

**[Jigwan Foundation PAN+ Scholars @ SK hynix]
Beyond the Hype Curve - What Today's AI Can and
Cannot Do, and the Technical Frontiers That Will
Define the Next Decade**

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Visiting Professor @ Sogang University

Advisory Professor @ DGIST

About Speaker

- *Co-Founder & CTO @ Erudio Bio, Inc., San Jose & Novato, CA, USA* 2023 ~
- *Co-Founder & CEO @ Erudio Bio Korea, Inc., Korea* 2025 ~
- *Co-Founder, Leader, and Chair of Silicon Valley AI Nexus, USA* 2024 ~
- *CGO / Global Managing Partner @ LULUMEDIC, Seoul, Korea* 2025 ~
- *AI-Korean Medicine Integration Initiative Task Force Member @ The Association of Korean Medicine, Seoul, Korea* 2025 ~
- *Advisor to Korean American Semiconductor Professional Alliance (KASPA)* 2026 ~
- *KFAS-Salzburg Global Leadership Fellow @ Salzburg Global Seminar, Austria* 2024 ~
- *Adjunct Professor, EE Department @ Sogang University, Seoul, Korea* 2020 ~
- *Advisory Professor, EECS Department @ DGIST, Korea* 2020 ~
- Global Advisory Board Member @ Innovative Future Brain-Inspired Intelligence System Semiconductor of Sogang University, Korea 2020 ~
- Technology Consultant @ Gerson Lehrman Group (GLG), NY, USA 2022 ~

- Co-Founder & CTO / Head of Global R&D / Chief Applied Scientist / Senior Fellow @ Gauss Labs, Inc., Palo Alto, CA, USA 2020 ~ 2023
- VP / Fellow @ SK hynix 2020 ~ 2021
- Senior Applied Scientist @ Amazon.com, Inc., Vancouver, BC, Canada 2017 ~ 2020
- Principal Engineer @ Software R&D Center, Samsung Electronics 2016 ~ 2017
- Principal Engineer @ Strategic Marketing & Sales, Samsung Electronics 2015 ~ 2016
- Principal Engineer @ DT Team, DRAM Dev, Samsung Electronics 2012 ~ 2015
- Senior Engineer @ CAE Team, Memory Business, Samsung Electronics 2005 ~ 2012
- PhD - Electrical Engineering @ Stanford University, CA, USA 2001 ~ 2004
- Development Engineer @ Voyan, Santa Clara, CA, USA 2000 ~ 2001
- MS - Electrical Engineering @ Stanford University, CA, USA 1998 ~ 1999
- BS - Electrical & Computer Engineering @ Seoul National University 1994 ~ 1998

Highlight of Career Journey

- BS in Electrical Engineering (EE) @ Seoul National University
- MS & PhD in Electronics Engineering (EE) @ Stanford University
 - *Convex Optimization - Theory, Algorithms & Software*
 - Advisor - *Prof. Stephen P. Boyd*
- Principal Engineer @ Samsung Semiconductor, Inc.
 - *AI & Convex Optimization*
 - collaboration with *DRAM/NAND Design/Manufacturing/Test Teams*
- Senior Applied Scientist @ Amazon.com, Inc.
 - *e-Commerce AIs* - anomaly detection, deep RL, and recommender system
 - *Jeff Bezos's project* - drove \$200M in sales via Amazon Mobile Shopping App
- *Co-Founder & CTO / Global R&D Head & Chief Applied Scientist* @ Gauss Labs, Inc.
- *Co-Founder & CTO* @ Erudio Bio, Inc.
- *Co-Founder & CEO* @ Erudio Bio Korea, Inc.

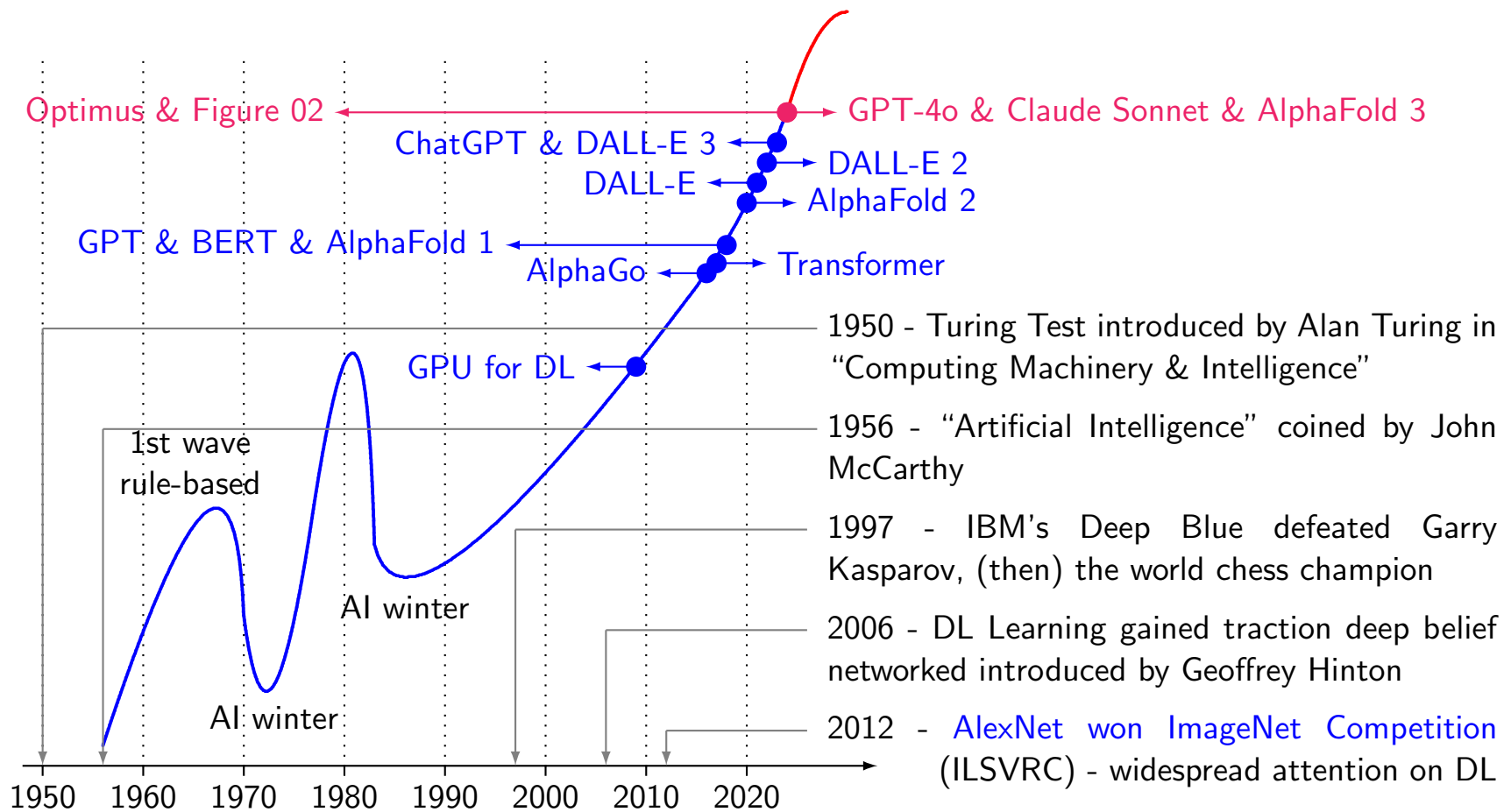
Unpacking AI for Jigwan Scholarship Program Students

- Artificial Intelligence - 5
 - AI history & recent significant achievements
 - market indicators
- AI Agents - 22
 - big data → ML/DL → LLM & genAI → agentic AI
 - LLM as highly effective knowledge-transfer representation learner
- Building Your Superpower using AI - 38
 - AI power user vs AI expert
 - powerful combination - domain expert + AI expert
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Artificial Intelligence

AI History

History



Significant AI Achievements - 2014 – 2025

Deep learning revolution

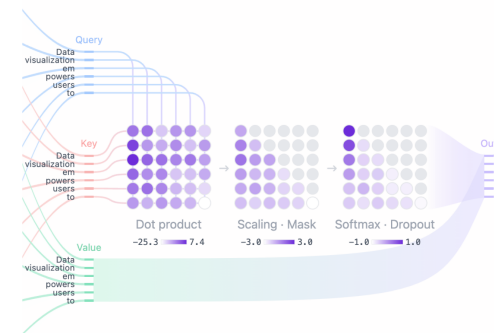
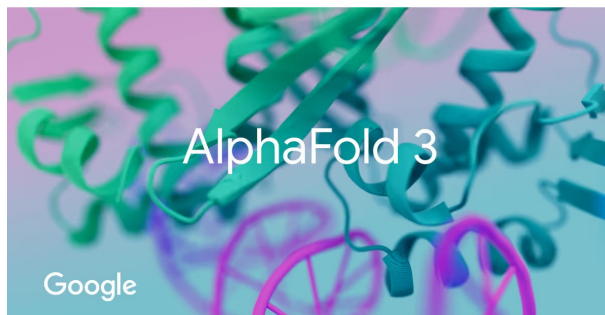
- 2012 – 2015 - DL revolution¹
 - CNNs demonstrated exceptional performance in image recognition, *e.g.*, *AlexNet's victory in ImageNet competition*
 - widespread adoption of DL learning in CV transforming industries
- 2016 - AlphaGo defeats human Go champion
 - DeepMind's AlphaGo defeated world champion in Go, extremely complex game *believed to be beyond AI's reach*
 - significant milestone in RL - AI's potential in solving complex & strategic problems



¹CV: computer vision, NN: neural network, CNN: convolutional NN, RL: reinforcement learning

Transformer changes everything

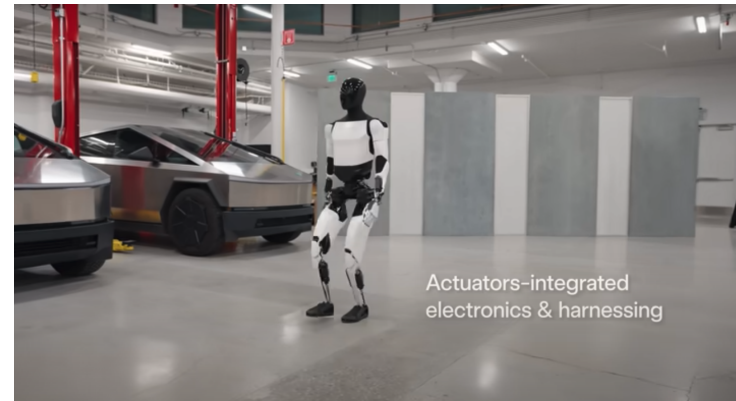
- 2017 – 2018 - Transformers & NLP breakthroughs²
 - *Transformer (e.g., BERT & GPT) revolutionized NLP*
 - major advancements in, e.g., machine translation & chatbots
- 2020 - AI in healthcare – AlphaFold & beyond
 - DeepMind's *AlphaFold solves 50-year-old protein folding problem* predicting 3D protein structures with remarkable accuracy
 - accelerates drug discovery and personalized medicine - offering new insights into diseases and potential treatments



²NLP: natural language processing, GPT: generative pre-trained transformer

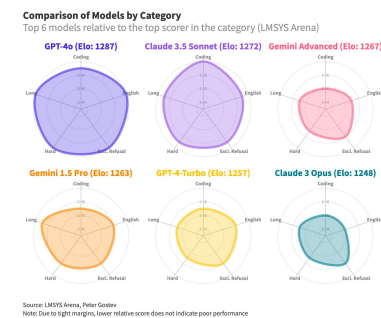
Lots of breakthroughs in AI technology and applications in 2024

- proliferation of advanced AI models
 - GPT-4o, Claude Sonnet, Claude 3 series, Llama 3, Sora, Gemini
 - *transforming industries* such as content creation, customer service, education, *etc.*
- breakthroughs in specialized AI applications
 - Figure 02, Optimus, AlphaFold 3
 - driving unprecedented advancements in automation, drug discovery, scientific understanding - *profoundly affecting healthcare, manufacturing, scientific research*



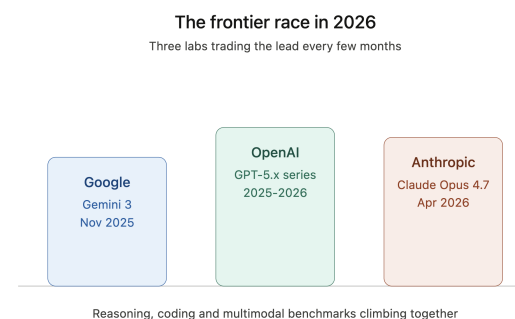
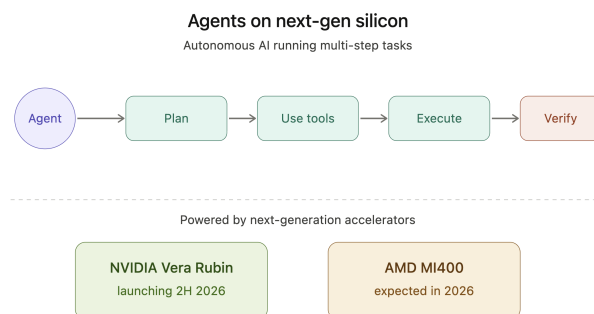
Major AI Breakthroughs in 2025

