI 1%)
Radar Systems and Wave Sensing Lab.

Min-Ho Ka

Education
- Ph.D. in Radar Engineering, Moscow Power Engineering Institute, 1997
- MS in Electronic Engineering, Yonsei University, 1991
- BS in Electric and Electronic Engineering, Yonsei University, 1989

Experience
- Professor, School of Integrated Technology, Yonsei University
- Visiting Scholar, Radar Institute of German Aerospace Center (DLR), Germany
- Visiting Scholar, Virginia Tech, USA
- Deputy Director, Korea-Russia Industrial Technology Cooperation Centre
- Senior Researcher, Agency for Defense Technology (ADD)
- Senior Researcher, Matra Marconi Space, UK

Research Areas
- Space and Air Reconnaissance and Surveillance Radar Systems
- Space Monitoring Radar Systems
- Modeling & Simulation of Synthetic Aperture Radar
- Electromagnetic Virtual Synthetic Environment for Radar Remote Sensing

Publications
- "Multichannel W-Band SAR System on a Multirotor UAV Platform With Real-Time Data Transmission Capabilities", IEEE ACCESS, pp. 144413 - 144431, Vol. 8, 6 August 2020

Modeling and Simulation of Microsatellite Radar Remote Sensing Systems

- Mission design, system modeling, and performance evaluation for radar remote sensing systems of various platforms such as satellites, aircrafts, and drones
- Development of robust image formation algorithms obtained from arbitrary imaging modes and satellites geometry
- Building a virtual synthetic environment with radar scattering information from various remote sensing data with a complex composition of the land, sea, and artificial objects

Multifunctional Microwave Imaging Systems

- 94GHz W-band multiple-input-multiple-output (MIMO) radar imaging system with time- and frequency division multiplexing
- Multichannel 77GHz W-band SAR system mounted on a multirotor unmanned aerial vehicle (UAV)

94 GHz 4-by-4 MIMO SAR System

77 GHz UAV Mounted SAR System
Education
• Ph.D in Chemistry, Northwestern University, 2013
• M.S. Course in Chemistry, Seoul National University, 2007
• B.S. in Chemistry, KAIST, 2006

Experience
• 2021 – Present: Associate Professor, School of Integrated Technology, Yonsei University
• 2015 – 2021: Assistant Professor, School of Integrated Technology, Yonsei University
• 2013 – 2015: Postdoctoral Fellow, Harvard University

Research Areas
• Organic-Inorganic Nanocomposite Materials
• Healthcare- and Energy-related Devices
• Real-time Monitoring and Prediction

Publications
• A Systematic Correlation between Morphology of Porous Carbon Cathode and Electrolyte in Li-S battery, J. Energy Chem., 2021
• Dual-Doping of Sulfur on Mesoporous Carbon as a Cathode for Oxygen Reduction Reaction and Lithium-Sulfur Battery, ACS Sustain. Chem. Eng., 2020
• Independent Multi-states of Photo-responsive Polymer/Quantum Dot Nanocomposite Induced via Different Wavelengths of Light, Scientific Reports, 2019
• Stimuli-responsive Switchable Organic-Inorganic Nanocomposite Materials, Nano Today, 2018

Materials Chemistry Lab.

Jiwon Kim

jiwon.kim@yonsei.ac.kr  https://sites.google.com/site/jiwonkimlaboratory  +82-32-749-3602

Stimuli-responsive Organic-inorganic Nanocomposite
• Nanocomposite synthesis by taking advantages from both organic and inorganic materials
• Application of nanocomposites in healthcare- and energy-related fields and building the database for regulation and prediction by real-time accumulation of chemical information

Nano-bio Device for Healthcare System
• Study of nanoscale molecular communication via active nanoscale cargo delivery and reception systems
• Construction of non-invasive real-time treatment system utilizing photo-responsive nanocomposite materials

Nano-energy Device for Information System
• Study of energy transfer, conversion, and storage mechanisms in various nano-energy devices
• Real-time accumulation of chemical information for increasing the efficiencies and regulating the devices by precise prediction

College of Computing Yonsei University
Department of Computer Science and Engineering • Department of Artificial Intelligence • School of Integrated Technology
Seamless Trans-X Lab.

