Human-Centered Computer Systems (HCS) Lab

이영기 교수

Prof. Youngki Lee

Contact Information

Office: 301-413

Lab: 301-412

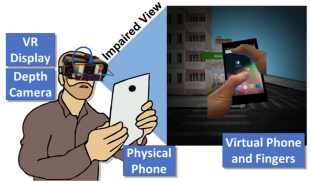
youngkilee@snu.ac.kr

https://youngkilee.blogspot.com/

In HCS lab, we bring innovative computing systems into various parts of our lives through researching and developing technologies in the areas of mobile and ubiquitous computing, applied machine learning, and human-computer interaction.

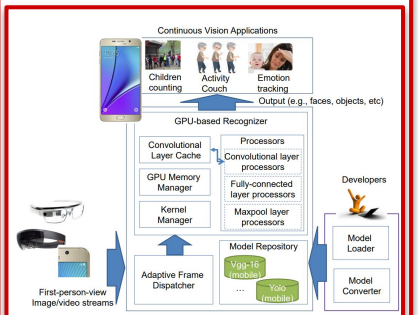
Human behavior & emotion sensing systems

Innovative tools for emerging devices

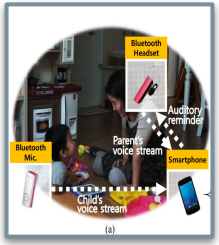


VR/AR Systems

Mobile deep learning



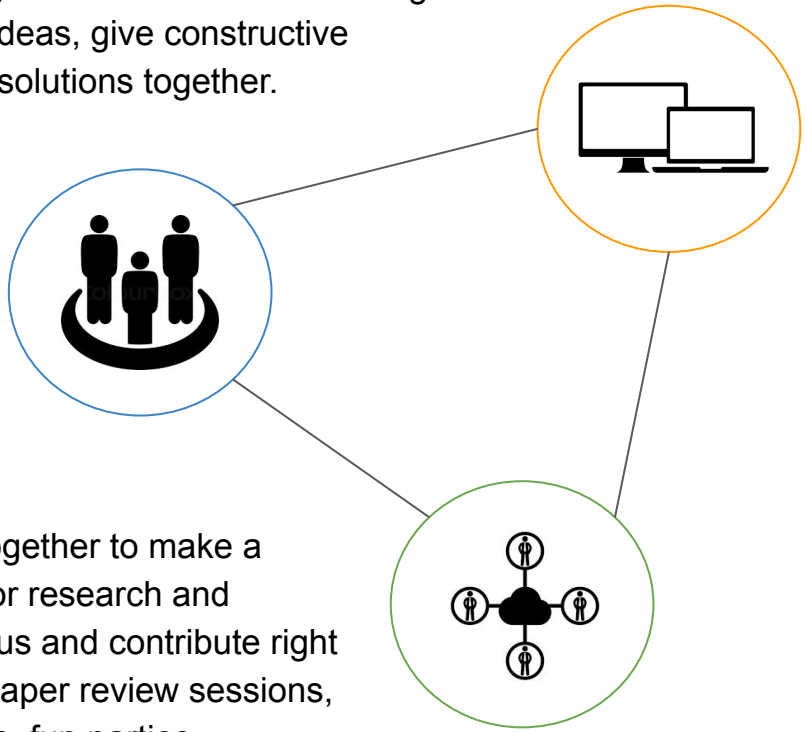
Assistive technology for the elderly, children and the disabled



What is HCS like?

Communication & Cooperation

We strongly encourage active discussions among lab members. We share ideas, give constructive comments, and build solutions together.



Creativity and Innovation

What is “excellent” research? How do we come up with innovative ideas and build creative solutions? These are some of the questions we ask ourselves all the time.

Culture

We build our culture together to make a healthy environment for research and personal growth. Join us and contribute right away. Lab meetings, paper review sessions, brainstorming sessions, fun parties, whatever. We are open to any suggestions.

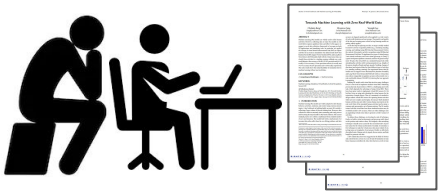
Student Lead: Jingyu Lee
Lab homepage: http://hcs.snu.ac.kr
Email: cheif@hcs.snu.ac.kr
Lab: 301-412

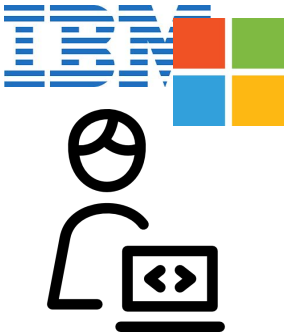
HCS Research Activities

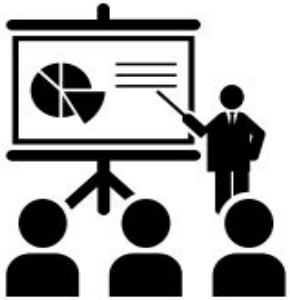
International Internship

Lab Seminar

Research Project







Group Study on State-of-the-art techniques

Mobile Systems,
HCI methodologies,
Machine Learning algorithms
...