- next-generation foundation models
 - GPT-5 (Aug 2025) and Claude 4 demonstrate strong reasoning abilities
 - open-source models (Llama, DeepSeek, Qwen) closing the gap
- hardware innovations
 - NVIDIA Blackwell Ultra (B300) shipped in late 2025, with Rubin announced for 2026
 - AMD's MI350 series accelerators challenging NVIDIA's market dominance
- AI-human collaboration systems
 - agentic AI going mainstream – systems autonomously executing multi-step tasks
 - multimodal interfaces enabling more natural human-AI collaboration
 - AI systems increasingly explaining their (reasoning) and recommendations



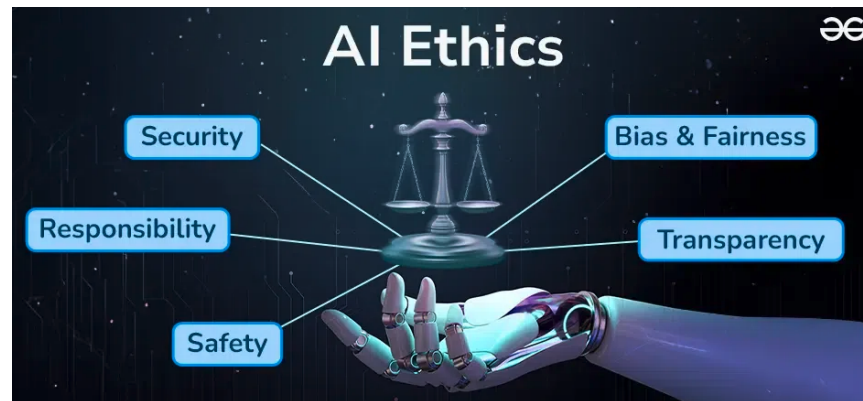
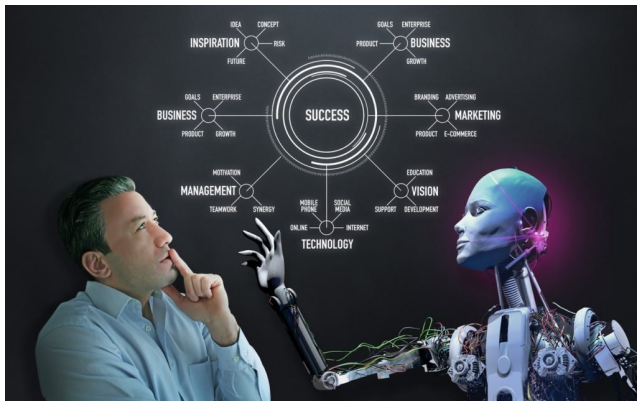
Where AI Is Heading in 2026 (as of May 2026)

- frontier models reaching new performance ceilings
 - Gemini 3, GPT-5.2 / 5.x series, Claude Opus 4.7 → multimodal benchmarks higher
 - intensifying competition among Google, OpenAI, and Anthropic
- hardware scaling and diversification
 - NVIDIA's Vera Rubin platform launching in 2H claiming $\sim 5\times$ faster than Blackwell
 - AMD MI400 series expected in 2026, continuing to challenge NVIDIA's dominance
- agentic AI going mainstream
 - AI agents autonomously executing long-horizon, multi-step tasks
 - expected expansion into enterprise workflows across software, finance, and research
 - growing focus on AI safety, reliability, and self-verification as capabilities scale



Transformative impact of AI - reshaping industries, work & society

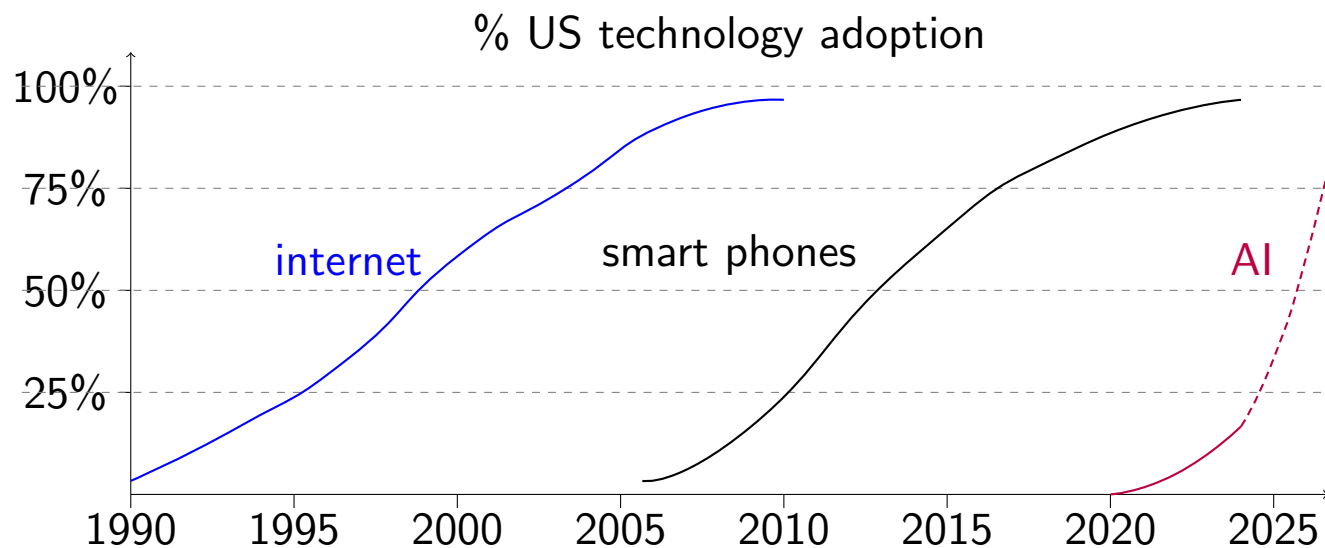
- accelerating human-AI collaboration
 - not only reshaping industries but *altering how humans interact with technology*
 - AI's role as collaborator and augmentor redefines productivity, creativity, the way we address global challenges, *e.g.*, *sustainability & healthcare*
- AI-driven automation *transforms workforce dynamics* - creating new opportunities while challenging traditional job roles
- *ethical AI considerations* becoming central not only to business strategy, but to society as a whole - *influencing regulations, corporate responsibility & public trust*



Measuring AI's Ascent

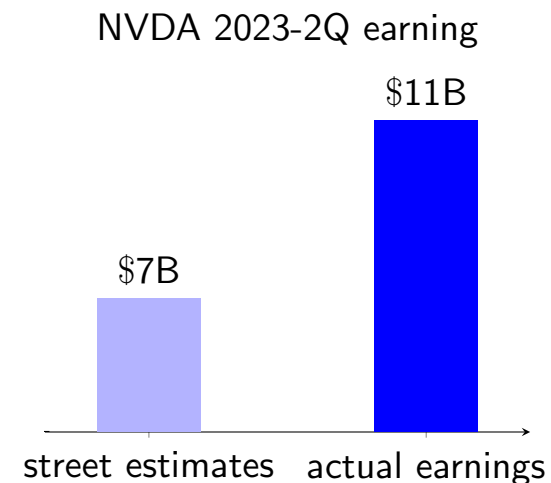
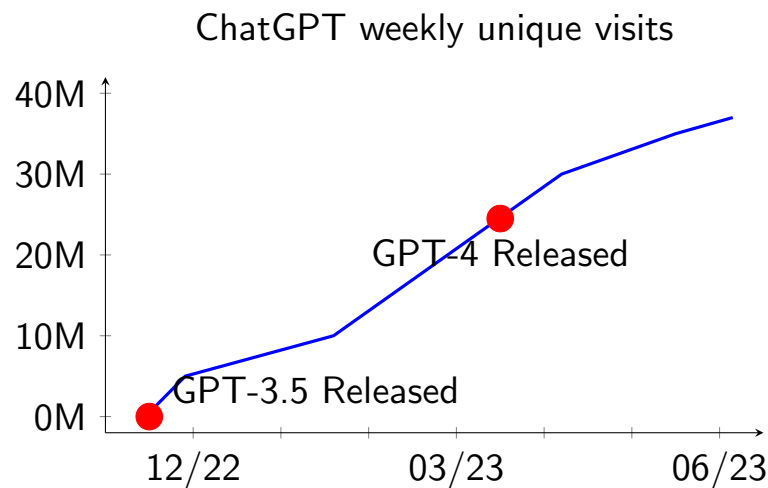
Where are we in AI today?

- sunrise phase - currently experiencing dawn of AI era with significant advancements and increasing adoption across various industries
- early adoption - in early stages of AI lifecycle with widespread adoption and innovation across sectors marking significant shift in technology's role in society



Explosion of AI ecosystems - ChatGPT & NVIDIA

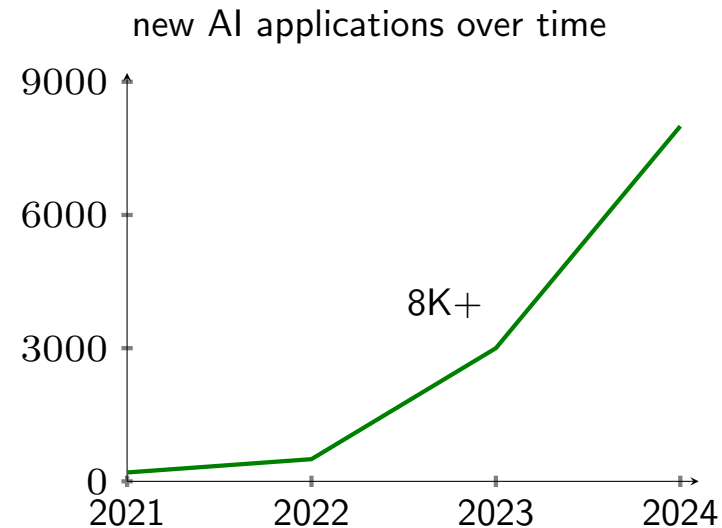
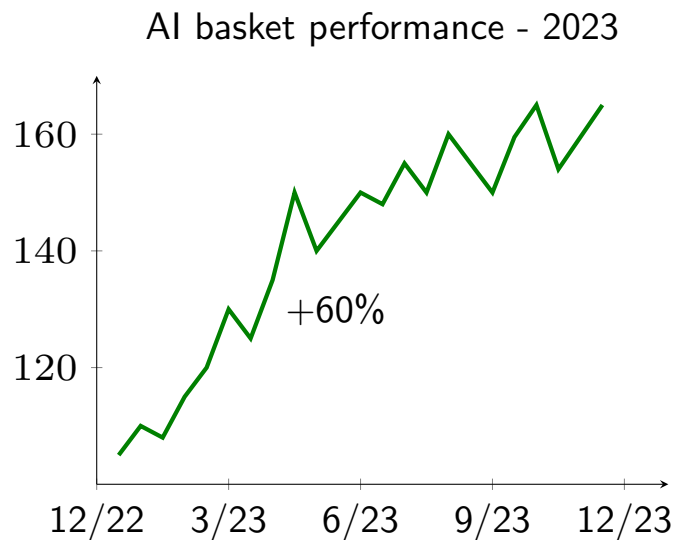
- took only *5 months for ChatGPT users to reach 35M*
- NVIDIA 2023 Q2 earning exceeds market expectation by big margin - \$7B vs \$13.5B
 - surprisingly, *101% year-to-year growth*
 - even more surprisingly *gross margin was 71.2%* - up from 43.5% in previous year³



³source - Bloomberg

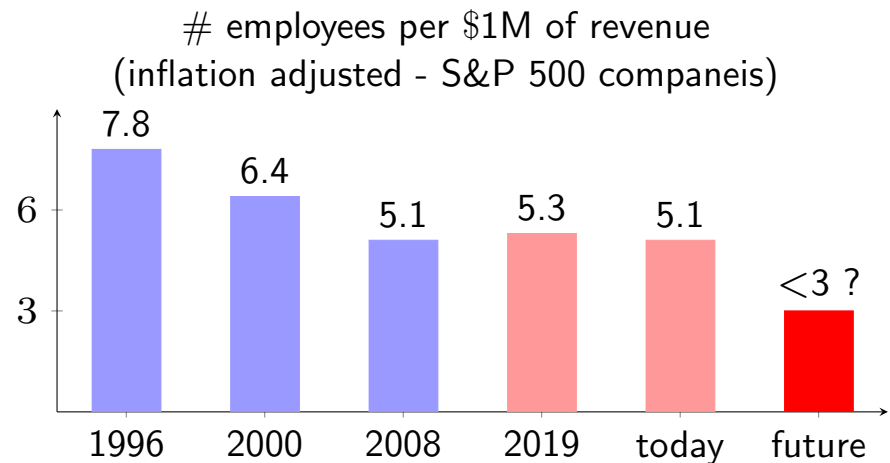
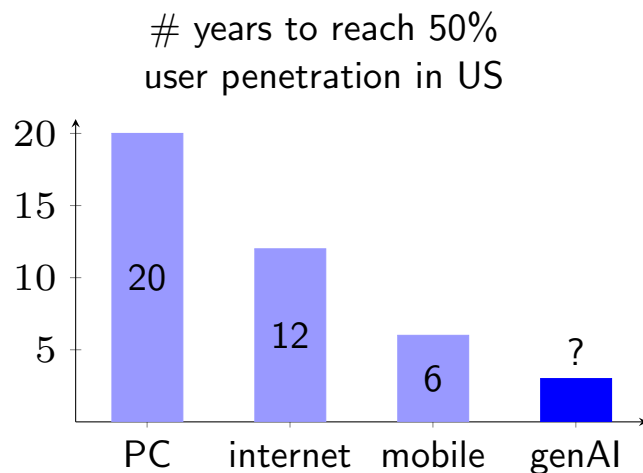
Explosion of AI ecosystems - AI stock market

