

# The Age of Coexistence with AI.Robots

: What Kind of Talent Do We Need?

KIST  
AI.Robot Institute

김익재

# Generative AI: A New Horizon

'실제 사람의 얼굴일 것'으로 가장 많은 선택을 받은 Top5



'AI가 생성한 얼굴일 것'으로 가장 많은 선택을 받은 Top5



생성형 인공지능(AI)의 발전으로 이제 AI로 만든 얼굴은 진짜 인간의 얼굴과 구분하기 힘들 정도로 비슷해졌다. 지난해 11월 13일 에이미 다웰 호주 국립대 의대 심리학과 교수팀은 국제학술지 '심리과학'에 AI로 만들어진 얼굴이 진짜 얼굴보다 더 현실적으로 인식된다는 연구 결과를 발표했다.

# Generative AI: A New Horizon

Input images



Expression modification ("A [state] [V] dog")

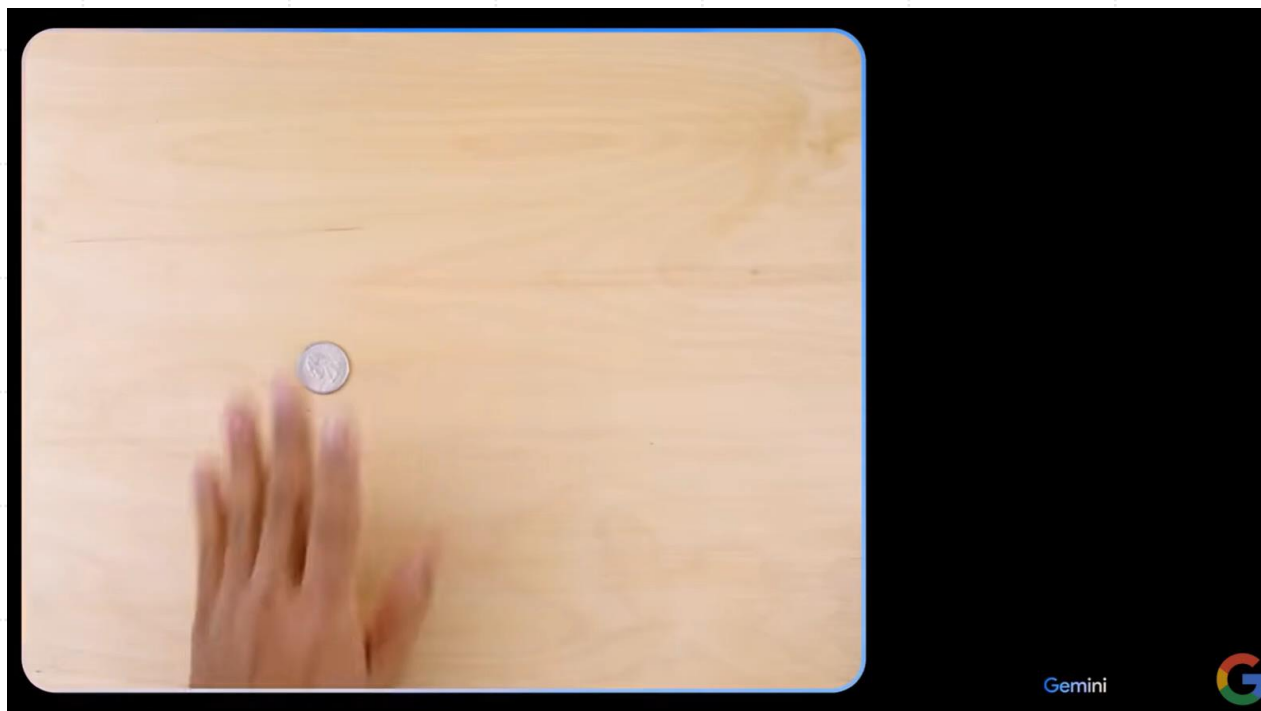


Google's Dream Booth

A litter of golden retriever puppies playing in the snow.  
their heads pop out of the snow

