

Architecting a New Paradigm for Future AI Infrastructure

미래 AI 인프라의 새로운 패러다임을 설계하다

KAIST AIS

Department of AI Systems

2026년 KAIST 학위수여식

LIVE

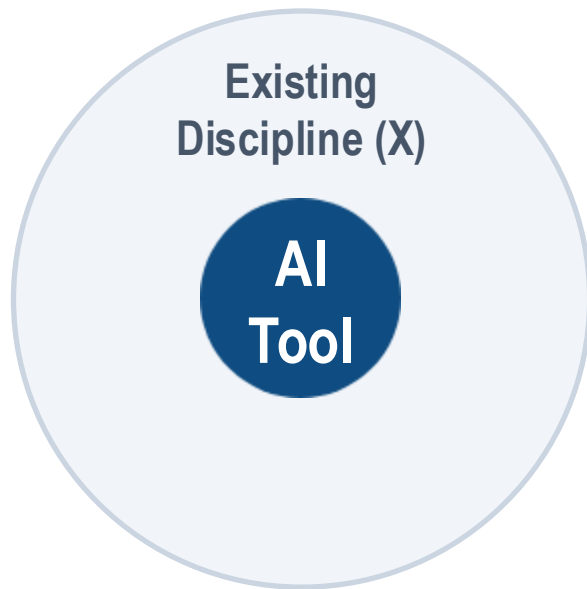
KAIST AIS
Department of AI Systems

"AI 단과대학, 인공지능 3대 강국 비전 토대"

Evolution of AI Era: From 'Use' to 'Creation'

The paradigm is shifting from using AI as a tool (X+AI) to designing AI itself and creating new value (AI+X).

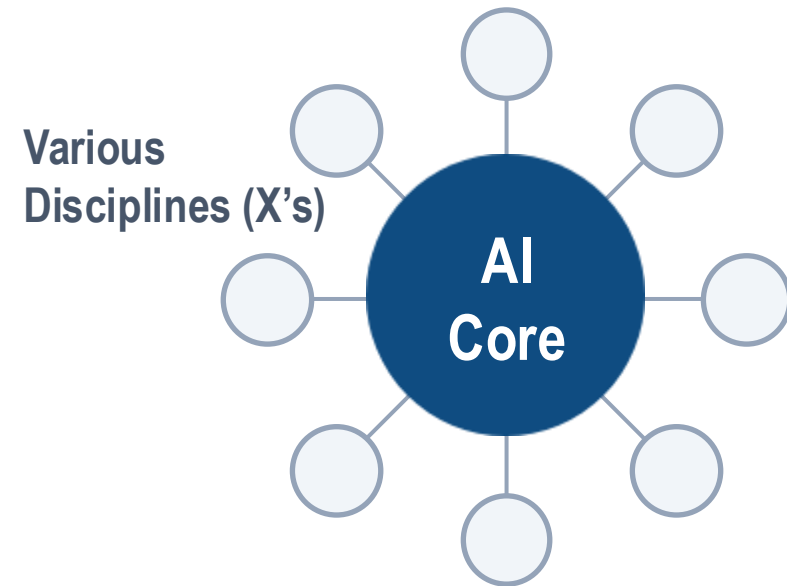
X+AI Talent (AI Utilization Expert)



Domain Expert Utilizing AI

✓ Understand ✓ Utilize ✓ Improve Efficiency

AI+X Talent = AI-Native



AI Expert Innovating Domains

▶ Design ▶ Build ▶ Lead Ecosystem

“Talent Demanded by the New Era: AI-Native”

KAIST's Answer: Establishment of College of AI



Vision

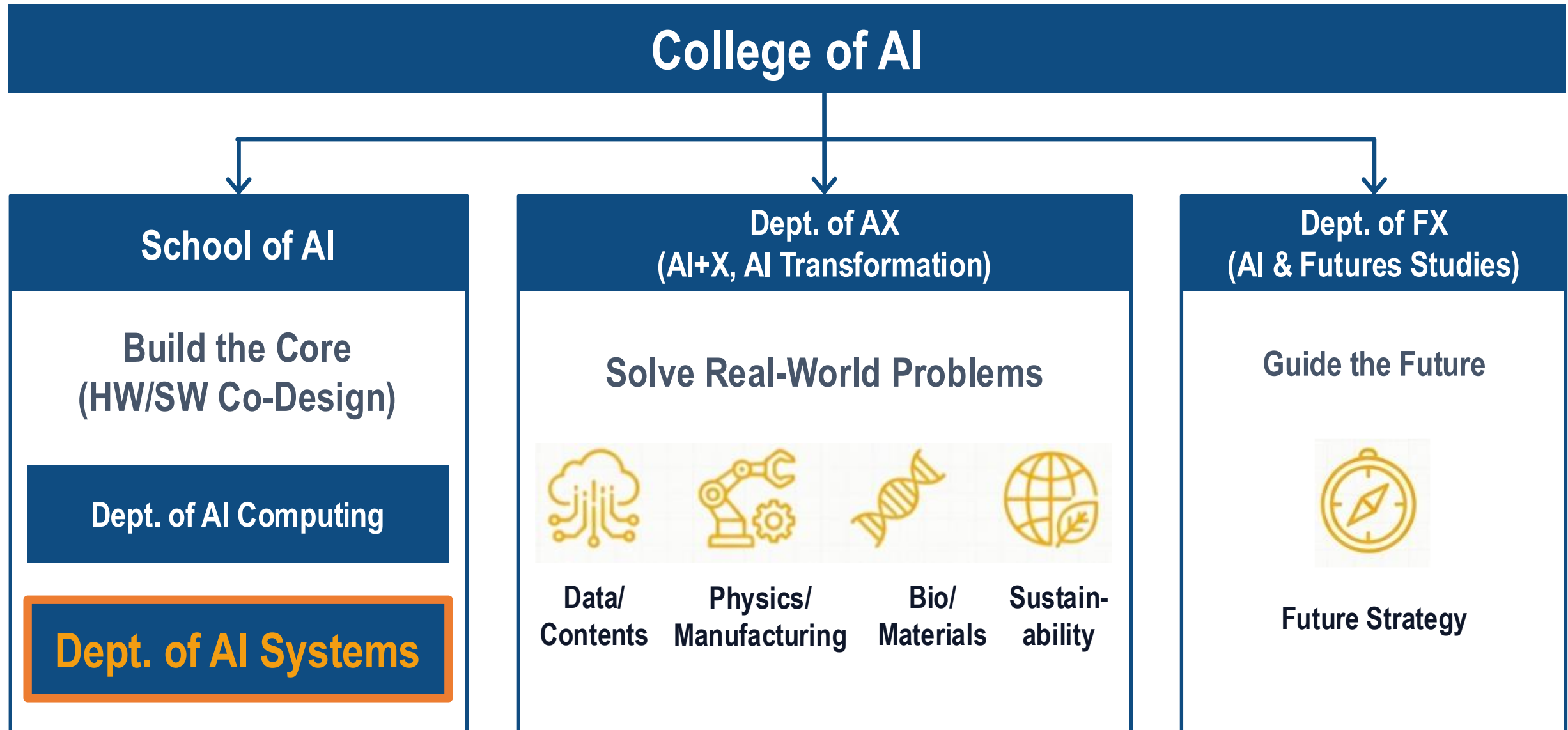
**Cultivating Creative and Solid
AI-Native Talents
Leading the Global AI Era**