- *AI investment surge in 2023 - portfolio performance soars by 60%*
 - AI-focused stocks significantly outpaced traditional market indices
- *over 8,000 new AI applications* developed in last 3 years
 - applications span from healthcare and finance to manufacturing and entertainment



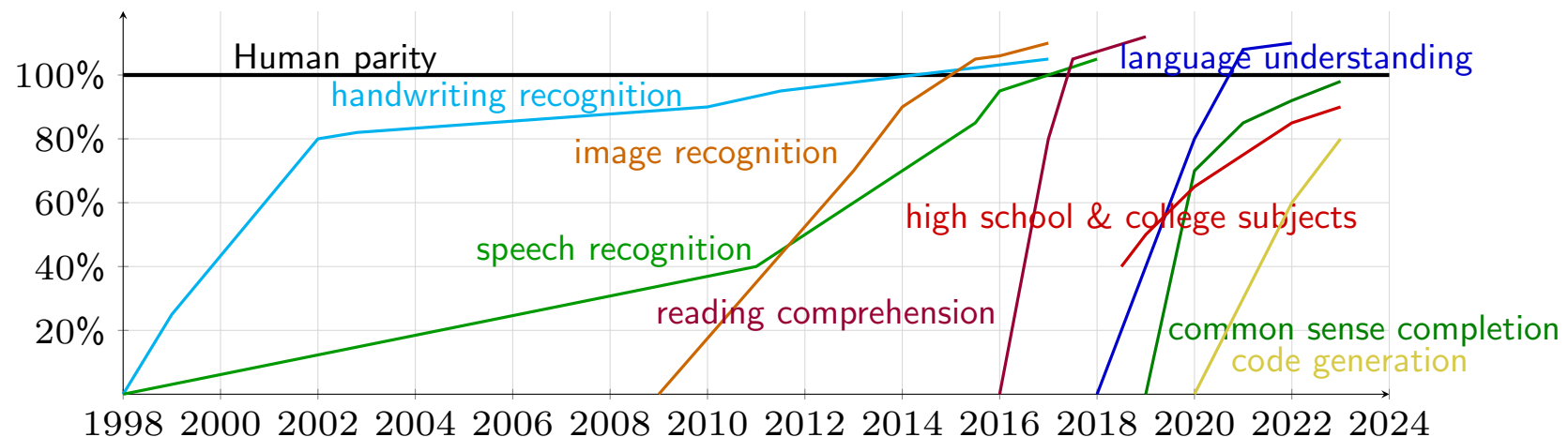
AI's transformative impact - adoption speed & economic potential

- adoption - has been twice as fast with platform shifts suggesting
 - increasing demand and readiness for new technology improved user experience & accessibility
- AI's potential to drive economy for years to come
 - 35% improvement in productivity driven by introduction of PCs and internet
 - greater gains expected with AI proliferation



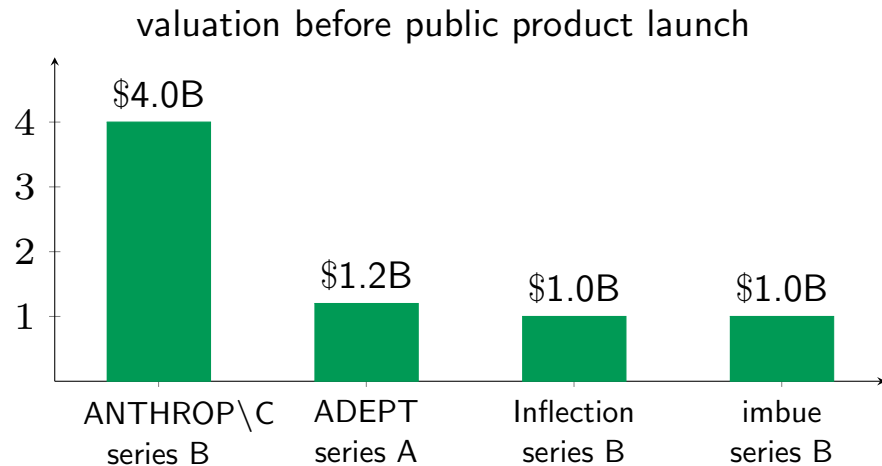
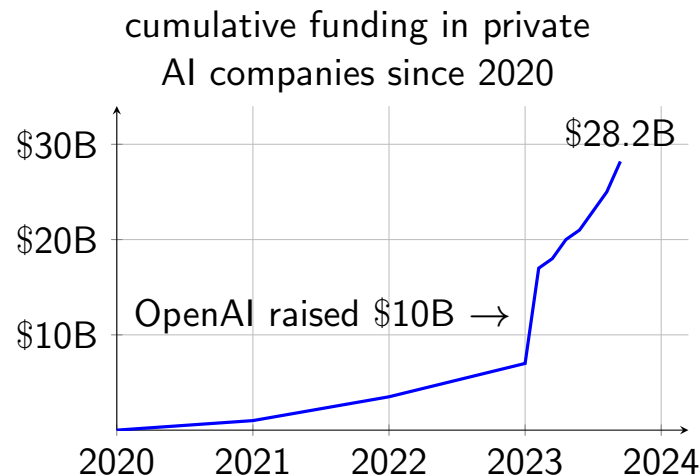
AI getting more & more faster

- steep upward slopes of AI capabilities highlight accelerating pace of AI development
 - period of exponential growth with AI potentially mastering new skills and surpassing human capabilities at ever-increasing rate
- closing gap to human parity - some capabilities approaching or arguably reached human parity, while others having still way to go
 - achieving truly human-like capabilities in broad range remains a challenge



Massive investment in AI

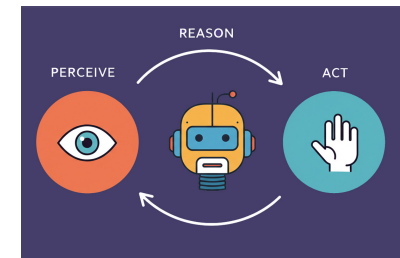
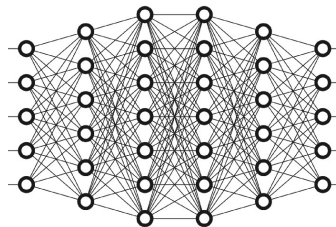
- *explosive growth* - cumulative funding skyrocketed reaching staggering \$28.2B
- OpenAI - significant fundraising (=\$10B) fueled rapid growth
- *valuation surge* - substantial valuations even before public products for stella companies
- *fierce competition for capital* among AI startups driving innovation & accelerating development
- massive investment indicates *strong belief in & optimistic outlook for potential of AI* to revolutionize industries & drive economic growth



AI Agents

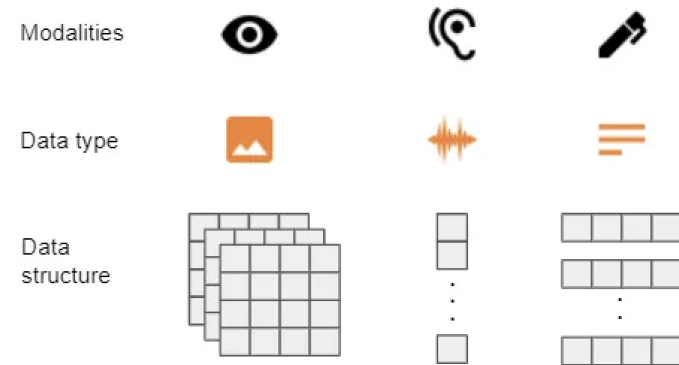
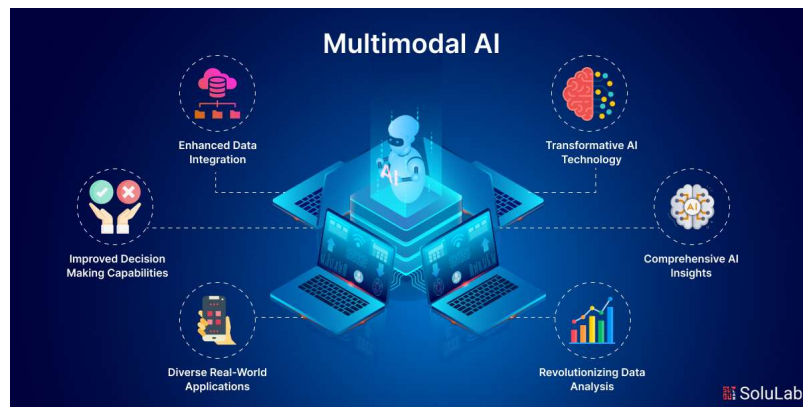
AI progress in 21st century in keywords

- 2010 ~ Big Data
- 2012 ~ Deep Learning
- 2017 ~ Transformer - Attention is All you need!
- 2022 ~ LLM & genAI
- 2024 ~ AI Agent (Agentic AI)



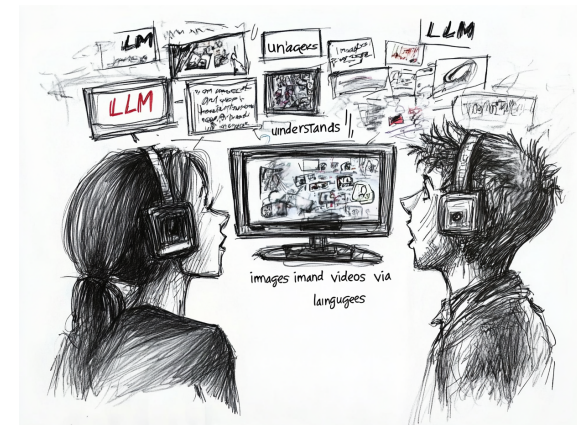
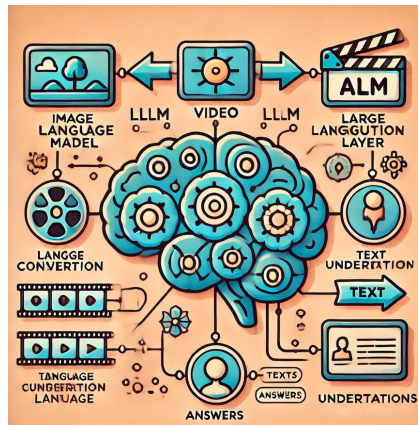
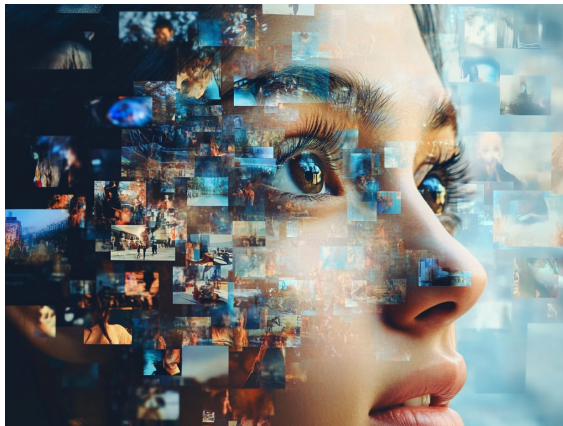
Multimodal learning

- understand information from multiple modalities, *e.g.*, text, images, audio, video
- representation learning methods
 - combine multiple representations or learn multimodal representations simultaneously
- applications
 - images from text prompt, videos with narration, musics with lyrics
- collaboration among different modalities
 - understand image world (open system) using language (closed system)