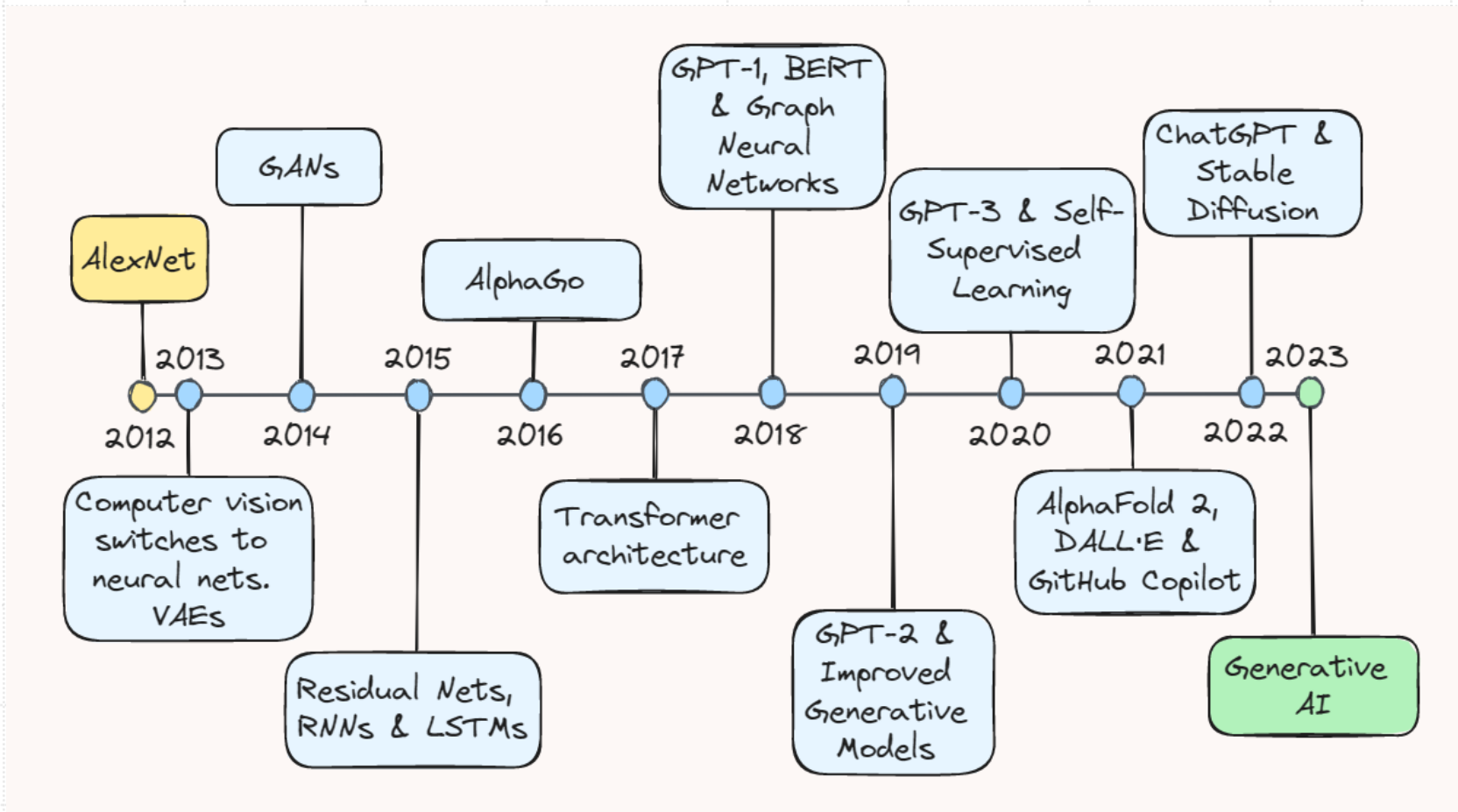
OpenAI's SORA

# Generative AI: A New Horizon

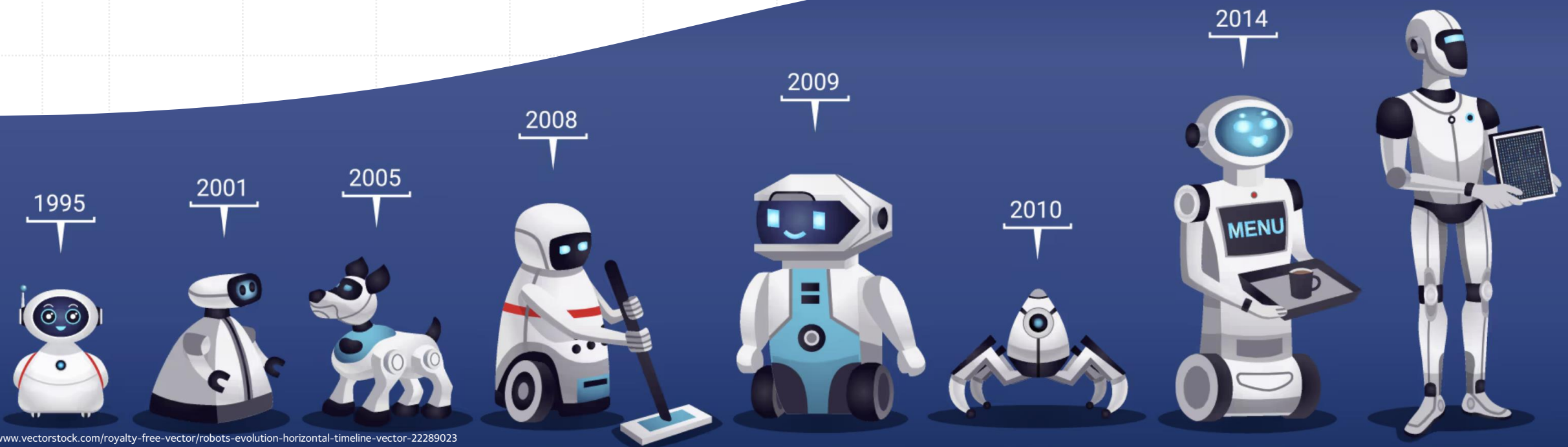


Google's Gemini

# Generative AI: Timeline



# AI.Robot: The New Era





# HUMANOID ROBOTS 2024 ///

									
Atlas	NEO	GR-1	Figure	Phoenix	Apollo	Digit	Atlas	H1	Optimus Gen 2
Boston Dynamics	1x	Fourier	01	Sanctuary AI	Apptronik	Agility	Boston Dynamics	Unitree	Tesla
									
150cm / 4'11"	160cm / 4'11"	165cm / 5'5"	167cm / 5'6"	170cm / 5'6"	172cm / 5'8"	175cm / 5'9"	175cm / 5'9"	180cm / 5'11"	180cm / 5'11"
									