Shiho Kim

Education
- Ph.D. in Electrical and Electronics Engineering, KAIST, 1995
- M.S. in Electrical and Electronics Engineering, KAIST, 1988
- B.S. in Electronics Engineering, Yonsei University, 1986

Experience
- Present: Professor, School of Integrated technology, Yonsei University
- Korea Intellectual Property office(특허청), Patent Examiner
- LG semicon (currently, SK Hynix) Engineer
- IMEC (Belgium) Visiting professor
- i4ft(Interuniversity alliance for future vehicular technology) Founder and Director

Research Areas
- Autonomous and intelligent mobility for Transportation:
  Hardware / Software / AI for Intelligent and Autonomous Vehicles
  Artificial Intelligence for Transformation:
  Reinforcement Learning, Quantum Machine Learning
- Metaverse, VR for Transition:
  Cyber to real space interaction

Publications
- (co-)authored more than 65 high-10 indexed papers and 50 patents
- co-edited 3 books on Hardware accelerators for machine Learning and other 3 technical books on Blockchain Technology and automotive cybersecurity (Publisher- Elsevier and Springer Nature).
- Learning unsupervised disentangled skill latents to adapt unseen task and morphological modifications, Engineering Applications of Artificial Intelligence, 2022

Autonomous and intelligent mobility for Transportation
- Rationale-aware Autonomous Driving Policy utilizing Reinforcement Learning
- Vision Sensing - AI for Vision under Adverse Weather Conditions
- AI for Multi-Multi-spectral Camera for sensing the adverse & irregular environment
- Simulator : Autonomous Driving Simulation on CARLA(CAR Learning to Act)

Vision Sensing under Adverse Environments

AI for transformation
- Deep Reinforcement Learning Processor(DRLP)
- Reinforcement Learning for Real-world Problems

Metaverse, VR for Transition
- Telepresence Interface using facial expression information
- Facial Expression Recognition (FER) - User Interface for Interactions in Virtual / Augmented Reality - Personalized Metaverse Platform in Fully Autonomous Environment

System Implementation
- Deep Model Network
- Facial Expression Sensor
- Model Screen Data
- Deep AI Generation
- Real-time facial expression data
- Facial Expression Recognition Sensors
- Unsupervised Learning in Automotive
- Unsupervised Learning in the Metaverse
- Explainable Emotion Recognition

Learning unsupervised disentangled skill latents to adapt unseen task and morphological modifications, Engineering Applications of Artificial Intelligence, 2022
Songkuk Kim

Education

- Ph.D. in Computer Science, University of Michigan, 2005
- M.S. in Computer Science and Engineering, Seoul National University, 1999
- B.S. in Computer Science and Engineering, Seoul National University, 1997

Experience

- Software Engineer, Google Research & Infrastructure 2007 - 2011
- Research Staff, Xerox Research Center 2005 - 2007

Research Areas

- Machine Learning
- Big Data
- Cloud Computing

Publications

- How Do Vision Transformers Work?, ICLR 2022
- Blurs behave like ensembles: Spatial smoothings to improve accuracy, uncertainty, and robustness, ICML 2022
- Vector Quantized Bayesian Neural Network Inference for Data Streams, AAAI 2021

Machine Learning

- How Neural Networks Work
- Neural Networks Comparison
- Uncertainty Analysis

AI for Bio-Images

- We apply computer vision methods to automate bio-image analysis

Cloud Computing

- We investigate efficient streaming method for videos

Loss Landscape Analysis

Vision Task Backbone

Inter-frame cross-attention architecture for cell tracking

Cloud-based Video Streaming

Split-layer Video Streaming
**Education**
- Ph.D. in Computer Science, Johns Hopkins University 2012
- B.Eng in Computer Science and Engineering, Korea University 2007