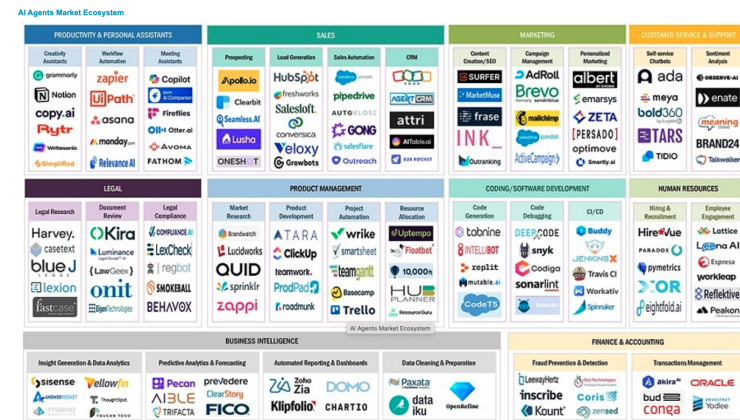
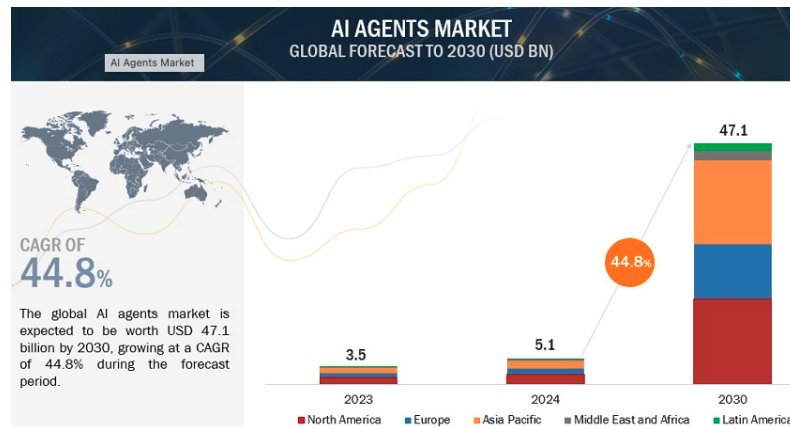
Implications of success of LLMs

- many researchers change gears towards LLM
 - from computer vision (CV), speech, music, video, even reinforcement learning
- *LLM is not only about NLP . . .* humans have . . .
 - evolved to optimize natural language structures for eons
 - handed down knowledge using *this natural languages* for thousands of years
 - internal structure (or equivalently, representation) of natural languages optimized via *thousands of generation by evolution*
- LLM *connects non-linguistic world (open system) via natural languages (closed system)*



Multimodal AI (mmAI)

- mmAI - systems processing & integrating data from multiple sources & modalities, to generate unified response / decision
- 1990s – 2000s - early systems - initial research combining basic text & image data
- 2010s - CNNs & RNNs enabling more sophisticated handling of multimodality
- 2020s - modern multimodal models - Transformer-based architectures handling complex multi-source data at highly advanced level
- mmAI *mimics human cognitive ability* to interpret and integrate information from various sources, leading to holistic decision-making

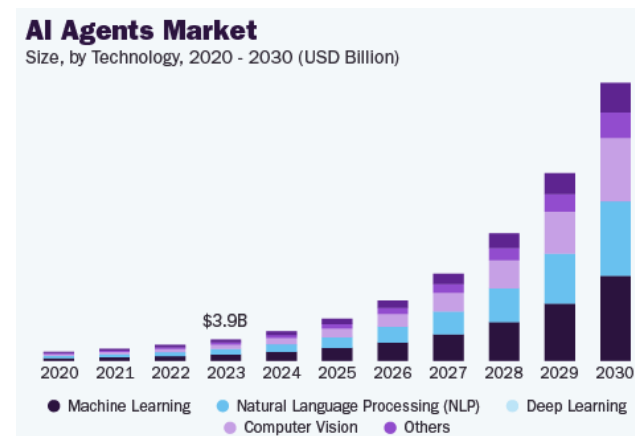
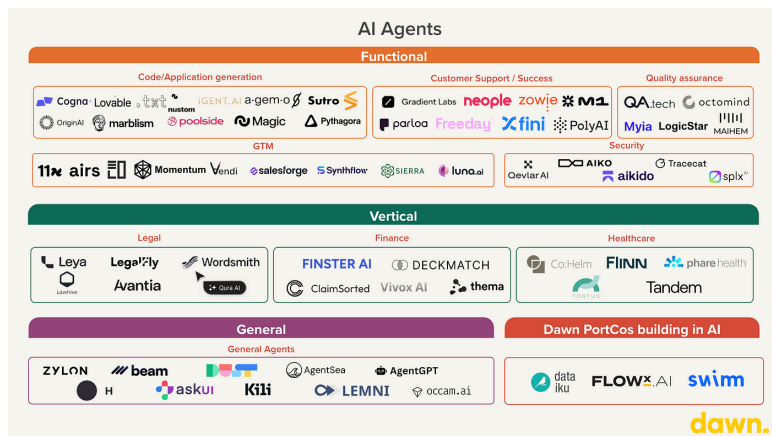


mmAI Technology

- core components
 - data preprocessing - images, text, audio & video
 - architectures - unified Transformer-based (*e.g.*, ViT) & cross-attention mechanisms / hybrid architectures (*e.g.*, CNNs + LLMs)
 - integration layers - fusion methods for combining data representations from different modalities
- technical challenges
 - data alignment - accurate alignment of multimodal data
 - computational demand - high-resource requirements for training and inferencing
 - diverse data quality - manage variations in data quality across modalities
- advancements
 - multimodal embeddings - shared feature spaces interaction between modalities
 - self-supervised learning - leverage unlabeled data to learn representations across modalities

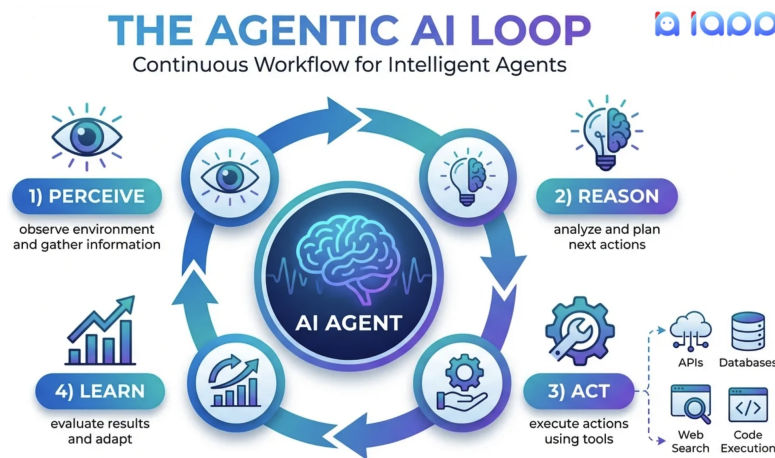
AI agents powered by multimodal LLMs

- foundation
 - integrate multimodal AI capabilities for enhanced interaction & decision-making
- components
 - perceive environment through multiple modalities (visual, audio, text), process using LLM technology, generate contextual responses & take actions
- capabilities
 - understand complex environments, reason across modalities, engage in natural interactions, adapt behavior based on context & feedback



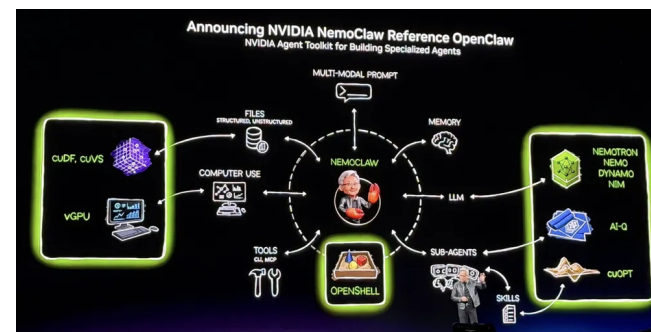
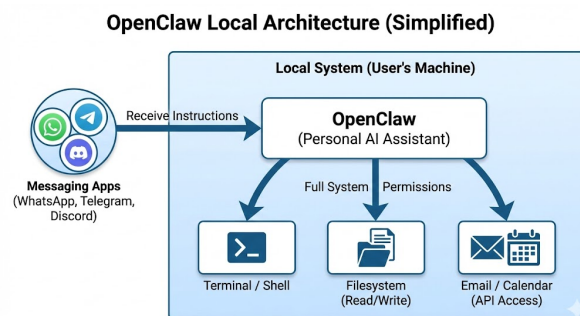
What makes AI “Agentic”?

- old AI responds to prompt; agentic AI *pursues goal*
- core loop
 - perceive → plan → (reason) → act → observe → repeat
- four traits - autonomy, tool use, memory/state, long-horizon planning
- enablers
 - tool/function calling, retrieval, code execution, multi-agent orchestration
- shift - *“answer my question”* → *“accomplish my objective”*



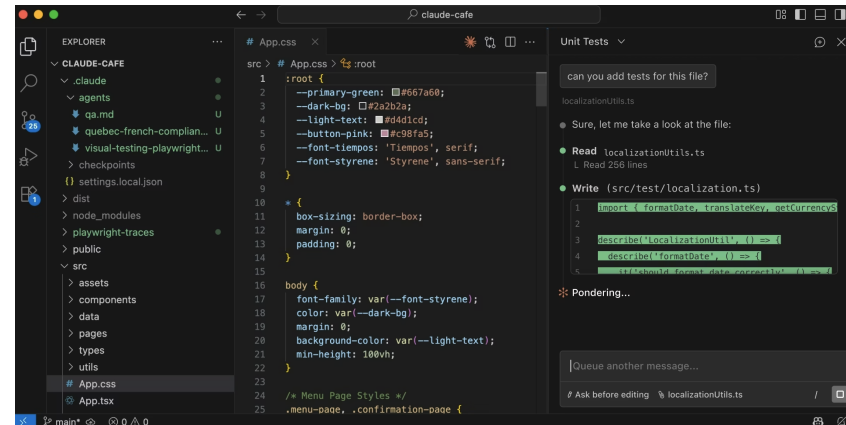
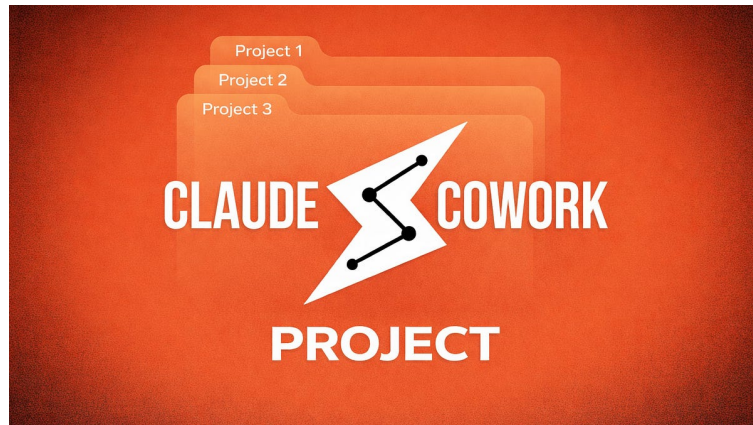
Cutting-edge AI agent tools - open source

- OpenClaw (Peter Steinberger) - open-source, runs locally, connects LLMs to real software
 - reads/writes files, runs shell commands, browses web, sends email, controls APIs
 - 350k+ GitHub stars (by May 2026) — most-starred GitHub software project
 - skill-based architecture - SKILL.md folders, shareable on ClawHub
 - works through chat apps - Slack, Telegram, WhatsApp, Discord, iMessage, *etc.*
 - model-agnostic - Claude, GPT, Gemini, or local via Ollama
- NVIDIA NemoClaw - security/privacy layer on top of OpenClaw
 - one-command install of Nemotron models + OpenShell secure runtime
 - network & filesystem isolation, local inference so no data leaves the device KKR



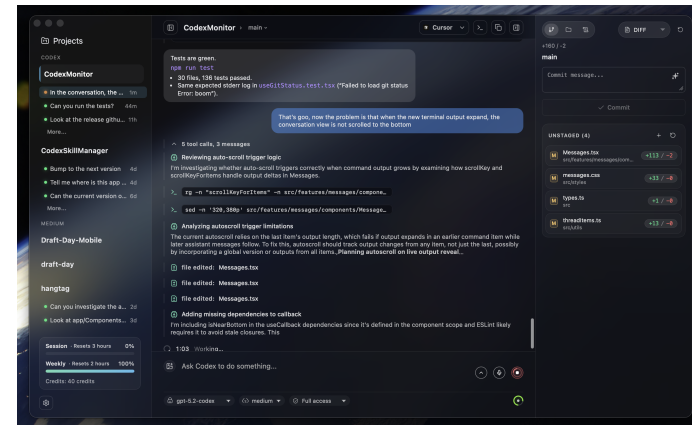
Cutting-edge AI agent tools - Anthropic

- Claude code
 - CLI/IDE coding agent; subagents, hooks, plugins, auto mode, routines
- Claude cowork
 - desktop tab; file-system access, scheduled recurring tasks, plugin marketplace
- managed agents
 - multi-agent orchestration; cloud-deployable agent templates TrendForce
- vertical bundles already shipping
 - legal, small business, marketing ops, finance