130lb   47kg	121lb   30kg	121lb   55kg	132lb   60kg	154lb   70kg	159lb   72kg	146lb   64kg	180lb   80kg	103lb   47kg	180lb   80kg
12mph   8km/h	7.4mph   12kmh	5mph   8kmh	5mph   4.3kmh	3mph   5kmh	7.4mph   12kmh	5mph   5.4kmh	11mph   18kmh	5mph   8kmh	8mph   12kmh

Humanoid robot revolution begins...





# RS 2024 ///

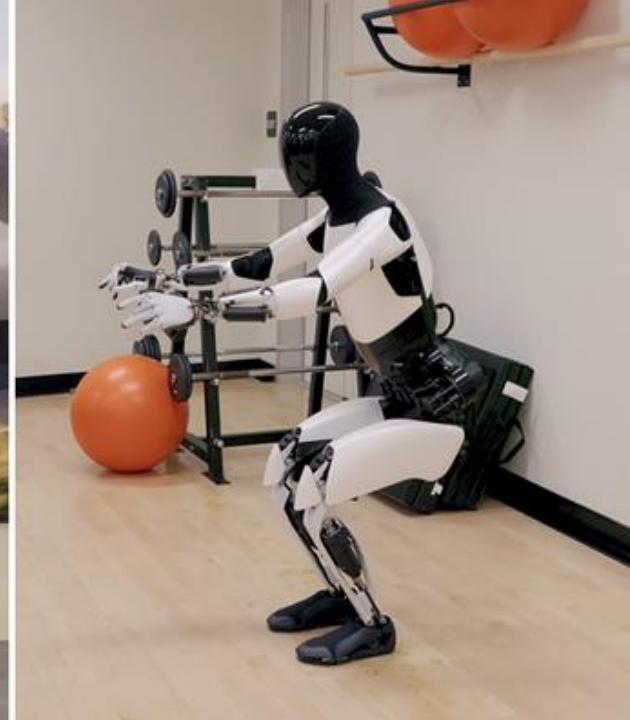
					
<b>Phoenix</b>	<b>Apollo</b>	<b>Digit</b>	<b>Atlas</b>	<b>H1</b>	<b>Optimus Gen 2</b>
Sanctuary AI	Apptronik	Agility	Boston Dynamics	Unitree	Tesla
					