Mission

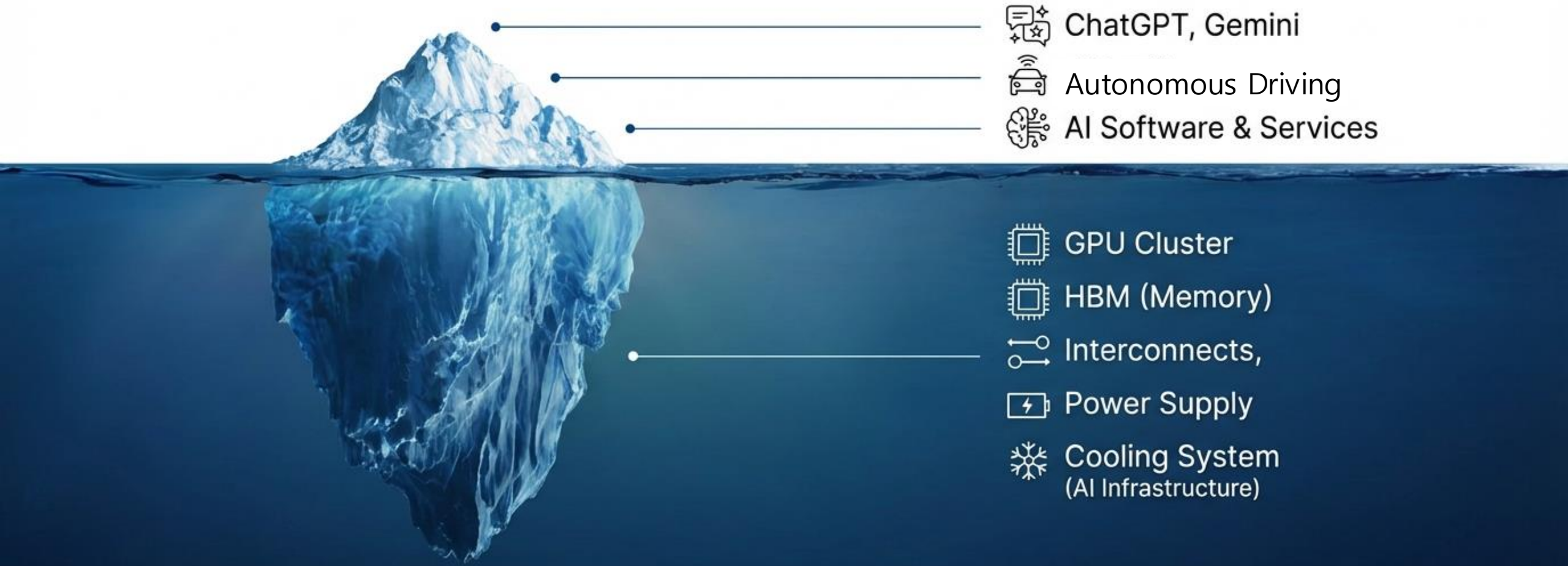
- Creating new AI and solving grand challenges with AI through multidisciplinary education & research
- Establishing a unified physical and organizational education and research system that consolidates all of KAIST's AI capabilities
- Contributing to the realization of an AI-empowered society in Korea

College of AI: Structure for Innovation



Why AI Systems?

AI Services: The Tip of the Iceberg

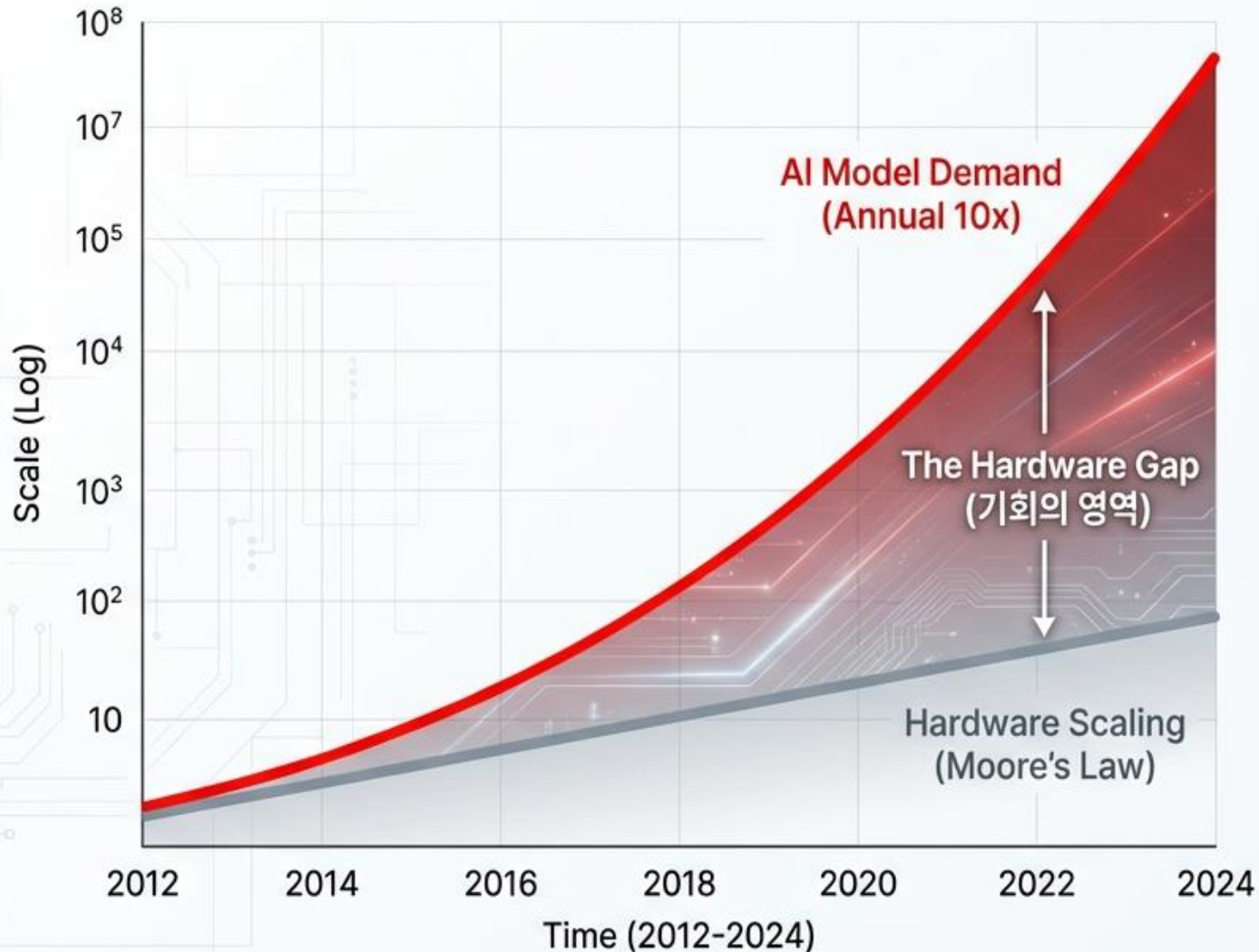


Software defines the Possibility, Hardware determines the Feasibility.