**Experience**
- 2019 - Present: Associate Professor, School of Integrated Technology, Yonsei University
- 2015 - 2019: Assistant Professor, Dept. of Software and Computer Engineering, Ajou University
- 2012 - 2015: Senior Researcher, Electronics and Telecommunications Research Institute (ETRI)
- 2010: Visiting Researcher, Dept. of Computer Science, Stanford University

**Research Areas**
- Human-centered mobile and ubiquitous computing systems
- Mobile and embedded sensing-based machine learning system design
  - Mobile healthcare application systems
  - Mobile AR and VR systems and applications

**Publications**
- "Memory-efficient DNN Training on Mobile Devices", ACM MobiSys 2022
- "iMon: Appearance-based Gaze Tracking System on Mobile Devices", ACM UbiComp 2022
- "Enabling Real-time Sign Language Translation on Mobile Platforms with On-board Depth Cameras", ACM UbiComp 2021
- "HeartQuake: Accurate Low-Cost Non-Invasive ECG Monitoring Using Bed-Mounted Geophones", ACM UbiComp 2020 (Distinguished Paper Award)

jeonggil.ko@yonsei.ac.kr  http://www.eis-lab.org  +82-32-749-5813
Education
- Ph.D. in Material Science & Engineering, Seoul National University, 2002
- M.S. in Material Science & Engineering, Seoul National University, 1999
- B.S. in Material Science & Engineering, Seoul National University, 1997

Experience
- Sep. 2011 - Present: Professor, School of Integrated Technology, Yonsei University
- Feb. 2002 - Jan. 2010: Principal Researcher, Samsung Advanced Institute of Technology (SAIT)

Research Areas
- Oxide semiconductors
- Neuromorphic electronics
- Bioelectronic devices

Publications
- Proton-enabled activation of peptide materials for biological bimodal memory, Nature Communication, 2020
- Energy scavenging artificial nervous system for detecting rotational movement, Nano Energy, 2020
- Effect of X-ray irradiation on a-IGZO and LTPS thin-film transistors for radiography applications, Applied Surface Science, 2021

Oxide Semiconductors
- Oxide semiconductors for application to devices such as displays, sensors and neuromorphic devices under research with varied approaches

Neuromorphic Devices
- Neuromorphic devices emulating the function of biological neurons in the brain are being researched to develop new types of computing system based on artificial neural networks

Bioelectronics
- Biosensors and devices based on biomaterials which can be introduced into human body with no harm are being researched for biosensing and bioelectronic applications
Multimedia Computing and Machine Learning Group

Jong-Seok Lee

Education
- Ph.D. in Electrical Engineering, KAIST, 2006
- MS in Electrical Engineering, KAIST, 2001
- BS in Electrical Engineering, KAIST, 1999

Experience
- 2011 – Present: Professor, School of Integrated Technology, Yonsei University

Research Areas
- Image and video processing:
  - Image and video compression / Image and video enhancement (super-resolution, deblurring, etc.) / Image and video quality assessment
  - Machine learning:
    - Efficient deep learning models and algorithms / Evaluating and enhancing robustness of deep learning models / Deep learning for graph data

Publications
- Demystifying randomly initialized networks for evaluating generative models, AAAI, 2023
- Joint global and local hierarchical priors for learned image compression, CVPR, 2022
- Just one moment: Structural vulnerability of deep action recognition against one-frame attack, ICCV, 2021

Education
- Jong-seok.lee@yonsei.ac.kr
- https://mcml.yonsei.ac.kr
- +82-32-749-5846

Image and video processing

- Efficient deep learning models and algorithms
- Evaluating and enhancing robustness of deep learning models
- Deep learning for graph data

Machine Learning

- Model-Parallel Learning
  Illustration of the local critic learning method for model-parallel training of deep neural networks including both CNNs and RNNs.

- Graph Neural Network
  An end-to-end neural network model for EEG-based emotional video classification.