170cm / 5'6"	172cm / 5'8"	175cm / 5'9"	175cm / 5'9"	180cm / 5'11"	180cm / 5'11"
					
154lb   70kg	159lb   72kg	146lb   64kg	180lb   80kg	103lb   47kg	180lb   80kg
3mph   5kmh	7.4mph   12kmh	5mph   5.4kmh	11mph   18kmh	5mph   8kmh	8mph   13kmh

Humanoid robot revolution begins...



# Convergence of Generative AI and Robotics

- **“Beyond Simple Repetitive Tasks: Anticipating the Rise of Robots with Advanced Abilities like Problem-Solving and Social Interaction”**
- This will enable robots to provide human-like interaction across a variety of domains, including manufacturing, logistics, healthcare, education, and customer service, as well as in home environments, such as household assistance and care services.



# Convergence of Generative AI and Robotics



# KIST AI & Robotics Institute

## KIST Artificial Intelligence & Robotics Institute Timeline of Innovations



1997, 고희동  
3D Virtual Studio for presidential election broadcast  
국내 최초 선거 방송중 3차원 가상 스튜디오



2001, 오상목  
MIMOT, Robot with a head-eye system, two 7-DoF arms & grippers



2010, 유병재  
MAHRU-Z, Autonomous home service humanoid



2012, 김문상  
CIRIOS, Cooking Robot  
주방로봇 '씨리오스'



2014, 최종석  
SSLBox, Sound Localization Box  
지능형 보안카메라를 위한 음향방향검지 모듈



2014, 김성규  
Autostereoscopic (Glasses-free) 3D Display  
무안경 입체 디스플레이



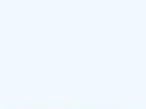
2016, 김기훈  
sEMG based Motion Capturing System  
근전도 신호 기반 모션 캡처 시스템



2017, 김익재  
3D Face Recognition robust to pose variations  
포즈 변화에 강인한 3차원 얼굴 인식 기술



2017, 박성기  
MyBom, a robot care assistant for people with dementia  
치매환자 간병 보조 로봇 '마이봄'



2017, 최종석  
SimonPIC: Sensor-network based In-Motion Perception in Cloud (Human Detection)  
센서융합기반 휴먼인식



2020, 천한용, 김원우  
Micro-debrider for FESS  
아비인후과 내시경 수술용 수술 도구



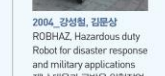
2021, 공리규  
Medical holographic 3D image visualization and control technology  
의료용 홀로그래픽 입체영상 재현 및 제어 기술



2022, 이종원  
MOONWALK: Wearable Walking Assist Robot  
웨어러블 보행 보조 로봇



1999, 유병재  
HECTER, Robot with vergence shift and movements of human eyes with neck



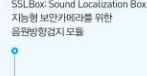
2004, 강성형, 김문상  
ROBHAZ, Hazardous duty Robot for disaster response and military applications  
재난 대응과 국방용 위험작업 로봇 플랫폼



2012, 김진욱  
VirtualPhysics: Realtime Physics Simulation Library  
실시간 물리 시뮬레이션 라이브러리



2014, 최종석  
XraNe: Customized Sports Gear Design Service  
맞춤형 스포츠기어 설계 시스템



2016, 일세혁  
Animatronic soft robots by additive folding  
적층형 접기를 이용한 생동로봇



2017, 안상철  
WIP navigation in VR  
제자의 길을 7면 내비게이션 기반



2017, 안상철  
Technology for fast generation of animatable avatars  
애니메이션 가능 아바타의 고속 생성 기술



2017, 김진욱  
XraNe: Customized Sports Gear Design Service  
맞춤형 스포츠기어 설계 시스템



2019, 유병재  
3D Hand Interaction Solution  
3차원 핸드 인터랙션 솔루션



2020, 권광진  
KIST AIBOT (Artificial Intelligence Disinfection robot)  
KIST 방역로봇 대한민국 AIBOT



2022, 임하섭  
Full-body generation and motion recognition technology of photorealistic digital human  
실사형 디지털 휴먼의 전신 생성 및 동작 인식 기술



2022, 김익재, 조정현  
Advanced integrated-intelligence for person re-identification  
복합인식기반 AIID 재식별 기술

2000

2005

2011

2013

2015

2016

2017

2018

2019

2020

2021

2022



1999, 이종원, 김문상, 오상목  
Centaur, Korea's First Humanoid Robot



2005, 유병재  
MAHRU & AHRA, World-first network-based biped humanoid robots



2007, 유병재  
ARO, Restaurant receptionist developed with ED Co.