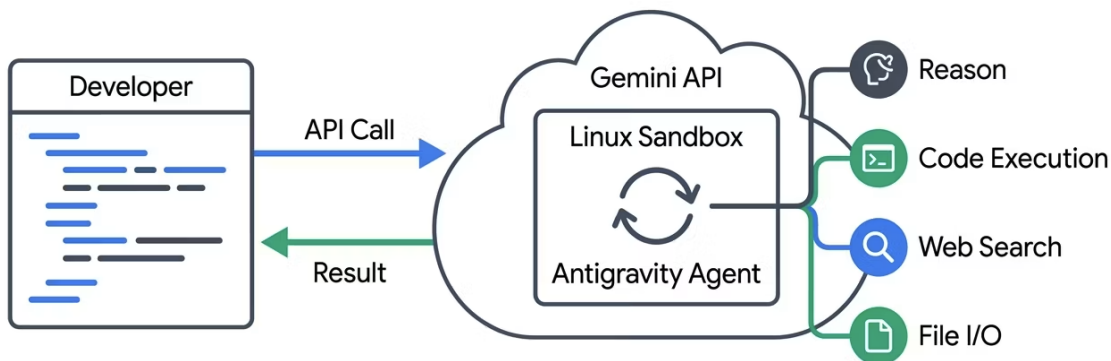
Cutting-edge AI agent tools - OpenAI

- OpenAI Codex
 - agentic coding tool - CLI, IDE, ChatGPT, desktop & now mobile
 - 2026 shift - from code editor → full “agent workspace”
 - multi-agent parallelism - runs several tasks in separate sandboxes while you review
 - powered by GPT-5.5 - tightly coupled, not model-agnostic (unlike Claude Code / OpenClaw) InfoQ
- Codex Security
 - dedicated agent that finds & fixes vulnerabilities



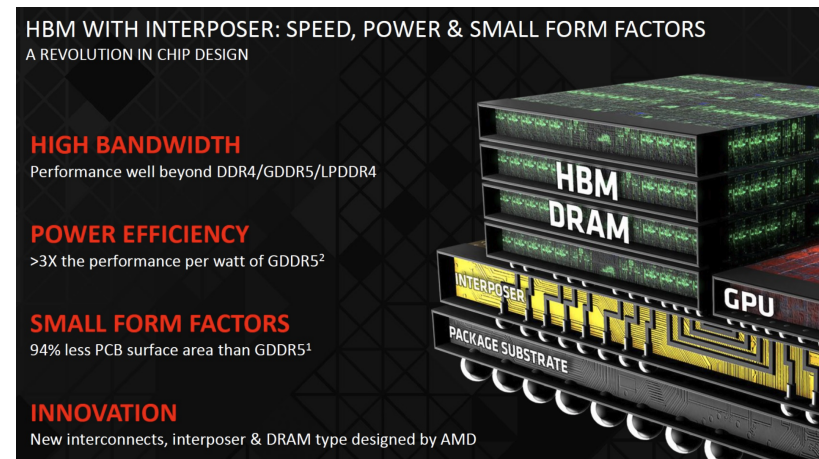
Cutting-edge AI agent tools - Google

- Antigravity 2.0
 - agent-first development platform; desktop app + CLI + SDK NVIDIA
- Gemini API Managed Agents
 - one API call spins up agent that reasons, uses tools, executes code
- Jules
 - AI agent for GitHub - debugging, pull-request prep NVIDIA Newsroom
- Gemini Spark
 - 24/7 personal agent on Gemini 3.5 Flash, wrapped in Antigravity
 - connects to Canva, OpenTable, Instacart, Workspace via MCP NVIDIA Blog



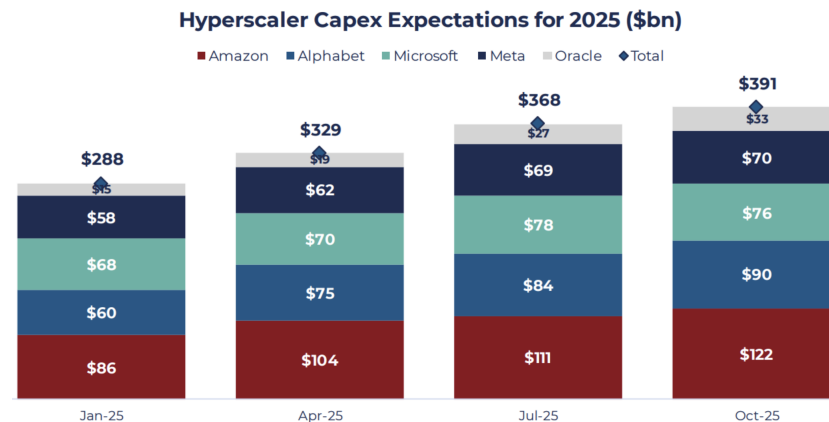
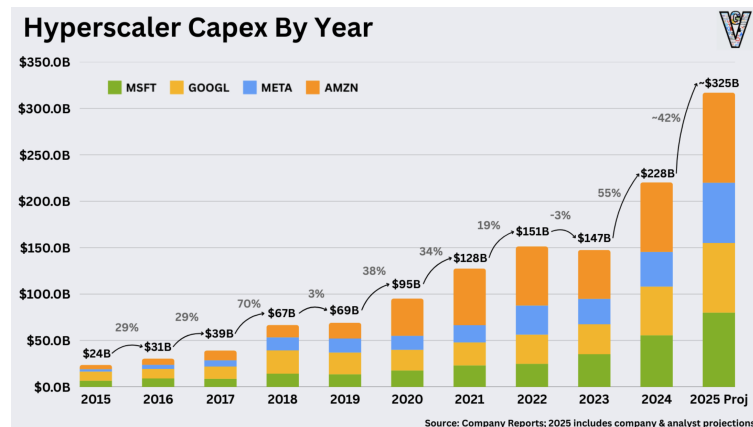
Agentic stack - LLM is engine, but not whole system

- *LLM - reasoning engine, not the system*
- stack
 - planner/orchestrator, memory (short/long-term), tools/APIs, environment interface
- patterns
 - ReAct, reflection/self-critique, planner-executor, multi-agent
- interoperability protocols emerging, *e.g.*, MCP, agent-to-agent
- *value migrating from model → system design*



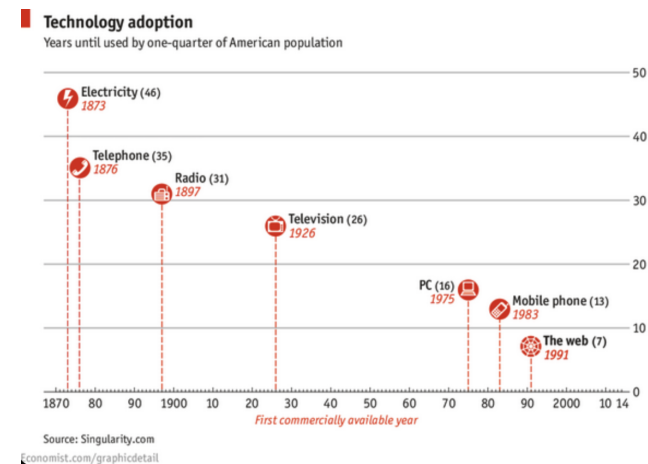
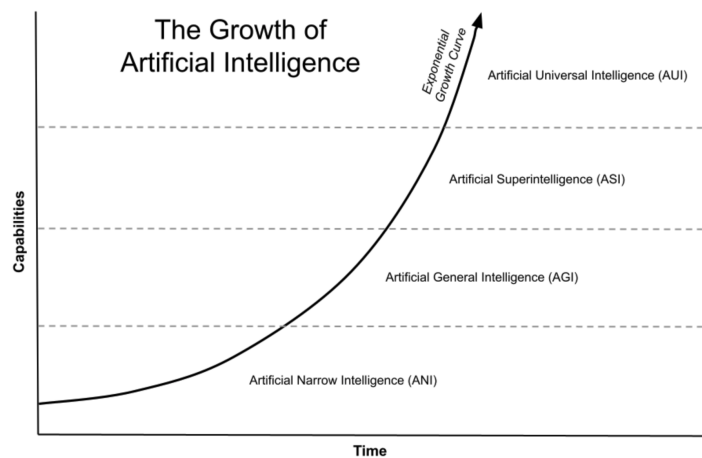
Trillion-dollar gravity well - capital, talent, geopolitics

- big 5 hyperscalers ~ \$725B AI capex in 2026 ~ Switzerland's GDP
- trajectory - \$256B (2024) → \$443B (2025) → \$725B (2026)
- *2026 is the first trillion-dollar year of compute capex in history*
- \$6.7T global data-center capex by 2030 (~70% AI) (McKinsey forecasting)
- *geopolitics*
 - export controls, chip sovereignty, national AI budgets



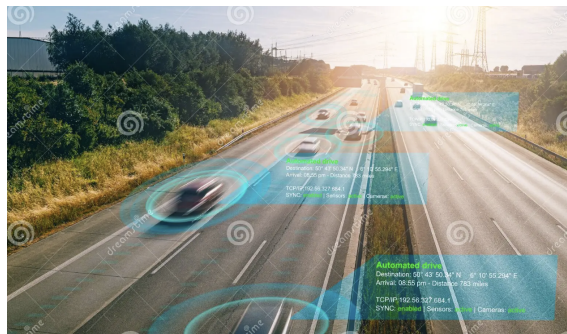
What took decades now takes months

- AlexNet (DL) → AlphaGo → Transformer → GPT (LLM) → Agentic in a decade
- adoption collapsing too
 - genAI penetration in fraction of PC/internet time
- *frontier you train on today will move by graduation*
- durable skill $\neq$ any one tool - it's relearning the frontier
- *what previously took decades now compresses into months!*



AI agents - present & future

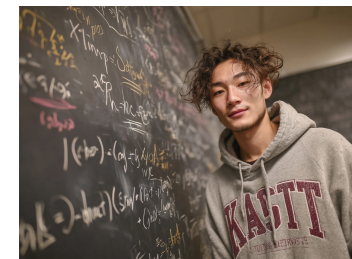
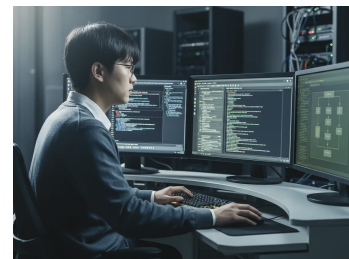
- emerging applications
 - scientific research - agents analyzing & running experiments & generating hypotheses
 - creative collaboration - AI partners in design & art combining multiple mediums
 - environmental monitoring - processing satellite sensor data for climate analysis
 - healthcare - enhanced diagnostic combining imaging, *e.g.*, MRI, with patient history
 - customer experience - virtual assistants understanding spoken language & visual cues
 - autonomous vehicles - integration of visual, radar & audio data
- future
 - ubiquitous AI agents - seamless integration into everyday devices
 - highly tailored personalized experience - in education, entertainment & healthcare



Building Students' Superpower

Students already building with AI - two paths, one future

- AI power user - domain experts using AI (majority)
 - 17-year-old high school student - passionate about helping elderly grandparents
 - built medication reminder app using Claude - no programming background
 - “. . . didn't learn to code. I learned to describe what grandparents need to AI.”
 - college business student - interested in K-beauty industry
 - used Claude to analyze social media sentiment to predict K-beauty trend
 - “I understood Korean beauty culture. AI understood data patterns.”
- AI expert - AI scientists & engineers & builders
 - computer science junior - 4 years studying math, algorithms, neural networks
 - fine-tuned open-source LLM for Korean medical terminology
 - collaborated with doctors (domain experts) on diagnostic tool



AI power user - domain expert AI-amplified

- who this is for?
 - you love literature, business, medicine, law, art, design, *etc.*
 - you find AI interesting as TOOL, not as end in itself
 - you get excited about domain problems, not algorithms
- what you'll do
 - deepen expertise in your chosen field (4+ years) - learn AI tools as power tools
 - use AI to amplify your domain work & compete on domain insight + AI leverage
- career examples
 - doctor using AI diagnostics, teacher using AI personalization
 - lawyer using AI research, artist using AI iteration
 - marketer using AI analytics, scientist using AI simulation



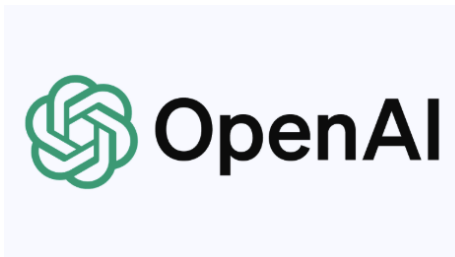
AI expert - researcher/scientist/engineer/developer

- who this is for?
 - you find algorithms, mathematics, systems *beautiful*, and read AI papers for fun
 - you want to work at AI labs being excited when new architectures are published
- what you'll do
 - deep study - mathematics, computer science, ML theory (*e.g.*, 4+ years)
 - understand neural networks, transformers to build and improve AI systems
 - *collaborate* w/ domain experts to apply your systems
- career examples
 - ML Engineer working for (tech) companies
 - AI Researcher in academia or industry labs
 - research scientist, robotics engineer, computer vision specialist



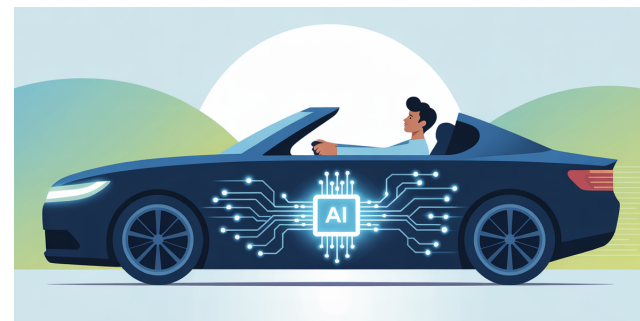
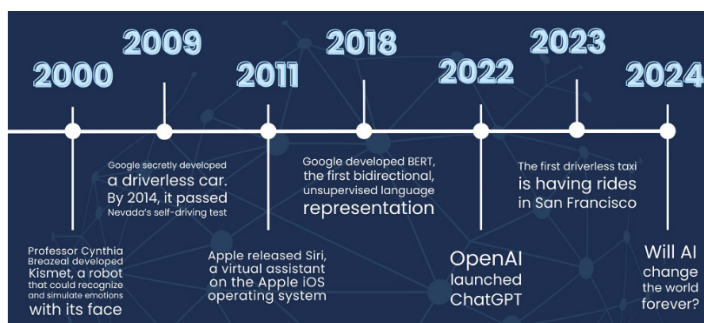
BIG shifts in AI landscape