- Adversarial Attack
  (Top) Overview of one-frame attack, which adds an inconspicuous perturbation to only a single frame of a given video clip. (Bottom) Visual comparison of the super-resolved outputs for the attacked inputs.
**Intelligent Semiconductor Lab.**

**Jungwoo Oh**

- **Education**
  - Ph.D. The University of Texas at Austin, Supervisor: Dr. Joe C. Campbell, 2004
  - M.S. POSTECH, Department of Materials Science and Engineering, 1999
  - B.S. Yonsei University, Department of Metallurgical Engineering, 1997

- **Experience**
  - 2012 - Present: Associate/Assistant Professor, School of Integrated Technology, Yonsei University
  - 2004 - 2012: Member Technical Staff, SEMATECH, Advanced CMOS & Emerging Technology, Austin TX
  - 2000 - 2004: Research Assistant, Microelectronic Research Center, The University of Texas at Austin

- **Research Areas**
  - Intelligent semiconductors: Ferroelectric synaptic devices and processing
  - Atomic layer deposition (ALD): ALD BeO for intelligent and power devices
  - Alternative Lithography and Etching: Metal-assisted chemical etching

- **Publications**
  - Heterostructured Mo2N-Mo2C Nanoparticles Coupled with N-Doped Carbonized Wood to Accelerate the Hydrogen Evolution Reaction: Small Structures, 2200283 (2023)
  - Polarization-Induced Two-Dimensional Electron Gas at BeO/ZnO Interface: Applied Surface Science, 154103 (2022)
  - Energy band offsets of BeO dielectrics grown via atomic-layer deposition on β-Ga2O3 substrates: Journal of Alloys and Compounds 922, 166197 (2022)
  - Anodic imprint lithography: Direct imprinting of single crystalline GaAs with anodic stamp: ACS Nano 13 (11), 13465-13473 (2019)

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**Artificial Intelligent Semiconductors/Synaptic Devices**

- Electronic devices to mimic the behavior of synapses in the human brain
- Ferroelectric characteristic of materials to emulate the behavior of synapses
- Engineered wurtzite crystals of Be(Mg)O can exhibit neuromorphic behavior

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**Atomic Layer Deposition (ALD) of Beryllium Oxide (BeO)**

- BeO has an extremely high thermal conductivity next to diamond
- Heterogeneous epitaxy of various semiconductors using ALD of BeO
- Promising for power transistors, artificial intelligent semiconductors

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**Metal-assisted Chemical Etching & Imprinting Technology**

- Metal-assisted chemical etching is an anisotropic etching technique
- The chemical imprinting integrates lithography and etching processes
- This technology addresses the challenges in modern optical lithography

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**Jungwoo.oh@yonsei.ac.kr**

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Education
- Ph.D. in Aeronautics and Astronautics, Stanford University, 2010
- M.S. in Electrical Engineering, Stanford University, 2008
- M.S. in Aeronautics and Astronautics, Stanford University, 2004
- B.S. in Mechanical Engineering, KAIST, 2002

Experience
- 2012 – Present: Associate Professor, School of Integrated Technology, Yonsei University
- 2010 - 2012: Postdoctoral Scholar, Department of Aeronautics and Astronautics, Stanford University

Research Areas
- Positioning and Navigation Systems:
  - Global Navigation Satellite Systems / Terrestrial Radionavigation Systems (eLoran, R-Mode, DME) / Emergency Location Services
  - Intelligent Unmanned Systems:
    - Unmanned Vehicles / Urban Air Mobility

Publications
- Optimal parameter inflation to enhance the availability of single-frequency GBAS for intelligent air transportation, IEEE Transactions on Intelligent Transportation Systems, 2022.
- Optimal action-based or user prediction-based haptic guidance: Can you do even better?, CHI, 2021.
Moo Whan Shin

Education
- BA in Metallurgy Eng, Yonsei University, 1986
- Master in Materials Science & Engineering, North Carolina State University, Raleigh, NC, USA, 1998
- Ph.D. in Materials Science and Engineering, North Carolina State University, Raleigh, NC, USA, 1991