2011, 박지형  
PhantomBook: Tangible E-Books on Smartphones Using HMD and Gesture Control  
오래된 장치를 이용한 착용형 디스플레이 장치 및 컨트롤 디스플레이



2013, 김문상  
KIRO, Humanoid Robot  
인간형 로봇



2015, 이우성  
Korean Lunar Rover POC (Proof of Concept) Model  
한국형 달탐사 로버 기술 검증 모델



2015, 김익재  
3D Montage Generation and Aging Simulation  
3D 몽타주 생성 및 나이변환 기술



2017, 강성형, 이우성  
ModMan, SW/HW Reconfigurable Modular Manipulator, Plug-Look-Play가 가능한 모듈러 로봇팔



2018, 박정민  
Direct manipulation of a virtual object by using multiple hands  
가상 물체 양손 직접 조작 기술



2019, 김진욱  
VR simulator for training Korean bobsleigh skeleton national team  
봅슬레이 스켈레톤 국가대표팀 훈련용 VR 시뮬레이터



2020, 안현기  
Smart Sling  
원자 이동용 스마트 슬링



2021, 최종석, 김강진  
Air-based home service robot, ZPSA  
인공지능 휴머노이드 로봇 집사



2022, 이종원, 양성욱  
Rapid, Uncontact Automatic Nasopharyngeal Swab Sampling Robot System  
신속 비대면 비강 자동 검체 추출 로봇 시스템



2000, 김형곤  
3D Virtual Theater for Kyungju World Culture EXPO  
국내 최초 3차원 가상현실 극장 (광주세계문화엑스포 주제행사관)



2008, 유병재  
MAHRU-M, Humanoid robot with wheeled mobility with AI and autonomous manipulation



2012, 고희동  
Enhancing the Tourism Experience through Mobile  
모바일 혼합 현실기반 체험형 투어 서비스 기술



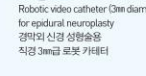
2014, 박성기  
CARO, a clinical assistant robot for autism therapy  
자폐아동 행동 증진 보조 로봇



2015, 박정민  
Real-Virtual Space Sharing technology  
현실-가상공간 공유기술



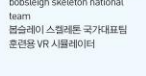
2016, 박지형  
Portable Digital Aquarium - UI/UX for Flexible Display (18inch)  
소형 플렉서블 디지털 아쿠아리움



2017, 강성형  
Robotic video catheter (3m diameter) for epidural neuroplasty  
경막외 신경 성형술을 위한 3mm급 로봇 카테터



2018, 강성형  
I-Quin, Interactive Robot  
Mannequin, 평상통계 올림피아드 마스코트 로봇 마네퀸



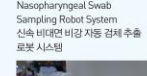
2019, 김진욱  
VR simulator for training Korean bobsleigh skeleton national team  
봅슬레이 스켈레톤 국가대표팀 훈련용 VR 시뮬레이터



2020, 김익재, 남기표  
Identity verifiable thermal self-check kiosk  
신원 확인 가능한 발열 셀프체크 카운터