Hidden Cost: Infrastructure represents 70%+ of AI training expenses.

No Infrastructure, No Intelligence: Without hardware, the finest algorithm is just math.

The Great Compute Crunch: The Intensifying Bottleneck



Computing Demand Explodes:

AI training compute has increased **10 billion-fold** over the past decade.

Moore's Law is Not Enough:

Process scaling alone is no longer **sufficient** to meet the exploding demands.

The Savior is System Innovation:

The only way to bridge this gap is through **radical innovation in system infrastructure.**

The New Gold Rush: Picks and Shovels

Added value in the AI era is shifting from software to 'systems'.



Software is infinite, Hardware is Scarce.

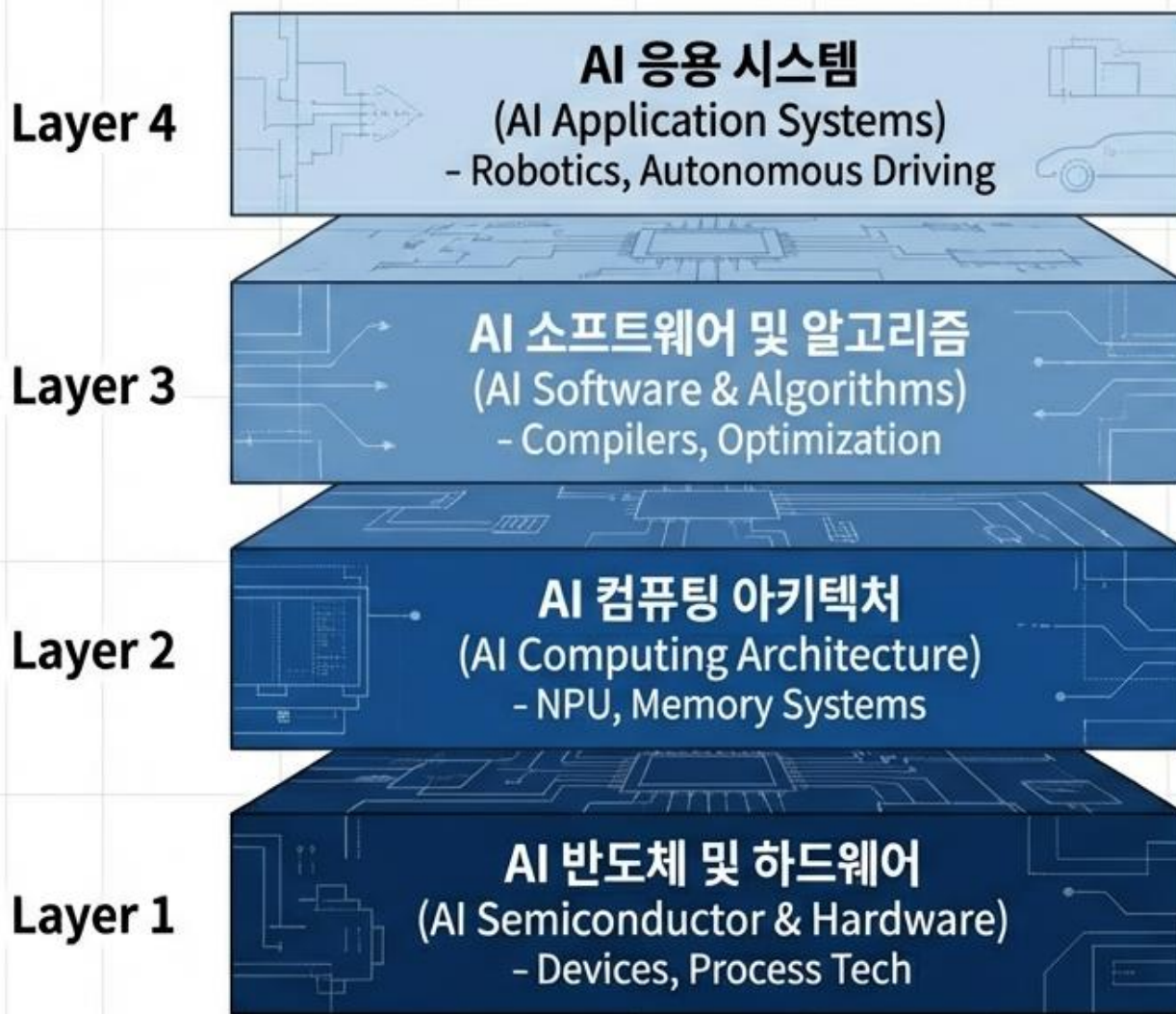
Software is infinitely replicable, but high-performance systems face supply constraints.
Value naturally migrates toward scarcity.

Energy is the Currency.

The future benchmark of AI competitiveness will shift from 'algorithmic excellence' to 'power efficiency (Watt/FLOPs)'.

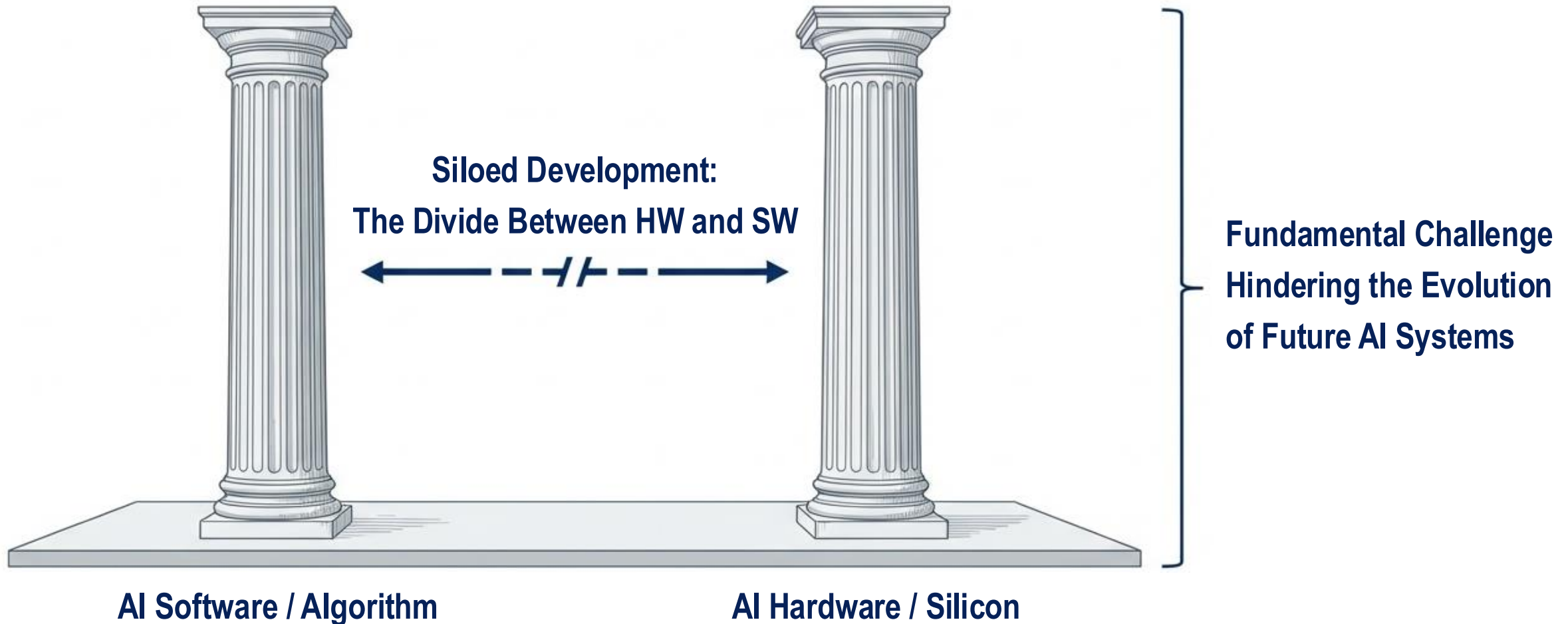
“Software creates the Brain, but Hardware creates the Life.”
(소프트웨어가 뇌를 설계한다면, 하드웨어는 그 뇌에 생명을 불어넣습니다.)