- old assumption (2015 – 2020)
 - AI will be built by tech companies, everyone else will be disrupted
 - lots of tech companies will compete for best models/products
- new reality (2024 –)
 - AI is commoditized tool, domain expertise is where value accrues
 - only handful of companies can develop cutting-edge foundation models



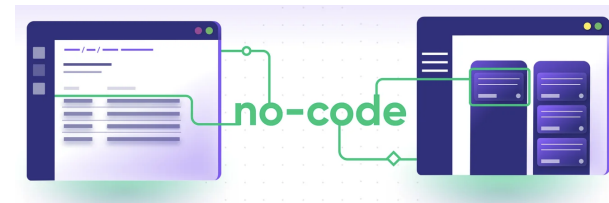
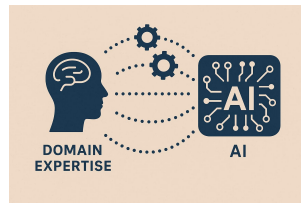
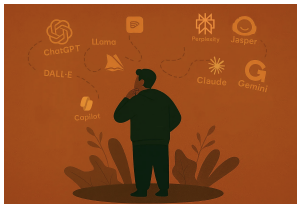
Domain expert revolution

- why domain experts are winning
 - problem identification requires domain knowledge
 - evaluation requires domain judgment
 - trust requires human domain expertise
 - context requires cultural/domain fluency
- pattern across industries
 - best medical AI applications → built by doctors collaborating with AI engineers
 - best legal AI tools → built by lawyers collaborating with AI engineers
 - best educational AI → built by teachers collaborating with AI engineers
 - domain expert leads & AI engineer supports (not the reverse)



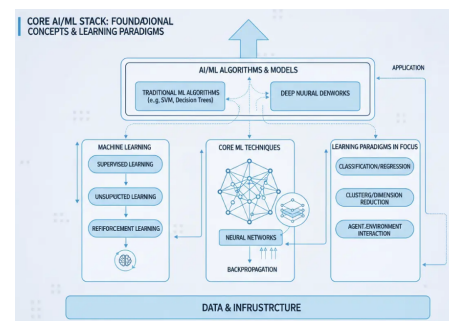
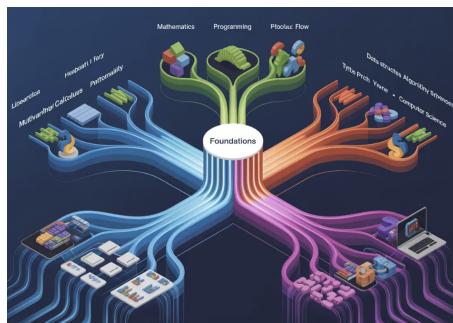
AI power user - what you actually need to learn

- tool awareness
 - what - know which AI tools exist and their capabilities
 - examples - ChatGPT for brainstorming, Claude for research, NotebookLM for synthesis
 - how - YouTube tutorials, free trials, experimentation
- right questions to throw - interactive way
 - what - communicate effectively with AI using domain knowledge
 - why it works - your domain knowledge makes prompts effective
 - how - practice + domain expertise
- tool integration
 - what - connect AI tools to your workflow, build custom GPTs, use APIs (no coding)
 - how - no-code tools + tutorials



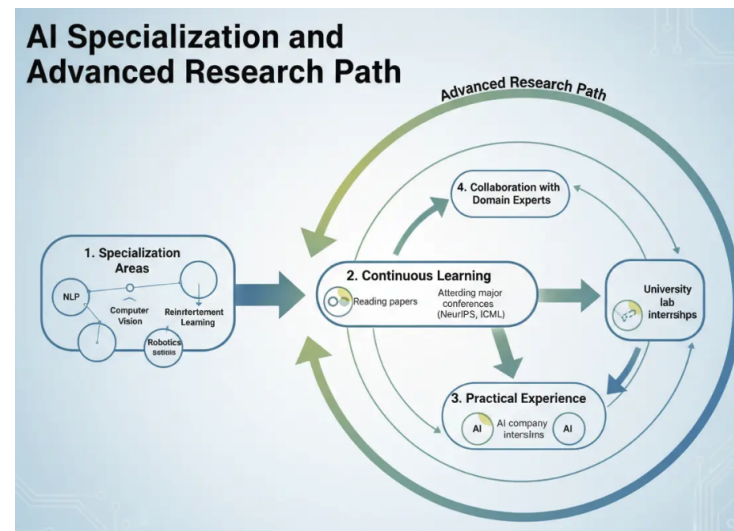
AI expert path - how to become AI scientist/researcher/engineer/practitioner

- foundation
 - mathematics - linear algebra, multivariable calculus, probability theory, optimization
 - programming - python w/ PyTorch, TensorFlow, . . .
 - computer science - data structures, algorithms, systems
- core AI/ML
 - machine learning (ML) - supervised/unsupervised learning, reinforcement learning, neural networks, backpropagation
 - deep learning (DL) - CNNs, RNNs, Transformers, attention mechanisms
 - practical projects - competitions, replicate papers, contribute to open source



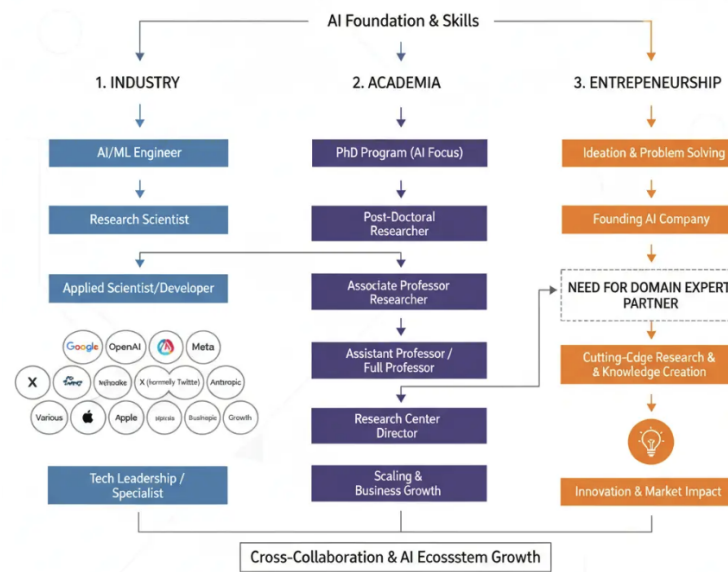
AI expert path - how to become AI scientist/researcher/engineer/practitioner

- specialization
 - choose area (or not!) - NLP, computer vision (CV), robotics, *etc.*
 - read papers - arxiv, attend conferences (*e.g.*, NeurIPS, ICML, ICLR, CVPR, *etc.*)
 - research experience - lab work at university, internships at AI companies
 - collaboration - work with domain experts on real problems



AI expert path - how to become AI scientist/researcher/engineer/practitioner

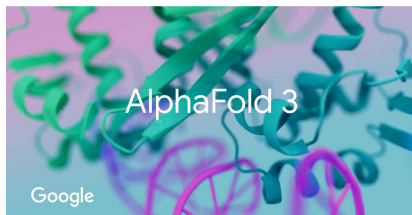
- career paths
 - industry - Google, OpenAI, Meta, Apple, X, Anthropic, and numerous startups
 - academia - PhD → professor / research center
 - entrepreneurship - found AI company (but need domain expert partner!)



Powerful combination - domain expert + AI expert collaboration

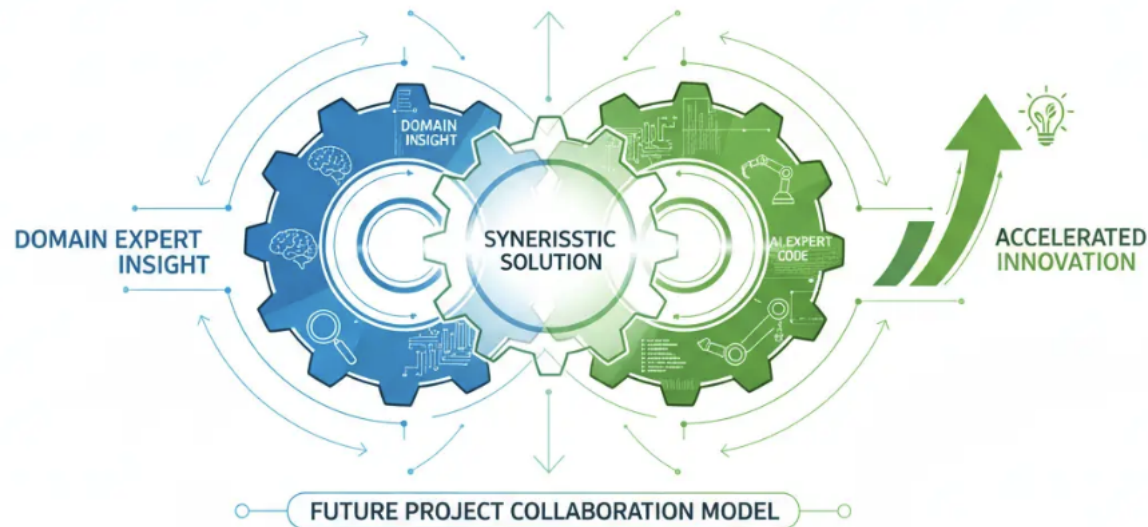
The magic happens at the intersection!

- case study 1 - AlphaFold (Protein Folding)
 - AI engineers - build transformer-based neural network, optimized training
 - structural biologists - identify protein folding as THE problem, validated outputs
 - result - 50-year problem solved - neither could do it alone
 - both Demis Hassabis (CEO @ Google DeepMind) & John Jumper (biochemistry background) got Nobel Prizes in chemistry in 2024!
- case study 2 - cancer diagnostic AI
 - AI engineer role - build model, handle large medical imaging datasets
 - oncologist role - label training data correctly, evaluate clinical relevance
 - result - 30% improvement in early detection
 - who makes final diagnosis - always the doctor!



Powerful combination - domain expert + AI expert collaboration

- case study 3 - your future project
 - domain expert & AI super user- identify problem in your field you understand deeply
 - AI expert - build custom solution beyond available tools
 - result - breakthrough that neither could achieve alone
 - who drives vision - TOGETHER!



Things AI can't do for you - choose who you'll become

- your technical superpower (Domain $\times$ AI) is only as good as *your moral compass*
- why this matters more than ever
 - AI amplifies whatever you choose to do - good intentions OR bad ones
 - history shows us - brilliant minds + no moral foundation = catastrophe
 - your skills will make you powerful; your values determine what you do with that power
- virtues that actually matter in the long run
 - *integrity* - doing the right thing (even) when no one's watching
 - *empathy* - genuinely caring about people; your technology will affect them
 - *service* - building things that help others, not just things that benefit you
 - *morality* - having inner compass that guides you beyond what's legal or profitable



Two pathways to scientific excellence - what to look for

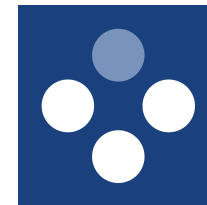
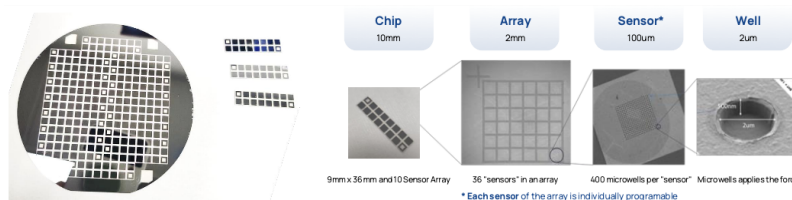
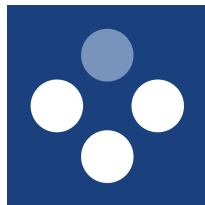
- two equally valuable pathways for students
 - AI researchers and engineers; building the tools
 - domain scientists who leverage AI - biologists, chemists, physicists using AI as powerful tool
 - both require deep problem-solving ability — but manifested differently
- beyond traditional metrics of knowledge mastery
 - ask compelling questions (not just answer them)
 - demonstrate genuine domain curiosity
 - show adaptability in learning new tools
 - exhibit collaborative mindsets
 - demonstrate genuine domain curiosity
 - show adaptability in learning new tools
 - exhibit collaborative mindsets