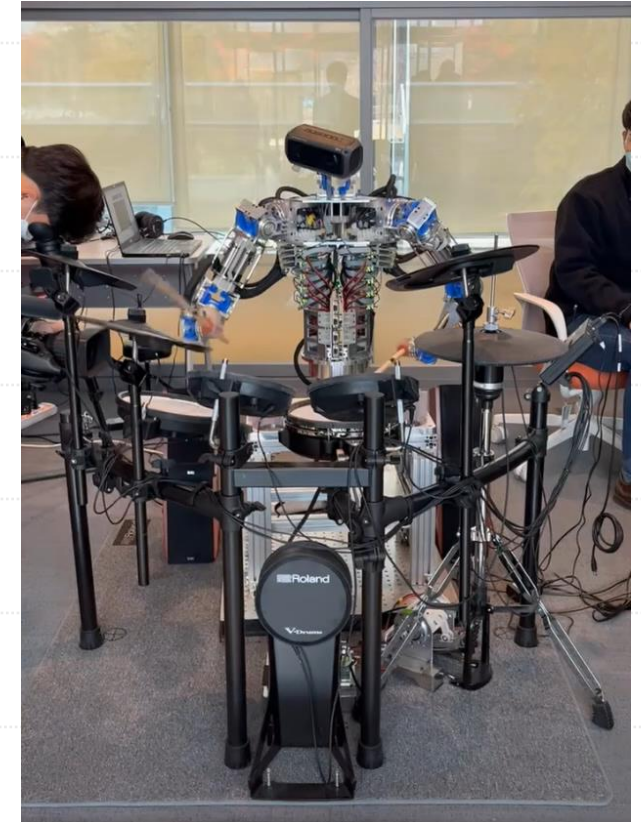
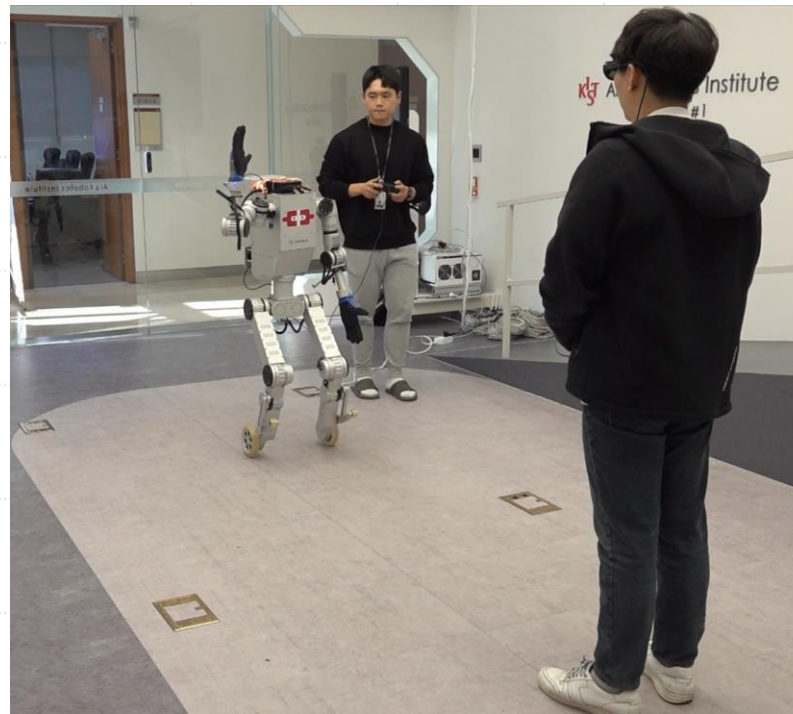
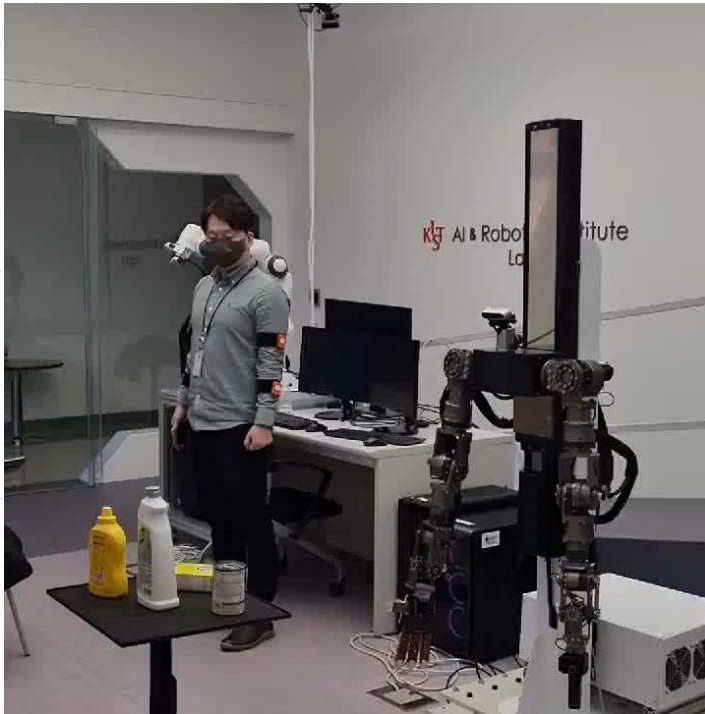
2021, 최종석, 김강진  
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인공지능 휴머노이드 로봇 집사