What is an AI System? Defining the Scope



**Unlocking Maximum
Performance through
Vertically Integrated
AI Stacks**

AI Today: Two Disconnected Worlds (Hardware & Software)



Limitations of Traditional Education: Fragmentation Driven by Over-specialized Research

New Leader: Bridging HW and SW through Co-Design



Nurturing Full-Stack Talent: from Silicon to Application

Who We Are:

The Department of AI Systems

Our Vision & Mission

From Silicon to Systems, Architecting the Future of AI Infrastructure

*We nurture integrated AI system experts,
spanning the full spectrum
from AI semiconductors and hardware/software architecture
to systems for multimodal interaction.*

Core Faculty: Global Leaders in the Field



권지민

Kwon, Jimin

3D IC & Advanced Packaging
for AI Systems

Device



문재균

Moon, Jaekyun

AI/ML & Distributed Storage,
Information Theory

Communication



이슬기

Lee, Seulki

On-Device AI,
Embedded AI System

Computer



이영주

Lee, Youngjoo

VLSI Signal Processing,
Digital SoC Design for AI Systems

Circuit



정완영

Jung, Wanyeong

Ultra-Low-Power Integrated Circuits
for AI Systems

Circuit



제민규

Je, Minkyu

Integrated Circuits for Secure &
Autonomous Physical AI Systems

Circuit



최정우

Choi, Jung-Woo

AI-Based Audio Signal Processing &
Sound Field Control

Signal

Affiliated Faculty: 33 Experts Across Diverse Areas



강익성



강준혁



김동준



김봉진



김상식



김성민



김용대



김주영



김창익



김훈



노용만



명현



배준우



배현민



백재일



서창호



송영민



신영수



심현철



안희진



원유집



유민수



유창동



이성주



이정용



장동의



정명수



정혜원



조성환



최성울



최진석

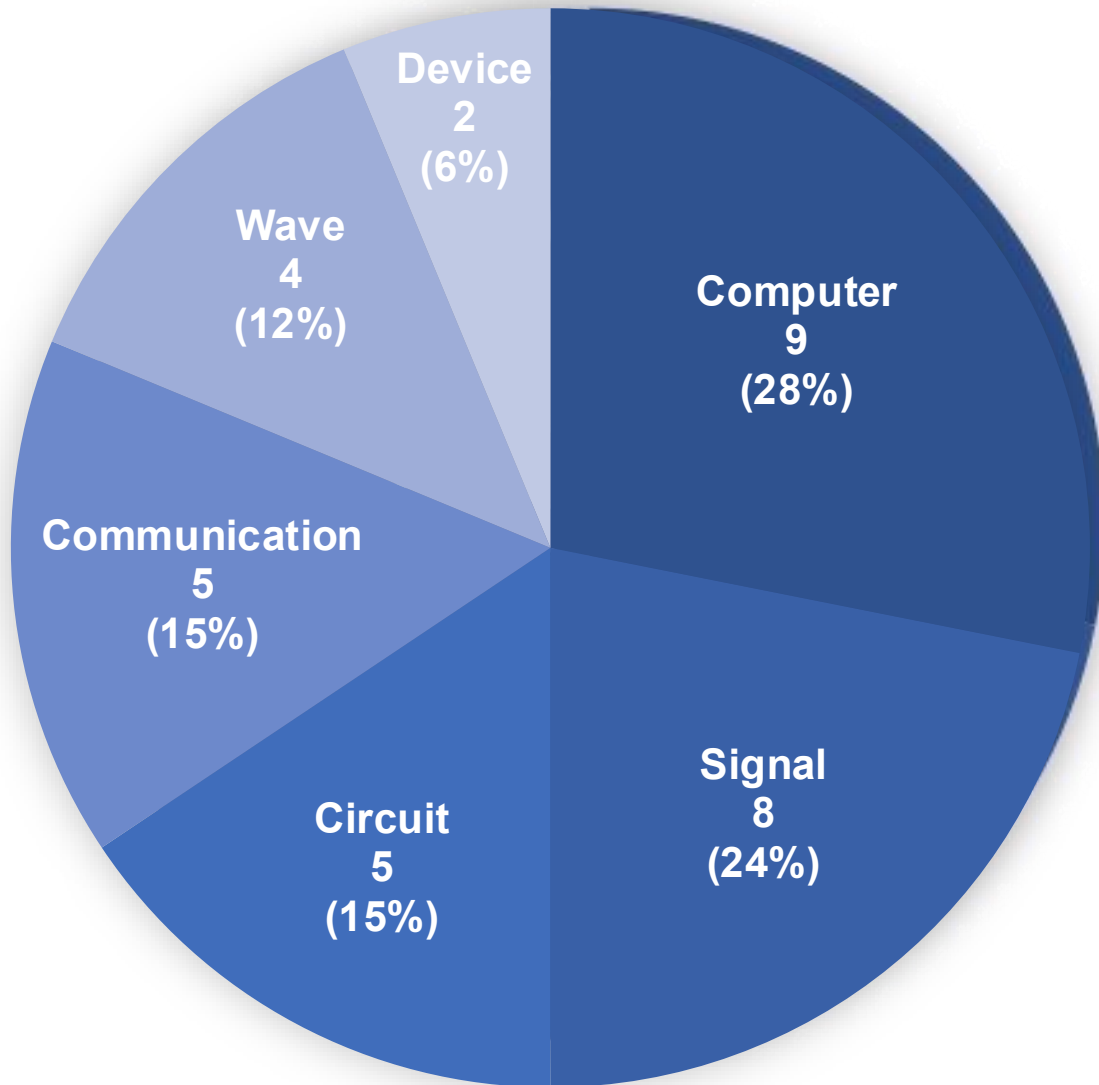


하정석



Ian Oakley

Affiliated Faculty: 33 Experts Across Diverse Areas



Strong Core Competencies in AI Systems

Balanced Integration of Hardware and Software

Comprehensive Technological Spectrum

Cross-Layer Innovation through Synergistic Fusion

KAIST's World-Class AI System Capabilities: Proven Globally

World

#1

Semiconductor Design

Based on ISSCC publications

World

#1

Devices & Process

Based on IEDM, VLSI publications

World

#6

Artificial Intelligence

Based on ICML, NeurIPS publications

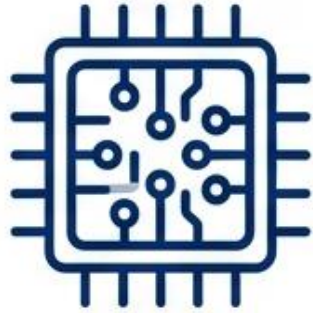
World

#7

Computer Architecture

Based on CSRankings

Core Education and Research Areas



AI Semiconductor & Hardware

- Silicon: NPU / PIM
- Advanced Packaging / Heterogeneous System Integration
- Thermal Management / Smart Power Infrastructure