Appendix

Erudio Bio

Powering AI-driven medicine with ground-truth binding data

- problems we solve
 - 90% of drugs fail in clinical trials due to poor early-stage prediction
 - multiplexed diagnostics suffer from false positives and cross-reactivity
- *Erudio Bio's Innovation*
 - *VSA* platform uses patented “*dynamic force spectroscopy*” to generate 1000x more high-quality binding data from single sample ($\sim 10\mu\text{L}$)
 - measuring not just presence, but *strength* and *kinetics* of molecular interactions
- *dual business model*
 - diagnostics - *multi-cancer biomarker detection* with clinical institutions & hospitals
 - *drug discovery - bioTCAD™ platform* providing ground-truth labels to train & validate pharma AI models, reducing preclinical cycles



Validated technology, proven team, clear path to market

- validated impact
 - *\$1M Gates Foundation Grant* (2025) to democratize drug development for global health
 - partnerships with top research institutions (KRIBB, KAIST)
- unique team - *Stanford-trained founders* combining
 - semiconductor TCAD expertise & force spectroscopy innovation (20+ years)
 - AI & optimization leadership (Samsung, Amazon, SK hynix, Gauss Labs)
- market entry
 - *Korea → (Asia hub &) US* strategy with 2026 regulatory milestones
 - expanding *pharma partnerships and B2G*

Gates Foundation



Biological Assays Struggle with Scale & Accuracy

Data is expensive

- so we make decisions with *incomplete* picture
- status quo
 - limited, small-scale testing confirms diagnosis
 - outcome only as good as doctor's ability to determine which tests, limiting the picture
 - cross reactivity prevents larger scale testing
- Erudio creates
 - *comprehensive, large-scale* testing will drive diagnosis without assumptions
 - increased scale enables enhanced scientific discovery leading to
 - *better patient care*
 - *reduced time to diagnosis*
 - *cost reduction*



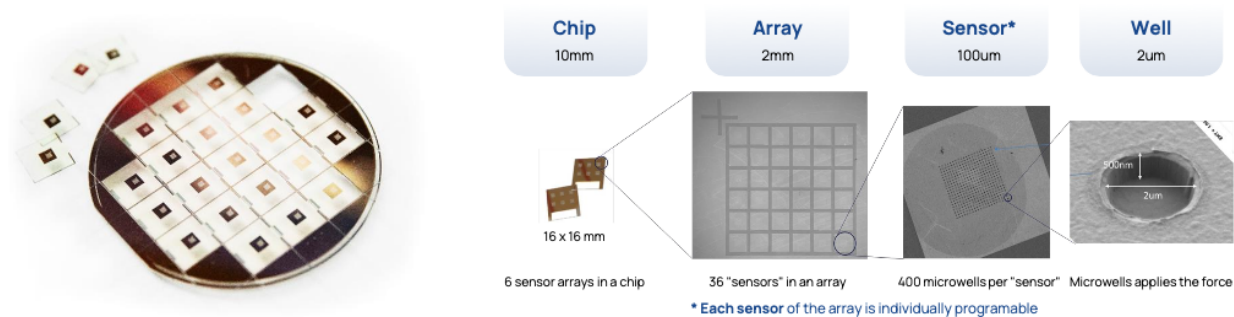
Erudio Bio starts revolution with Gates Foundation's support

- more data
 - comprehensive data from *single biological sample*
 - *multiplexed analysis* of nucleic acid, protein, cells, and more!
 - *multi-omic platform*
- actionable data
 - combined quality score from all data sources for comprehensive & conclusive assessment
- earlier data
 - complete data early to drive accurate decision making



Versatile Smart Assay (VSA) Platform

VSA technology



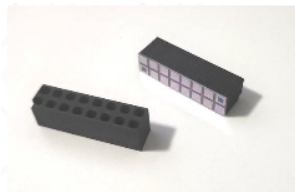
- generates *1000x more data* than the prevailing technology
 - scalable multi-omic microarray sensor
- *21 patents* in US, Canada, EU, and China
- indicates how good the data is in real time
 - patented “dynamic force spectroscopy” and “powerful Bayesian inference” method provides our data *quality score* to know their accuracy for actionable data
- AI software extracts a detailed, interpretable picture for quick diagnosis
 - leads to *AI knowledge discovery* resulting in *data-driven diagnosis*

Enabling comprehensive data acquisition

- antibodies - versatile tools in biology
 - can engineer to target virtually *anything* we want
 - problem
 - indiscriminate interactions severely limits use of antibodies – *cross-reactivity*
 - error-prone results due to *non-specific binding*
- solution - comprehensive data with *dynamic force spectroscopy*
 - comprehensive binding strength to distinguish specific from non-specific binding
 - *quality score* discerns noise from useful data to enable multiplexing



VSA's business models



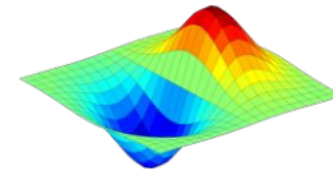
Consumable chip
& flowcell



Instrument



Consumable
reagent kit



Software
AI/ML & SaaS

- VSA platform
 - instrument - recurring revenue with high margin
 - modular licensable software - AI based data interpretation and feature extraction
- SaaS
 - subscription based pre-validation of reagent database
 - AI feature extraction and knowledge discovery

When Erudio's VSA meets AI - Gates Foundation Grant

Erudio Bio wins \$1M Gates Foundation Grant - scaling bioTCAD

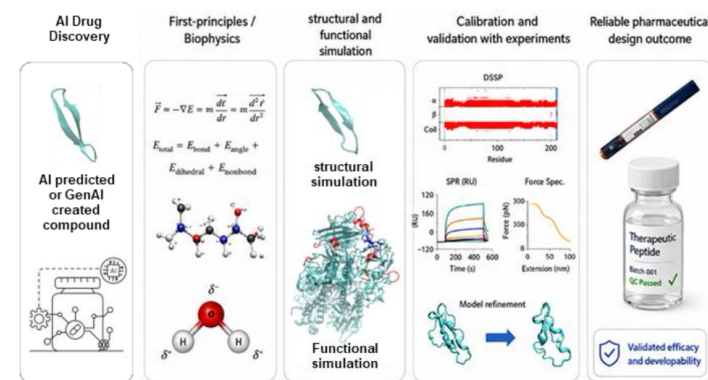
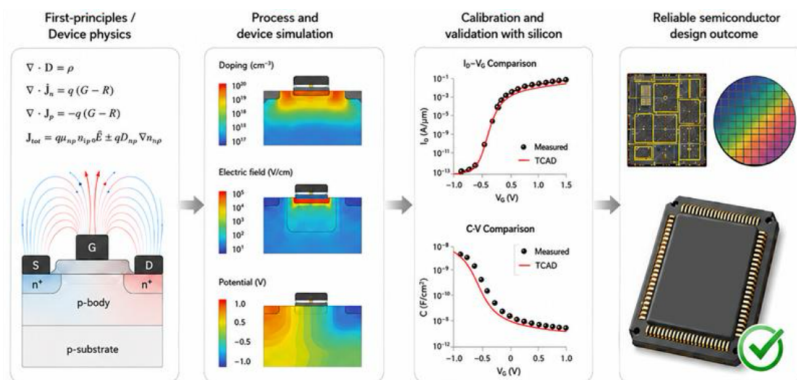
Gates Foundation



- *\$1M Grant Award (2025)*
 - Gates Foundation recognizes Erudio Bio's potential to transform drug development for global health
- mission alignment - democratizing medicine by making preclinical drug design faster, yet reliable & accessible
 - lowering development costs for diseases affecting LMICs
 - addressing the 90% clinical trial failure rate that drives up drug costs
- funded project - develop *bioTCADTM platform for lead optimization of drug discovery*
 - expand force spectroscopy measurements across high-burden disease targets
 - train AI models with kinetics-resolved binding data (on/off rates, unbinding forces)
 - *enable pharma/biotech to prioritize candidates earlier with higher confidence*

bioTCAD - hybrid AI & physics-based drug development

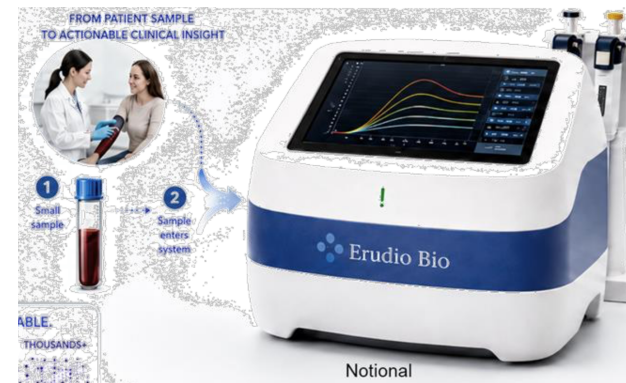
- (old school) AI/ML excels at pattern recognition across large chemical libraries
 - identifying candidate hits at scale – valuable role established and growing
- AI alone *cannot reliably explain binding physics or predict behavior in unexplored and novel chemical space* – *capability and credibility gap*
- bioTCAD combines *AI and measurement-backed, physics-grounded simulation*
- applies *the* principle that made semiconductor TCAD trustworthy
 - validate model parameters to YOUR experimental measurements to be reliably right



Erudio Bio's Business Models

Erudio Bio Applications

- drug development
- clinical diagnostic
 - medicine is already 20% of the world's economy and growing at 5% per year
- biodefense
 - GWOT to great power competition
 - need to defend against near-peer adversaries
 - flexible, efficient solution needed from CBRND to readiness



Teams

Team & advisory board

- team
 - Kee-Hyun Paik, Ph.D. (CEO) - chip, microfluidics, instrumentation
 - Sunghee Yun, Ph.D. (CTO) - AI, optimization, business development, software
 - Susanne Baumhueter, Ph.D. - biology, immunology, project management
- advisory board
 - Michael Cola - CEO of AEVI Genomic Medicine (\$62B sales to Takeda)
 - Tim Germann - CCO of Carterra Bio
 - Karyn Eliot - retired CIA Sr. Executive
 - Phil Ferro - virologist, formerly DoD, DoS, HHS and White house
 - Bill Chen - Former hedge fund and VC professional with national security, FFRDC
 - Ronald W. Davis - Director of Stanford Genome Tech Center (\$15B+ exits)
 - Michael Snyder - Prof. Genetics, Dir. Stanford Human Genome Center
 - William J. Greenleaf - Prof. Genetics and Applied Physics, Stanford University



Sunghee Yun

Jul 23, 2026



Silicon Valley AI Nexus

Silicon Valley AI Nexus (or just AI Nexus)

- pioneering community of professionals dedicated to building privacy-preserving AI solutions, products, and systems
- comprehensive expertise across AI domains
 - biotechnology, healthcare, and medical research
 - industrial applications and data centers
 - cloud infrastructure, storage solutions, mobile technologies
 - customer service platforms, multi-agent systems
 - RAG implementations, vector databases, agentic AI frameworks
- vision
 - *shaping future where AI innovation and privacy protection go hand in hand*
- active community with [homepage](#) & KakaoTalk collaboration platform for members

Our journey - forum history

- Nov-Dec 2024 - “The AI Strikes Back” & “Free Your Data”
 - Prof. Jung Hee Cheon (homomorphic encryption revolution)
- Jan 2025 - “The AI Knight Rises”
 - [Sunghee Yun](#) @ Erudio Bio on deep learning to flourishing societies
- Feb 2025 - “Silicon Citadel”
 - Chanik Park @ MangoBoost on AI data infrastructure
- Mar 2025 - “Blockchain Awakens”
 - Daejun Park @ a16z crypto on decentralized AI
- Apr 2025 - “Advancing Humanity”
 - Stanford Medicine team on bio/medical AI
 - co-hosting with K-BioX
- May 2025 - “The Autonomous Alliance”
 - Microsoft, GitHub, Uclone, SK Hynix on AI agents

Our journey - forum history

- Jun 2025 - “Silicon Companions”
 - Altos Ventures on robotics & smart devices
- Aug 2025 - “The Human-Centric AI Revolution”
 - address legal and ethical issues related to AI
- Nov 2025 - “The AI Silicon Race”
 - Korea-US Innovation Leadership at K-ASIC



Strategic partnerships & ecosystem

- *Perpetual Partnership with KOTRA Silicon Valley as Strategic Alliance*
- 2026 co-hosting partners
 - K-ASIC (Korea AI & IC Innovation Center)
 - K-BioX (biotech innovation)
 - KOTRA Silicon Valley (trade & investment)
 - Consulate General of the Republic of Korea at San Francisco (diplomatic support)
 - KABANC (Korean American Bar Association of Northern California - legal expertise)
- building bridges between Silicon Valley innovation and Korean institutional networks
- creating comprehensive support ecosystem: technical, legal, business, diplomatic



Community & engagement

- membership requirements
 - attend one! AI Nexus event!
- member benefits
 - networking with AI professionals across all domains
 - knowledge sharing and collaboration opportunities
 - direct access to world-class speakers and experts
- forum format - 5pm-8pm, typically Wednesdays at premier Silicon Valley venues
- venues - Stanford, KOTRA, SK Hynix, Altos Ventures, K-ASIC, and more
- active community engagement and professional development