Writing and Presentation Practice

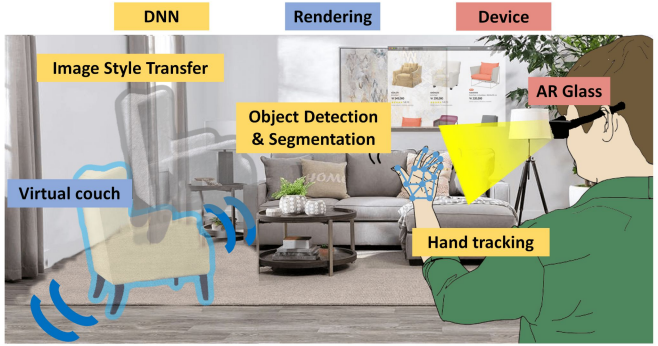
Recent Top-tier Conference Publications

We continuously publish impactful papers to the top-tier conferences in the area of mobile and ubiquitous computing. Some of the recent papers include the following:

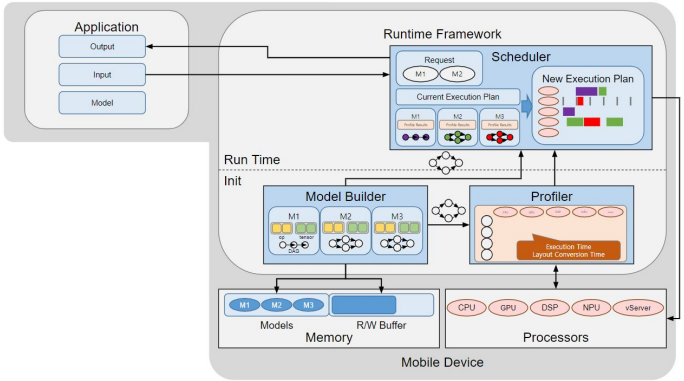
- **MobiCom ’20**: GROOT: A Real-time Streaming System for High-Fidelity Volumetric Videos
- **MobiCom ’20**: Heimdall: Mobile GPU Coordination Platform for Augmented Reality Applications
- **MobiCom ’20**: EagleEye: Wearable Camera-based Person Identification in Crowded Urban Spaces
- **SenSys ’19**: VitaMon: Measuring Heart Rate Variability using a Smartphone Front Camera
- **SenSys ’19:** SmrtFridge: IoT-based, User Interaction-Driven Food Item and Quantity Sensing
- **MobiCom ’19**: Occlumency: Privacy-Preserving Remote Deep Learning Inference Using SGX
- **CHI ’19**: Examining Augmented Virtuality Impairment Simulation for Mobile App Accessibility Design

Ongoing Research - Edge AI

AR-based Person Identification in Crowded Urban Spaces

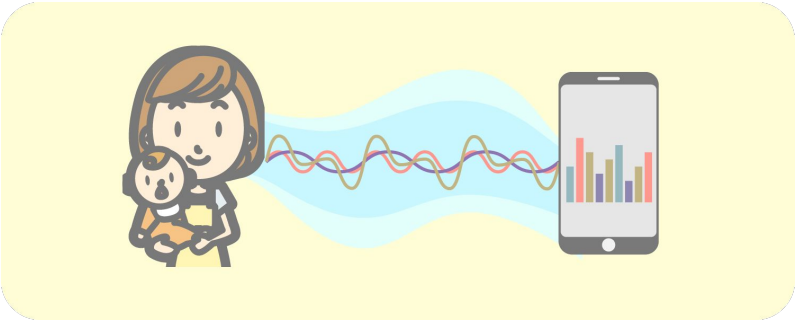


Mobile GPU Scheduling Platform for Emerging AR apps



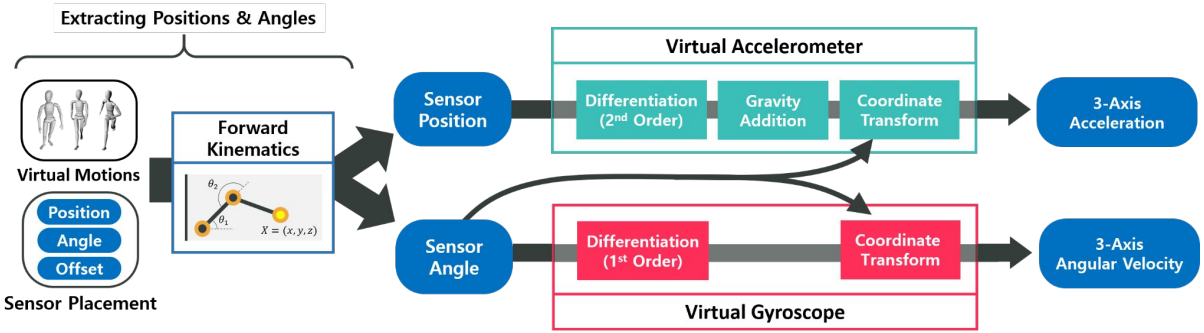
Mobile-Cloud Collaborative Deep Learning Platform for eXtended Reality