AI System Architecture & Software

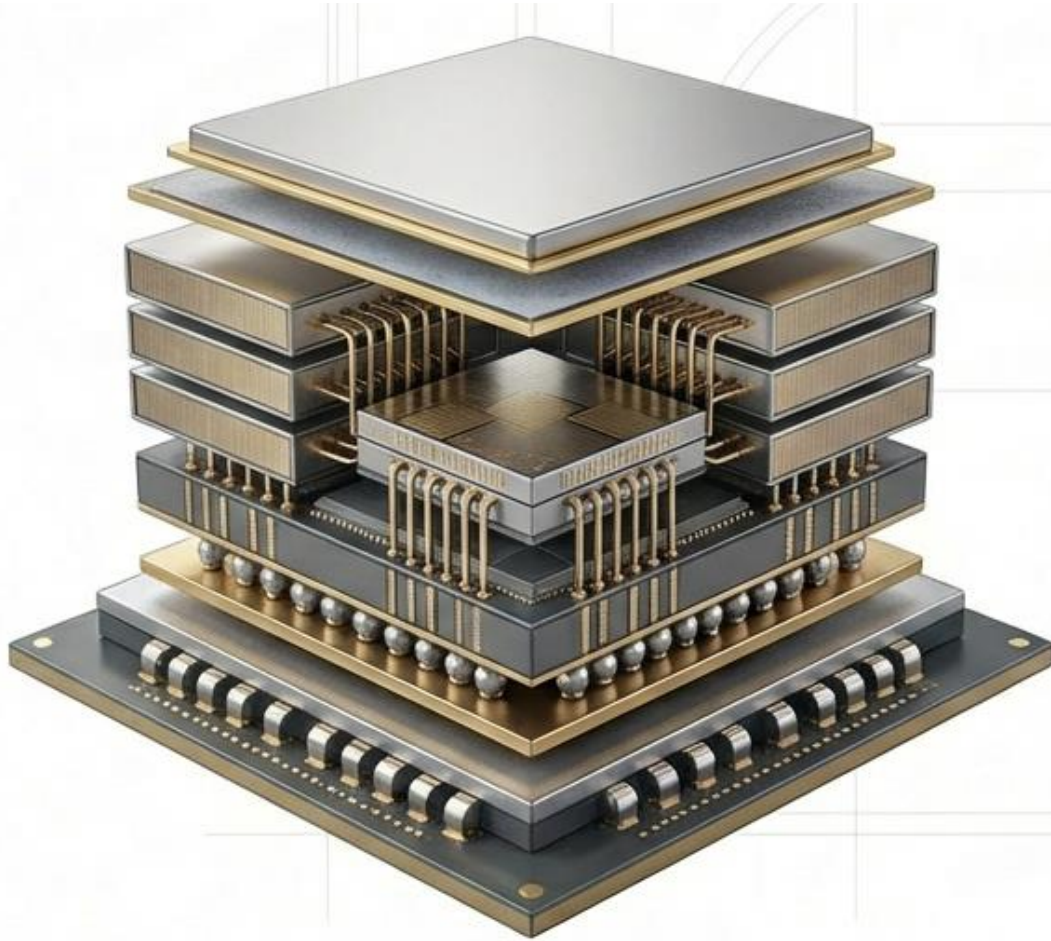
- System Architecture
- AI Compilers
- System Security
- Integration of AI and Communication for Ultra-Low Latency



AI Application Systems & Solutions

- On-Device AI
- Robotics
- Autonomous Driving
- Visual, Audio, and Language Interaction

The Core of AI Infrastructure: High-Performance, Low-Power Hardware



AI Semiconductor Integrated Circuits

Silicon Chips Optimized for AI Workloads



PIM (Processing-in-Memory)

Overcoming the Memory Wall in Large-Scale Model Training and Inference



Advanced Packaging

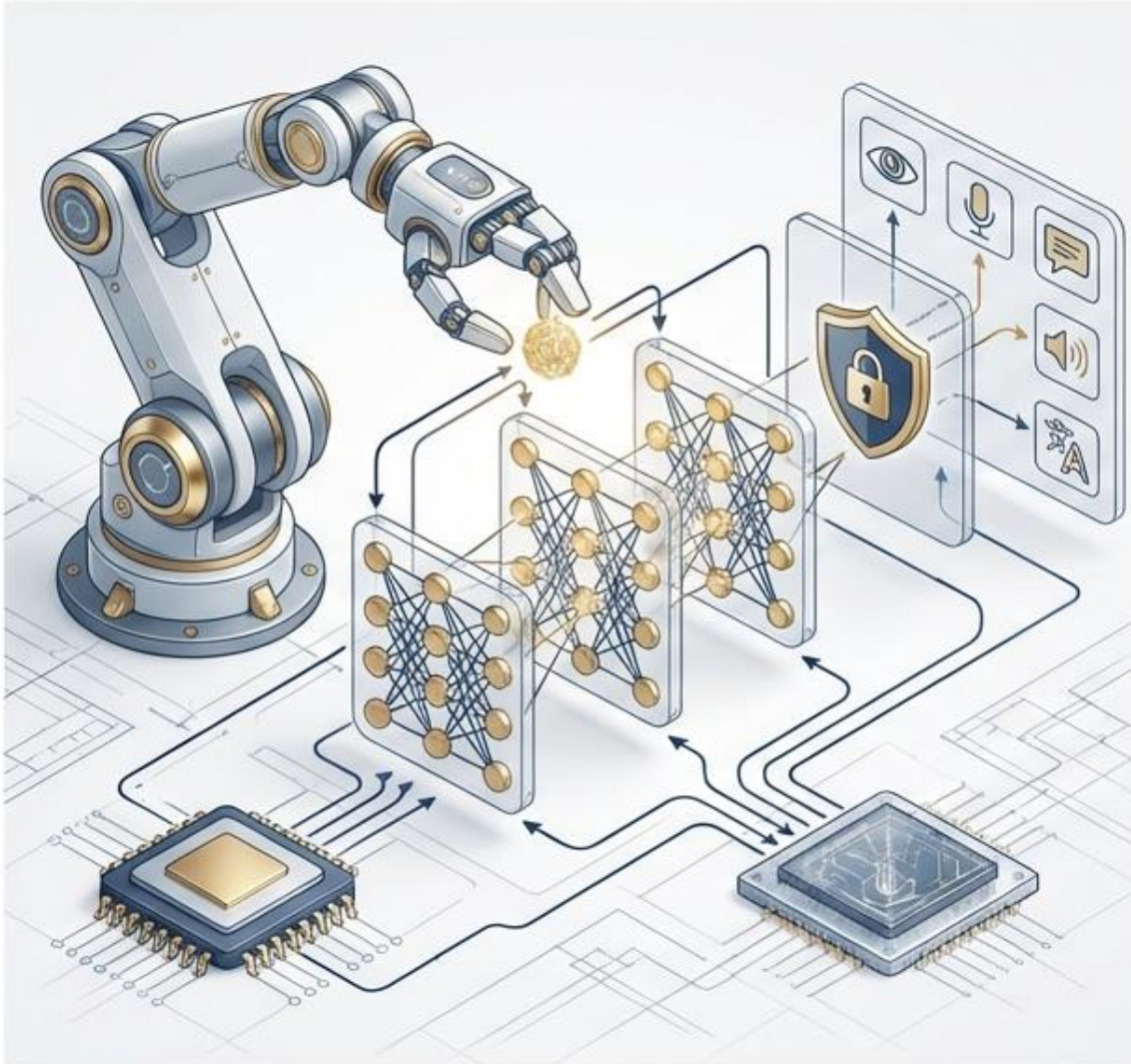
3D Stacking and Heterogeneous Integration for High-Density Integration