Three Core Tenets

- *Explore & Lead*
 - world-class forums, the AI & Humanity Council, and thought leadership shaping AI's most consequential questions
- *Elevate Community*
 - mentorship, startup showcases, professional connections, and leadership opportunities that amplify every voice
- *Give Back to Society*
 - policy engagement, academic partnerships, and public discourse ensuring AI's benefits reach beyond Silicon Valley

AI Nexus encourages and embraces Interest Groups

- Bio / Medical / Data Group (7)
 - Chanik Insuk Jeff Jongmin Minha Mitch Sunghee led by Chanik
- Karaoke Group (4)
 - Hayden Jeff Sunghee Yeseul led by Sunghee
- AI Hands-on Group (5)
 - Chanik James Kyoung Whan Minha Sunghee led by Minha
- East Bay Group (7)
 - Daniel Eugene Hyunjung Linda MiSook MJ Sunghee led by Hyunjung

Collaboration with Institutions & Universities

- MOUs
 - SNU
 - *AI Nexus × SNU College of Engineering Silicon Valley Immersion Program*
 - *Winter Internship 2026*
 - asked by
 - KIC SV
 - SVreboot
 - XL8
 - KASPA
 - Korea Univ.
 - Sungkyunkwan Univ.
 - KAIST
 - Korean American Semiconductor Professional Alliance (KASPA)
 - *etc.*

Collaboration with Institutions & Universities

- Co-hosting with
 - K-BioX
 - KOTRA SV
 - KIC SV
 - K-ASIC
 - Korea-America Student Conference (KASC)
 - Consulate General of the Republic of Korea at San Francisco
 - Korean American Bar Association of Northern California (KABANC)
 - *etc.*

AI Nexus Committee

- Board of Directors
 - *Sunghee Yun* - Co-Founder & Char
 - *Minha Hwang* - Co-Founder & AI Master
 - *Sue Kim* - Co-Founder & Marketing Leader
 - *Youngwook (Hayden) Song* - Co-Founder & Legal Affairs Advisor
 - *Bo Hyoung (Jeff) Lee* - Co-Founder & Legal Affairs Advisor
 - *MiSook Chung* - Co-Founder & Community Engagement Chair
- Vision & Principles Committee
- Tech & Social Media Committee
- Program & Content Committee
- the full list of committees can be found [here](#)!

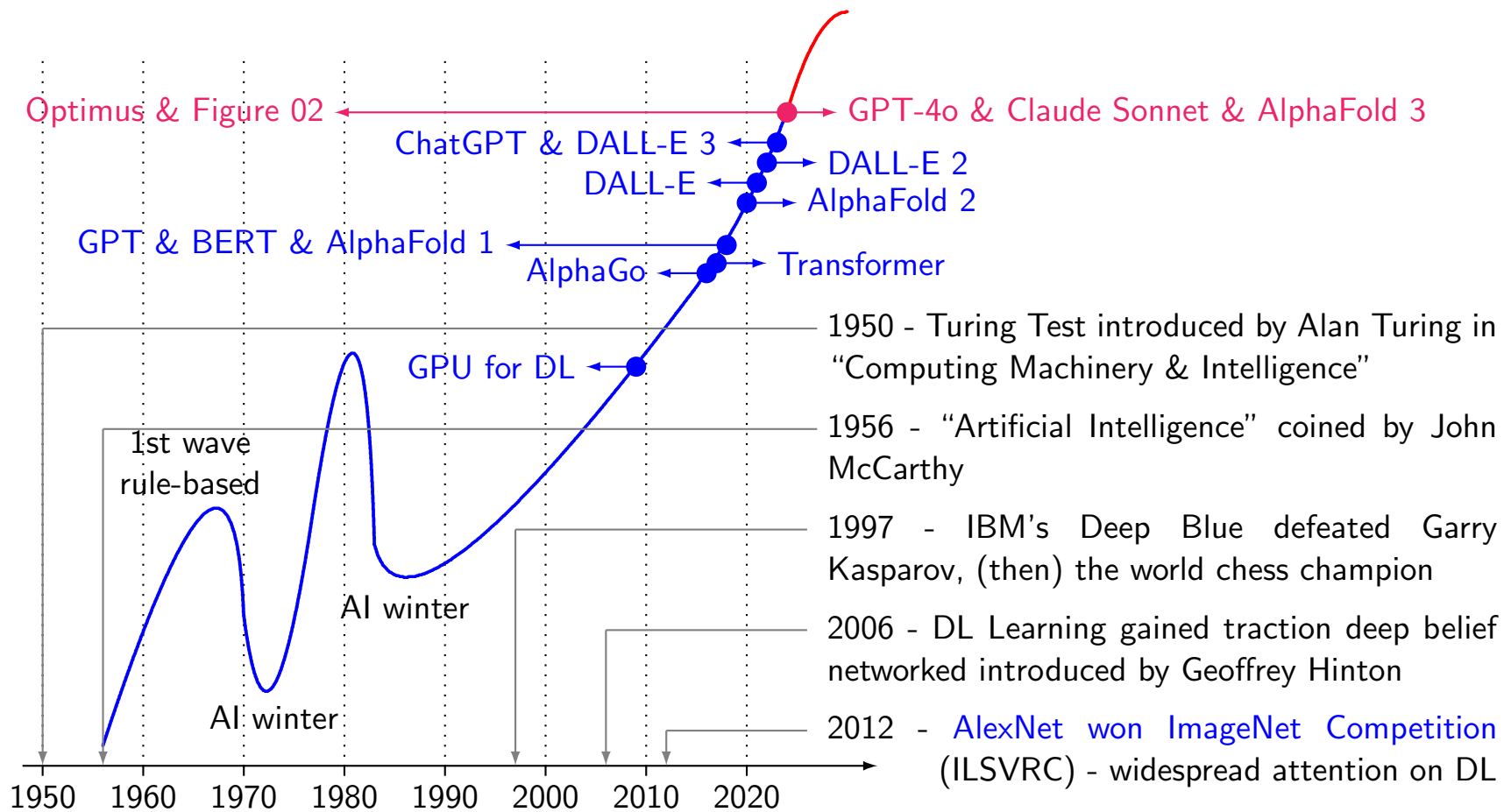
Silicon Valley's Cultural Engine of Innovation and Disruption

My journey from Samsung & Amazon to Gauss Labs & Erudio Bio

- Samsung Semiconductor, Inc.
 - inception into industry from academia, the world's best memory chip maker!
- Amazon.com, Inc.
 - experience so-called Silicon Valley big tech culture and technology
 - set tone for my future career trajectory!
- Gauss Labs, Inc.
 - found & operate AI startup, shaping corporate culture & spearheading R&D as CTO
 - inherent challenges of Korean conglomerate spin-off startup - cultural constraints, over-capitalization, and leadership limitations
- Erudio Bio, Inc.
 - concrete & tangible bio-technology in addition to AI
 - great decisions regarding business development; business models, market fit, go-to-market (GTM) strategies based on lessons learned *in a hard way* 😊

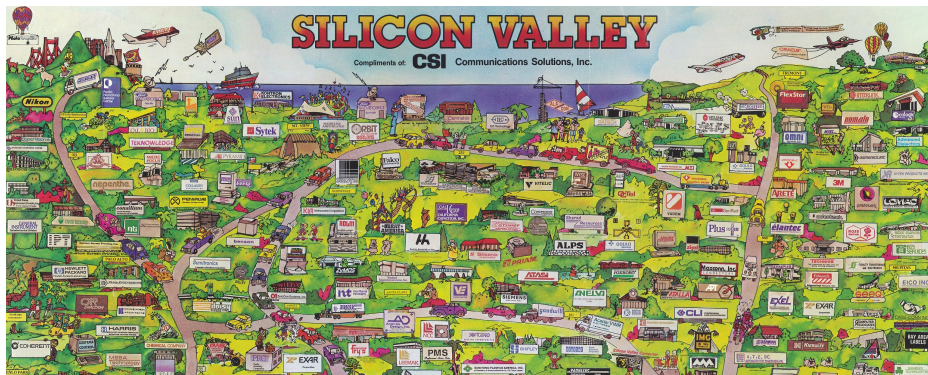


Joining Amazon.com, Inc. at the inflection point of AI



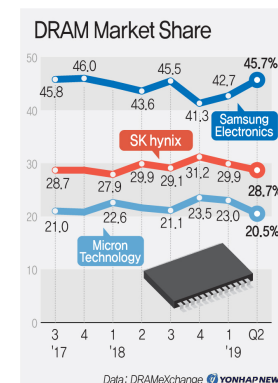
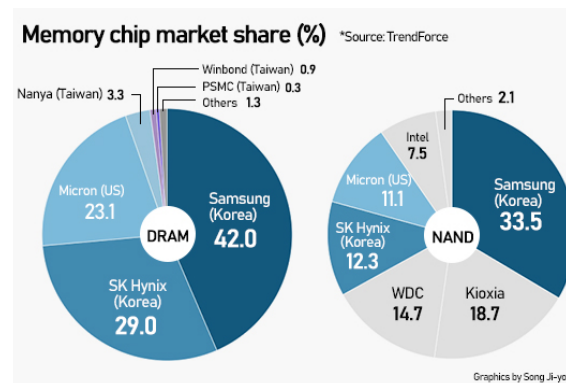
Innovation ecosystem of Silicon Valley

- key characteristics
 - risk-taking culture, *trust* in technology → *genuine* respect for engineers and scientists
 - easy access to huge capital - VCs, angel investors alike
 - talent density - engineers, researchers, scientists, entrepreneurs, PMs, TPMs, . . .
 - diversity, “collision density” of ideas
 - ecosystem of collaboration and competition - startups, academia, industry leaders
- what they mean for global big tech
 - set trends in AI, software & hardware (and or hence) product & industry innovation
 - act as testing ground for disruptive ideas



Case study: Amazon - amazing differentiators of big techs

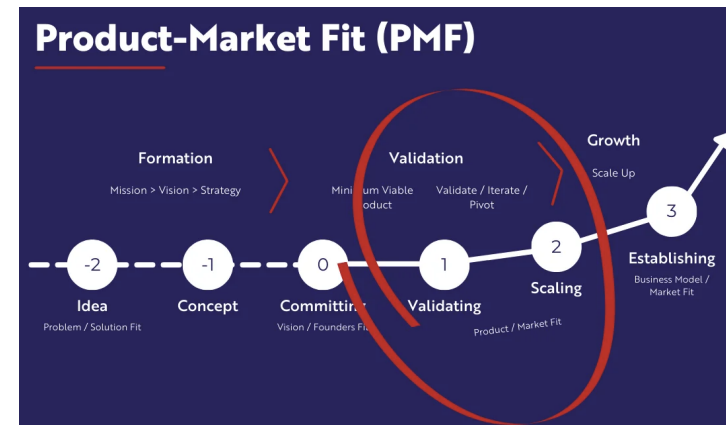
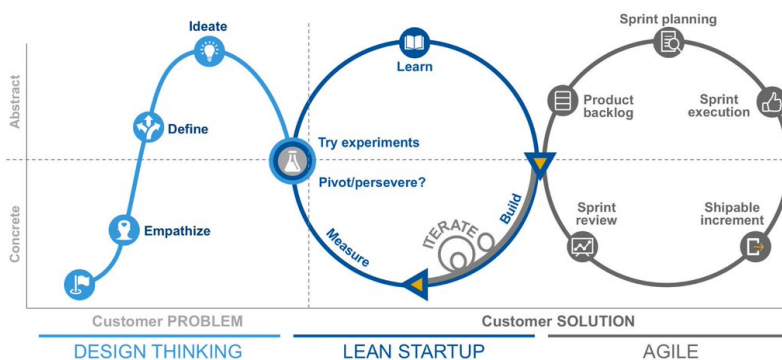
- Amazon's culture & leadership principles
 - customer obsession as driver of innovation
 - high standards & ownership culture, disagree & commit
 - bias for action and long-term thinking - sounds contradictory?
 - mechanisms like “two-pizza teams” & “Day One” for (or rather despite) scalability
- lessons for Korean corporations
 - applying customer-centric innovation in hardware & AI, *e.g.*, on-device AI
 - balancing agility with long-term R&D
 - *build / adapt / apply on the core strength of Samsung that no other company has!*



Founding and scaling startups

- challenges
 - competence of and chemistry among co-founders crucial
 - technology & great team are *necessary*, but *not sufficient (at all!)* for success
 - business models, market fit, timing, agility, flexibility for pivoting / perseverance
- insight
 - importance of domain expertise in addition to AI
 - balancing innovation with good business decisions

Combine Design Thinking, Lean Startup and Agile



Bridging Silicon Valley & Korea

- cultural differences
 - risk appetite & failure tolerance
 - decision-making speed vs hierarchy
 - innovation vs execution focus
- opportunities for collaboration
 - leveraging Korea's manufacturing expertise with Silicon Valley's software/AI strengths
 - building global teams with diverse perspectives



To be successful . . .

- embrace customer/market-centric mindset in innovation and for business decisions
- balance agility with long-term vision
- foster cross-cultural collaboration for global impact
- ((very) strategically and carefully) leverage AI to solve real-world industrial challenges



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- VCs on Sand Hill Road - Palo Alto, Menlo Park, Woodside in California, USA

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Thank You