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# KIST AI & Robotics Institute



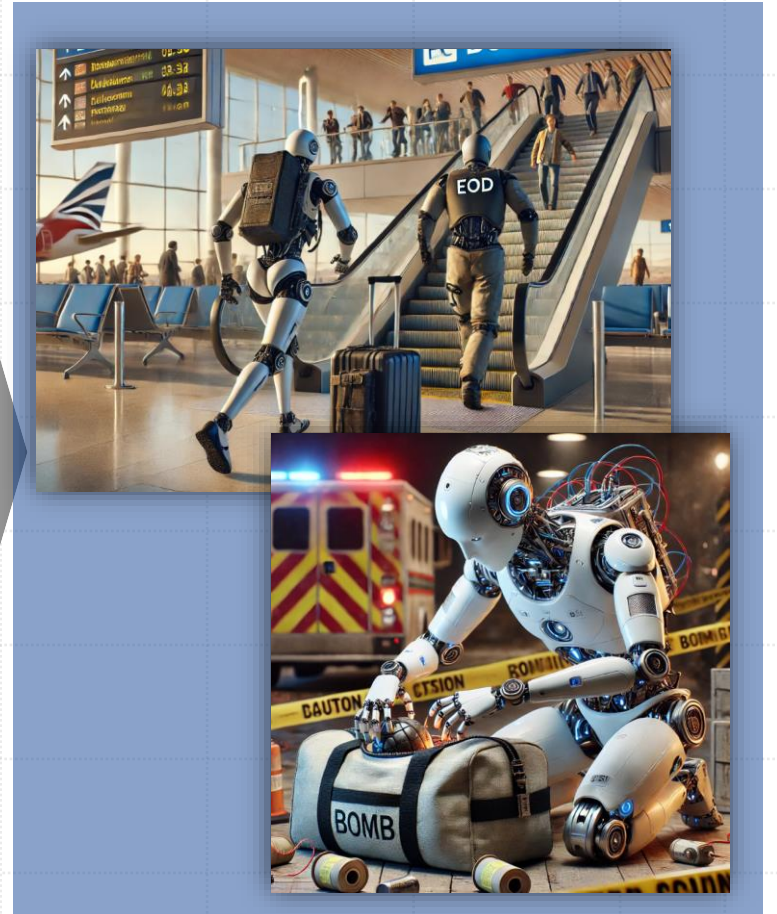
# KIST AI & Robotics Institute



Development of Next-  
Generation Humanoid 4.0



Phase 1: KIST Autonomous Humanoid  
Patrol Mission



Phase 2: Detection and Response Mission for Explosive  
Devices in Populated Environments



Is this Enough?