Thermal & Power Management

Toward Energy-Efficient and Thermally Sustainable Large-Scale AI Data Centers

Implementing Intelligence: System Architecture & Applications



Architecture & Security

Toward Secure and Efficient Architecture Design for Data Flow



On-Device AI

Extending AI Beyond the Cloud: Toward Edge and On-Device Intelligence



Physical AI

Robotics and Autonomous Vehicles Interacting with the Physical World



Multi-Modal Interaction

Unified Systems for Vision, Speech, and Language Processing

Strategic Importance and Vision

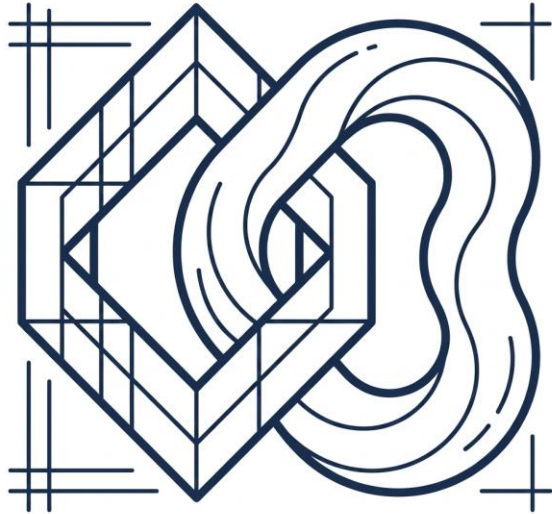


Nurturing core talent to lead the AI infrastructure stack

Bridging K-semiconductor excellence with integrated system design capabilities

Securing Global Leadership in AI System Technology

What Makes Us Unique: 3 Core Strategies



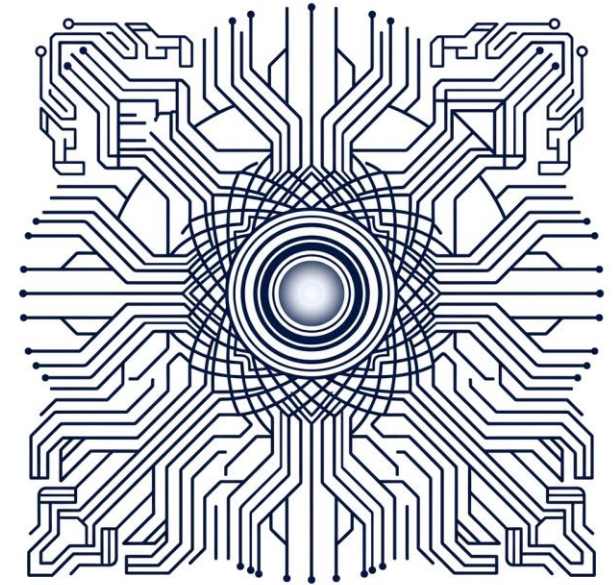
Integrated Education

Borderless HW/SW
co-design curriculum



Industry Partnership

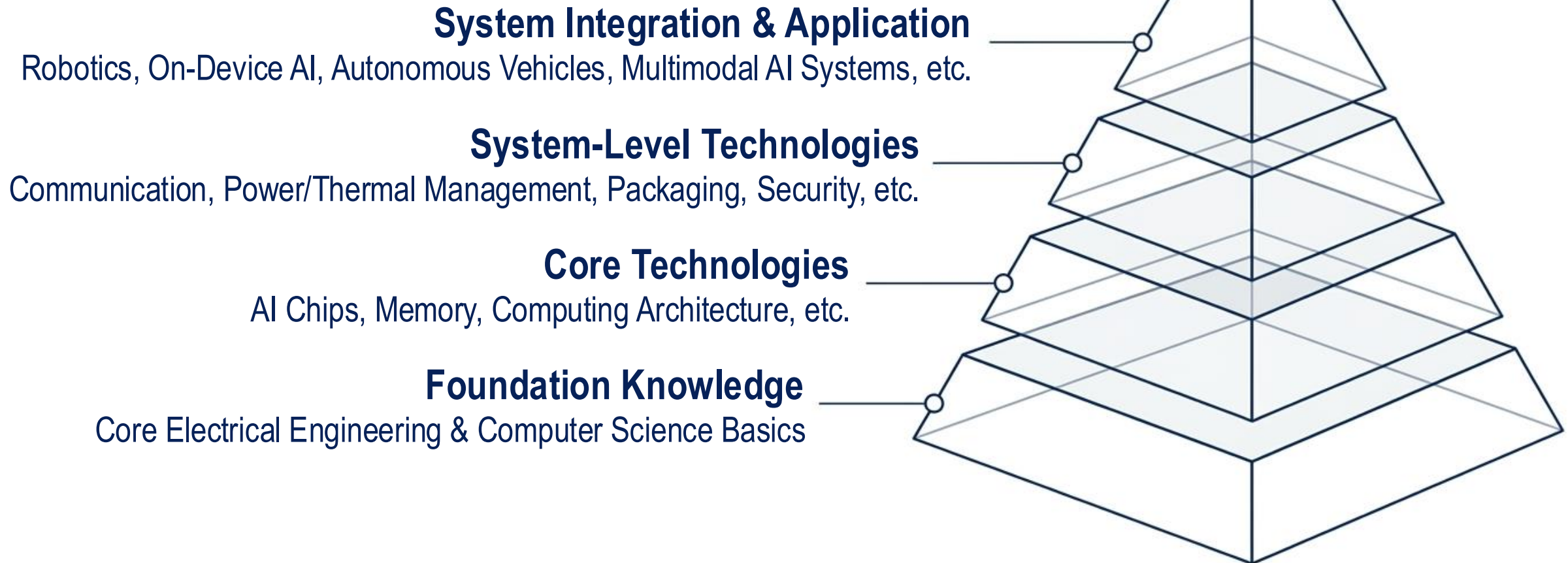
Nurturing practical talent to
solve real-world challenges