Experience
- 2011 - Present: Professor, School of Integrated Technology, Yonsei University
- 1995 - 2011: Professor of Materials Science & Engineering, Myong Ji University
- 1994 - 1995: Engineer III, EEAP Case Western Reserve University, Cleveland, OH, USA
- 1991 - 1993: Post Doctoral Research Fellow ECE, North Carolina State University, Raleigh, NC, USA

Research Areas
- Development of High Performance Batteries
- Development of New Fabrication Process for Resistive Random Access Memory Device

Publications
- Seoyoon Shin, and Moo Whan Shin, "Nickel metal-organic framework (Ni-MOF) derived NiO/C@CNF composite for the application of high performance self-standing supercapacitor electrode", Applied Surface Science, 540, 148295, 2021
- Chul Jin Park, Seung Woo Han, and Moo Whan Shin, "Laser-Assisted Interface Engineering for Functional Interfacial Layer of Al/ZnO/Al Resistive Random Access Memory (RRAM)", ACS Appl. Mater. Interfaces, 12, 32131-32142, 2020

Development of New Fabrication Process for Resistive Random Access Memory Device
- MOF-based flexible RRAM
  - MOF direct growth on the surface of metal
  - Excellent Interfacial adhesion
  - Ultrafast and simple fabrication process

Development of High Performance Batteries
- Core solution
- Shell solution (Cobalt precursor)
- Co-axial electrospinning
- PAN/PAN-Co(NO3)2 nanofiber
- Stabilization Carbonization
- OER
- ORR
**Jong-Souk Yeo**

**Nano Convergence Systems Lab.**

**Education**
- Ph.D. in Materials Science and Engineering, Ph.D. Minor in Electrical Engineering, Stanford University, Stanford, CA, USA, 1998
- M.S. in Metallurgical Engineering, Seoul National University, 1991
- B.S. in Metallurgical Engineering, Seoul National University, 1989

**Experience**
- 2011 - Present: Professor, School of Integrated Technology, Yonsei University
- 2002 - 2011: Research Scientist, Hewlett-Packard Company, OR, USA
- 1999 - 2002: Member of Technical Staff, Lucent Technologies, PA, USA
- 1998 - 1999: Post-Doctoral Scholar, Electrical Engineering, Stanford University, USA

**Research Areas**
- Neuromorphic Semiconductors and Nature-Inspired Nanotechnologies
  - Quantum Devices and Computational Materials Science
  - Nano-Bio Sensors and Nano-Bio Interface

**Publications**
- How the Eurasian Jay Expands its Color Palette by Optimizing Multiple Scattering, Advanced Optical Materials (Front Cover), 2023
- Highly Stretchable and Reliable, Transparent and Conductive Entangled Graphene Mesh Networks, Advanced Materials, 2018
- Atomic Migration Induced Crystal Structure Transformation and Core-Centered Phase Transition in Single Crystal Ge2Sb2Te5 Nanowires, Nano Letters, 2016

**Neuromorphic Semiconductors**
- Low power nanoelectronics for brain-inspired computing
- Ovonic threshold selectors and non-volatile memories for 3D cross point neuromorphic applications

**Nature-Inspired Nanotechnologies**
- Efficient functionalities enabled by biomimicry
- Brilliant colors from sustainable organic nanostructures inspired by avian feathers

**Quantum and Atomic Scale Devices**
- Quantum tunneling based metasurfaces for on-chip nanophotonics
- Atom-mediated quantum energy transport in molecule junction

**Nano-Bio Sensors**
- Point-of-Care biosensor system for early diagnosis of diseases
- Scalable fabrication of ultrasensitive nano-biosensing platform

**Nano-Bio Interface**
- Nanotopography control of adipose-derived stem cells
- Understanding mechanotransduction for proliferation and differentiation

**Computational Materials Science**
- Finite-Difference Time-Domain analysis of optical nanostructures
- Simulation of microfluidics and devices for advanced designs
- Molecular dynamics simulation to explain switching mechanism

**Advanced Materials**
- Advanced Optical Materials
- Advanced Materials
- Advanced Biosystems

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Epilogue

Please refer to the web page for more information.