Ongoing Research - Human-Centered Sensing



Systems for Effective Parent–Child Interaction

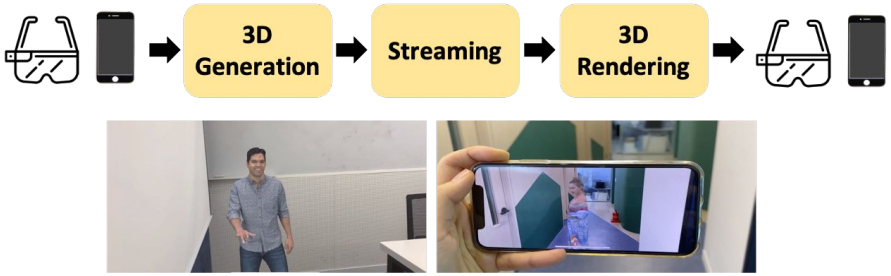
Smartphone Data Analytics for Human Science



Enabling Scalable Sensor Data Collection with Virtual Reality

Ongoing Research - Mixed Reality Systems

AR Interface for DL-enabled Interactive Applications



Mobile 3D Telepresence Systems

Relieving Errors of Object Detection in AR Games

Ongoing Research

- AR-based Person Identification in Crowded Urban Spaces
- Mobile GPU Scheduler
- DL enabled AR Interface for Beach Lifeguard
- Machine Learning with Virtual Reality
- Toddler-inspired Cognitive Agent in Virtual Reality
- Automatic Interventions for Effective Parenting
- Social Network-based System for Psychological Questionnaires and Smartphone Sensing

What Skill Sets Do We Develop?

- Programming Skill
- Writing Skill
- System Design
- Machine Learning & Deep Learning Knowledge
- Mobile/IoT System Knowledge

Career After the Graduation

Faculty

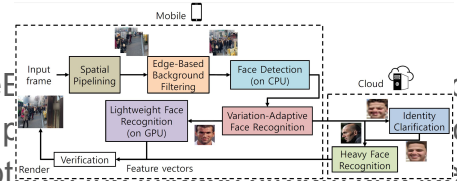
IBM

NOKIA Bell Labs

Research Organizations

Ongoing Research

AR-based Person Identification in Crowded Urban Spaces



We propose EagleE obile devices to identify p ces. It continuously capt ntifies where the target is in the scene in real-time.

DL enabled AR Interface for Beach Lifeguard

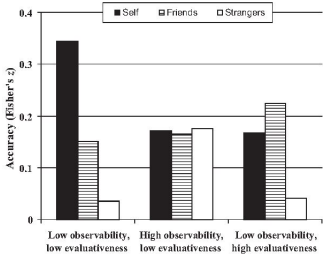
We develop AR user interface that uses deep learning to identify potentially dangerous situations in beach and swimming pool. This may enhance safety by reducing human error and cognitive burden of lifeguards.

Mobile GPU Scheduler

MR application requires to render highly interactive user interfaces while running concurrent DNN inference jobs.
We propose a mobile gpu scheduler that can coordinates latency-critical rendering tasks with multiple DNN tasks.

Phone's-eye View

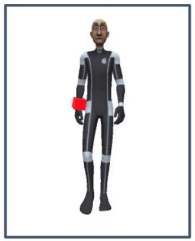
Could my phone know me better than I know myself? We propose a social network based system for psychological questionnaires and smartphone sensing, and explore its potential as a means of collecting model-driven real-world data for human studies.

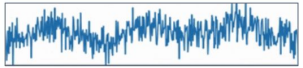


Ongoing Research

Toolkit for Developing Cognitive Agents

Cognitive agents try to interpret the data and learn general knowledge in a self-directed way. VECA is a new simulation tool that can train/test cognitive agents with the following features: 1) rich perceptions in a human-like way 2) various interaction with the environment 3) easy integration of custom task.





Machine learning models are widely used to detect human behaviors, activities, emotion and context. However, data collection in real world is time-consuming and exhausting. We suggest a novel data collection system using computer simulation. With this system, we aim to significantly decrease the cost of data collection, while preserving the accuracy of the generated model.

Automatic Interventions for Effective Parenting

How can technology encourage “better parenting” that stimulates mental and psychological growth in children? In collaboration with experts in developmental linguistics, we explore advanced techniques in speech and natural language processing to build systems that can monitor the everyday habits of parents, as well as provide feedback.