Pioneering Research

World-leading, large-scale
integrated flagship projects

Integrated Education: Hardware & Software, Speaking a Common Language



Industry Engagement: From Theory to Value, From Ideas to Startups



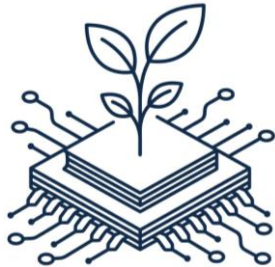
Internships

Internship opportunities with leading international and domestic AI system companies



Adjunct Faculty

Practical education learned directly from experts in AI system companies and venture capital firms



Entrepreneurship

Systematic entrepreneurship education program for creating technological value



Research Commercialization

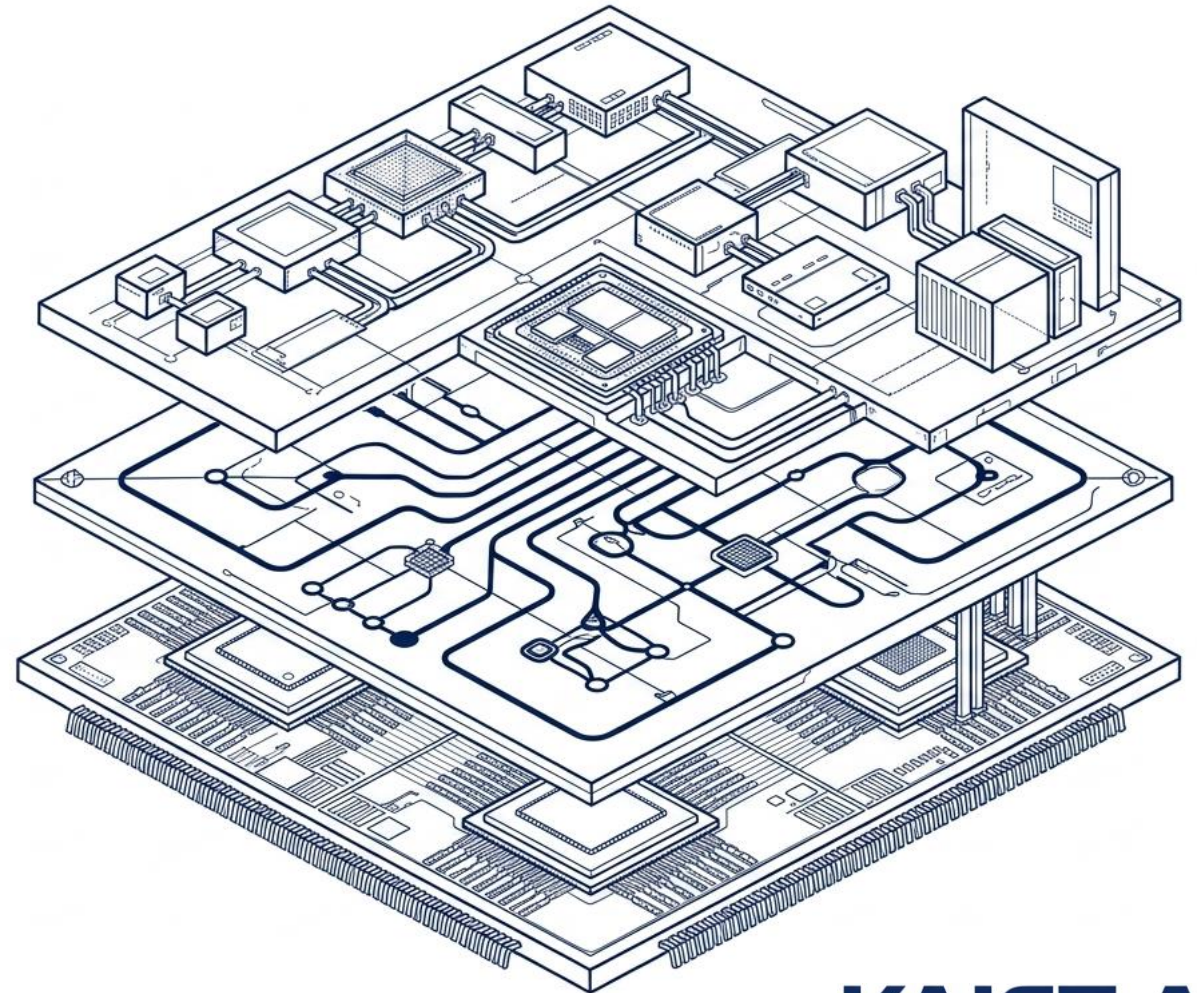
Creating a virtuous cycle where outstanding research results lead to technology transfer and startups

World-Leading Integrated Flagship Initiatives: KAIST AI Computing System (K-AICS)

Shared Goal:

Realizing world-class AI computing systems powered by KAIST's proprietary technologies

A new flagship project where participating labs conduct research in an organic and integrated manner, presenting new methodologies and directions to lead future AI technology development



What We Teach: Curriculum and Tracks

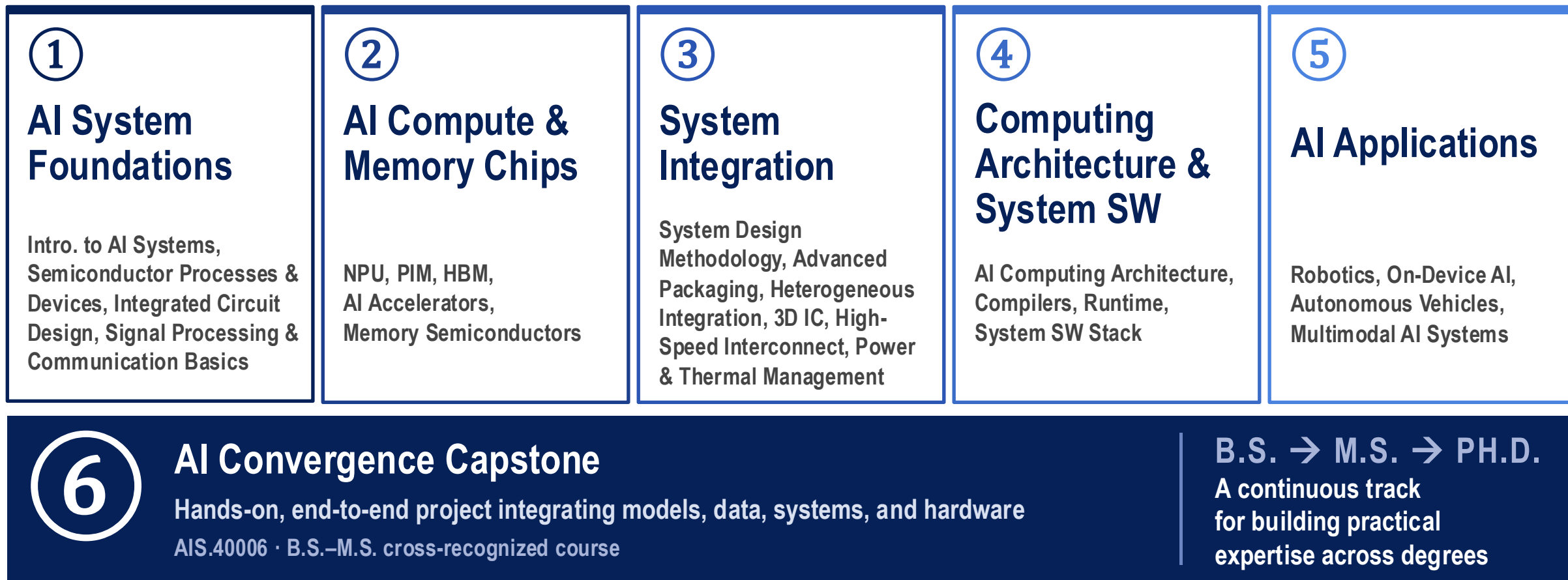
Curriculum Structure: From AI Semiconductors to System Software