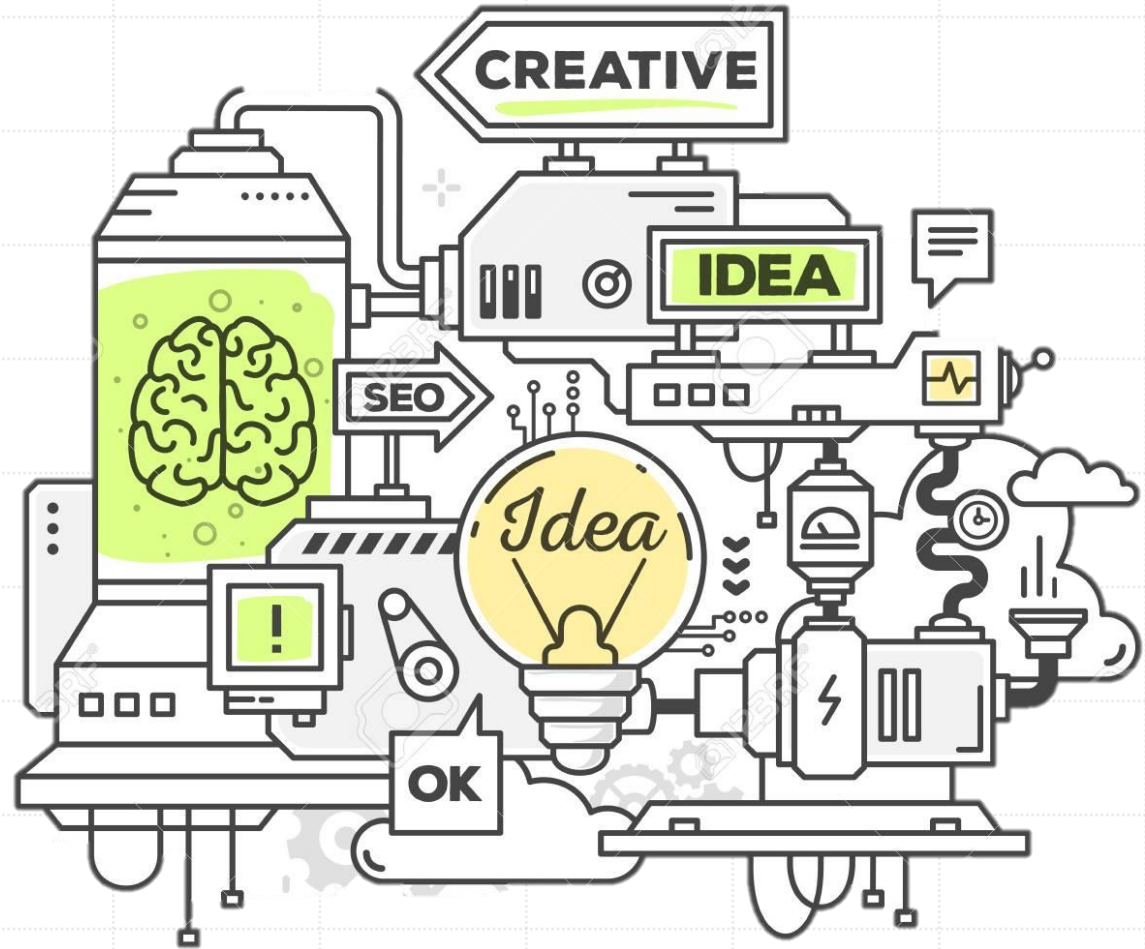
# How about this?



► But the reality is...



So, what kind  
of talent do  
we need?





# Let's tackle problems without definite answers

- **4C**

- **Creative Thinking:** The ability to overcome stereotypes and come up with innovative ideas.
- **Critical Thinking:** The ability to analyze and evaluate given information and solutions from multiple perspectives.
- **Complex Problem-Solving Ability:** The ability to break down a problem into smaller steps and approach it structurally.
- **Collaboration Ability:** The ability to communicate and coordinate with people from diverse backgrounds to achieve goals together.





## Strengthening Critical Thinking Skills

- The ability to verify information provided by AI instead of accepting it uncritically.
- The ability to analyze problems from multiple perspectives and derive creative solutions.
- A spirit of inquiry that continuously asks “why?”

## Digital Literacy Education

- Understanding the basic principles of how AI tools work.
- Recognizing the strengths, weaknesses, and limitations of AI.
- Learning how to use digital tools ethically and effectively.



## Developing Unique Human Abilities

- Empathy and emotional intelligence.
- Creativity and artistic sensibility.
- Collaboration skills and communication abilities.
- Ethical judgment.

## Strengthening Basic Academic Disciplines

- Mathematical thinking skills.
- Language proficiency (native language and foreign languages).
- Scientific thinking approach.
- Humanities literacy.





# Concrete Action Plans to Cultivate These Skills:

## 1. Project-Based Learning

- Utilizing AI tools in the process of solving real-world problems.
- Gaining collaboration experience through teamwork.
- Improving communication skills through presenting the outcomes.

## 2. Strengthening STEAM Education

- Integrative learning of Science, Technology, Engineering, Arts, and Math.
- Focusing on education that addresses real-life problems.
- Developing creative thinking skills.

## 3. Discussion and Presentation-Centered Classes

- Enhancing the ability to analyze from various perspectives.
- Developing logical thinking skills.
- Strengthening communication skills.



# Take home message

*The important thing is not to fear or reject **AI** but to use it **as a tool** while also developing **unique human values and abilities**.*

***AI** is ultimately a tool created by humans, and how we use it is up to us. Therefore, a balanced education that allows students to grow alongside AI is necessary.*

# ***The Road Not Taken***





# Thank you

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