Vertically integrated education spanning every layer of AI system infrastructure

AI Applications	Robotics, On-Device AI, Autonomous Vehicles, Multimodal AI Systems
Computing Architecture & System Software	AI Computing Architecture, Compilers, Runtime, System SW Stack
System Integration	System Design Methodology, Advanced Packaging, Heterogeneous Integration, 3D IC, High-Speed Interconnect, Power & Thermal Management
AI Compute & Memory Chips	NPU, PIM, HBM, AI Accelerators, Memory Semiconductors
AI System Foundations	Introduction to AI Systems, Semiconductor Processes & Devices, Integrated Circuit Design, Signal Processing & Communication

Five Tracks + AI Convergence Capstone

A complete education system built on 5 tracks and a convergence capstone



Vertically integrated, HW–SW co-designed within a single department curriculum

Restructured from core AI-system courses in EE and CS into one unified program

New Specialized Courses, Phased Rollout

Roadmap for newly designed AI system courses

9

New courses
Specialized for AI systems

PHASE 1

2026 Fall

First courses launched

Intro. to On-Device AI

AIS.40005

AI Convergence Capstone Design

AIS.40006 · B.S.–M.S. cross-recognized

Digital System-on-Chip Design

AIS.50005 · B.S.–M.S. cross-recognized

3 COURSES

PHASE 2

2027 Spring

Undergraduate foundations

Intro. to AI Systems

AIS.20001

AI Fundamentals & Lab

AIS.20014

2 COURSES

PHASE 3

Sequential

Phased development & rollout

Intro. to AI Memory

AIS.40001

Intro. to Physical AI

AIS.40002

Semiconductor Packaging for AI Systems

AIS.40003

Semiconductor Devices for AI Systems

AIS.40004

4 COURSES

K-AICS

Flagship Project

KAIST AI Computing System — building a world-class AI computing platform

Graduate flagship initiative · cultivating Ph.D.-level research leaders

KAIST AIS

Who We Are Looking For: Our Future Students

Who We Are Looking For

탐험가 (Explorer)



**Boundary-breaking minds
with a relentless curiosity for
integrating hardware and
software**

창조자 (Creator)



**Makers who love to bridge
the gap between idea and
code, and between concept
and system**

리더 (Leader)



**Visionaries who will lead
technological innovation for a
better world and pioneer new
paradigms**

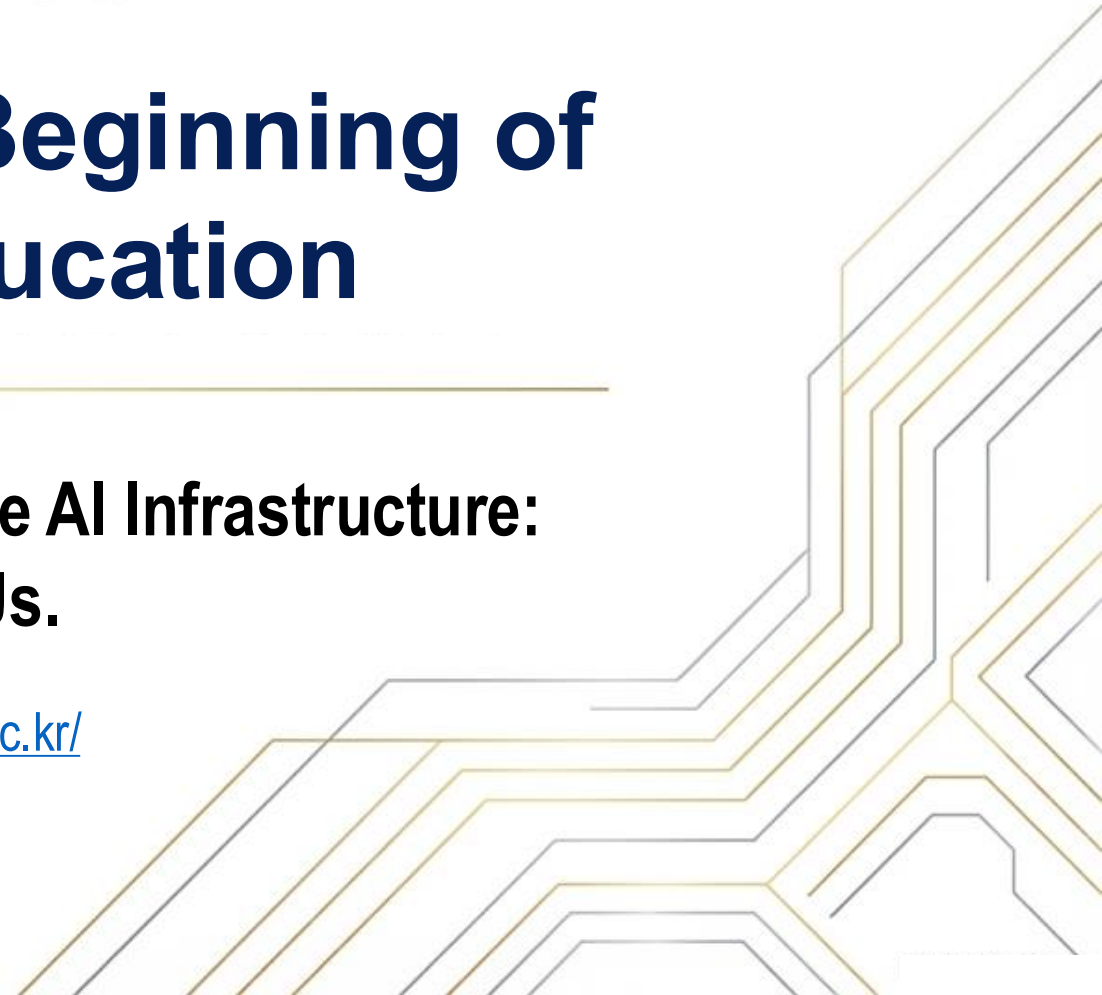
KAIST AIS

Korea's First: The Beginning of AI Systems Education

**A Grand Journey Toward Future AI Infrastructure:
Embark with Us.**

<https://ai-systems.kaist.ac.kr/>

mkje@kaist.ac.kr

A series of overlapping, parallel lines in gold and grey, forming a complex, angular pattern that resembles a stylized circuit board or a modern architectural design, located in the bottom right corner of the slide.