VinAI

INTELLIGENCE FOR TOMORROW, TODAY

CES

COMPANY PORTFOLIO

VinAI's presence in CES

In the dynamic realm of automotive technology, VinAI takes center stage, leveraging cutting-edge innovations to elevate operational efficiency for Original Equipment Manufacturers and Tier-1 Suppliers. Our commitment lies in optimizing end-users' experiences through state-of-the-art Computer Vision and Machine Learning technologies, seamlessly integrated into millions of vehicles across the globe.

As we celebrate our triumphant return to CES for the 3rd consecutive year, VinAI proudly introduces MirrorSense, recognized as a CES 2024 Innovation Award Honoree in the esteemed Vehicle Tech and Advanced Mobility category. This groundbreaking feature, alongside other advancements in our smart mobility solution, will take center stage in a live demonstration drive on real vehicles navigating public roads during the event from January 9 to 12 at CES 2024.

In a strategic stride towards the future of smart mobility, VinAI embarks on a significant partnership with Qualcomm. The seamless integration of VinAI's Driver & Occupants Monitoring Systems (DOMS) and Advanced Driver Monitoring System (ASVM) onto the Qualcomm Snapdragon Automotive platform represents a milestone achievement.

Join us at CES 2024 as we unveil the next level of safety and comfort. Explore the possibilities, witness innovation in action, and be a part of the transformative journey shaping the future of mobility. VinAI welcomes you to experience excellence, where technology meets the road!

JOIN US IN CES 2024

January 9 - 12, 2024

Unveil the Future of Smart Mobility

LAS VEGAS CONVENTION CENTER
WEST HALL | BOOTH NO. 6417

VinAI

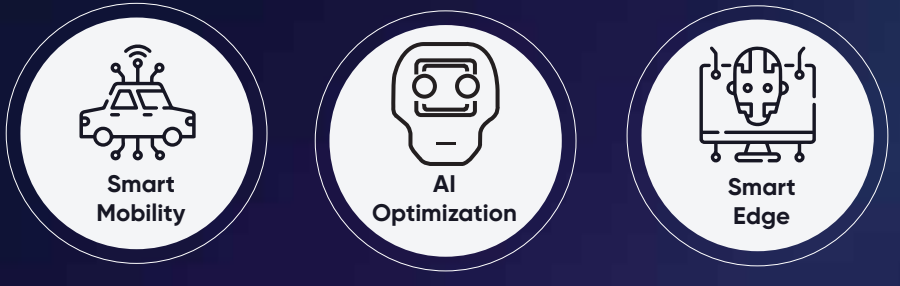
COMPANY PROFILE

Intelligence for Tomorrow, Today!

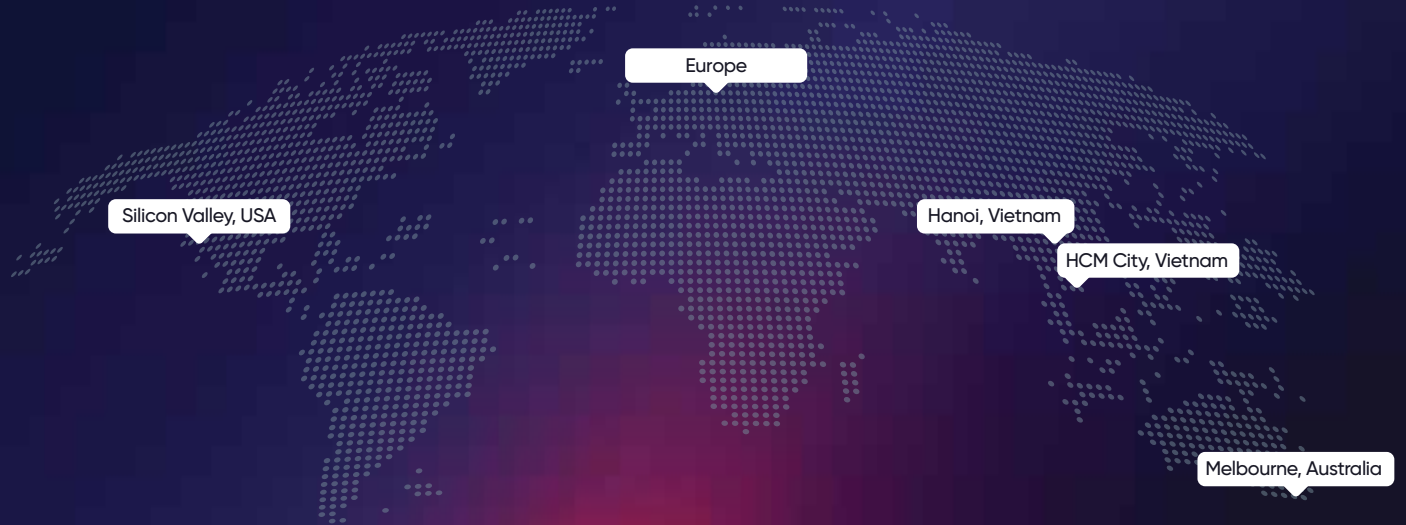
Founded in 2019, VinAI is a global top 20 AI research-based company with a myriad of practical research projects and products. VinAI's headquarters are in Hanoi (Vietnam), with additional locations in Ho Chi Minh City, the United States, Australia, and Europe. Bringing together almost 200 high-profile researchers and engineers, VinAI sets out to transform its state-of-the-art AI research technology into products and services that solve real-world problems.

VinAI is currently led by AI/Machine Learning and Mobility Experts from Google DeepMind, Adobe, Stanford Research Institute, Bosch, Audi, Volkswagen, Toyota, DARPA Urban Challenge, Monash University, CMU, and the University of Oxford.

BUSINESS DIVISIONS



Our offices and Tech hubs



VinAI

COMPANY PROFILE

INNOVATIVE AI-POWERED PRODUCTS

Our goal is not just to develop new technologies, but to deploy state-of-the-art AI that has meaningful impact on people's lives. As part of the Vingroup ecosystem - which spans everything from real estate and car manufacturing to healthcare, hospitals, and education – we have access to real customers facing real problems across multiple industries. We already have key products gaining traction in both the smart mobility and the smart edge verticals, and VinAI is one of the few AI companies with real world experience in many of the diverse fields where AI will be most needed.

AI OPTIMIZATION

Having a strong, unified team of both AI and embedded systems engineers gives us an advantage in developing, optimizing, and deploying AI models quickly in the real world, with the shortest turnaround time. We've honed our ability to deploy real-time AI on cost-effective hardware (on-device, on-edge, and on-cloud), from adaptation and quantization, to profiling, optimization, and execution.

WORLD-CLASS AI R&D

VinAI is one of the leading global producers of fundamental research in machine learning, deep learning, and AI development. Our advancements are enabling new optimized AI methods in computer vision, natural language processing and generative AI. We believe in building along the entire chain of AI development – from cutting edge theory all the way through to practical product in a customer's hands.

OUR GLOBAL COLLABORATORS & CUSTOMERS

NVIDIA · intel · Qualcomm · Microsoft · Confidential Tier-1 · Confidential Europe-based OEM · VINFAST

AMD · Hewlett Packard Enterprise · ESE · ADVANTECH · VINHOMES · VINUNIVERSITY · GIGABYTE

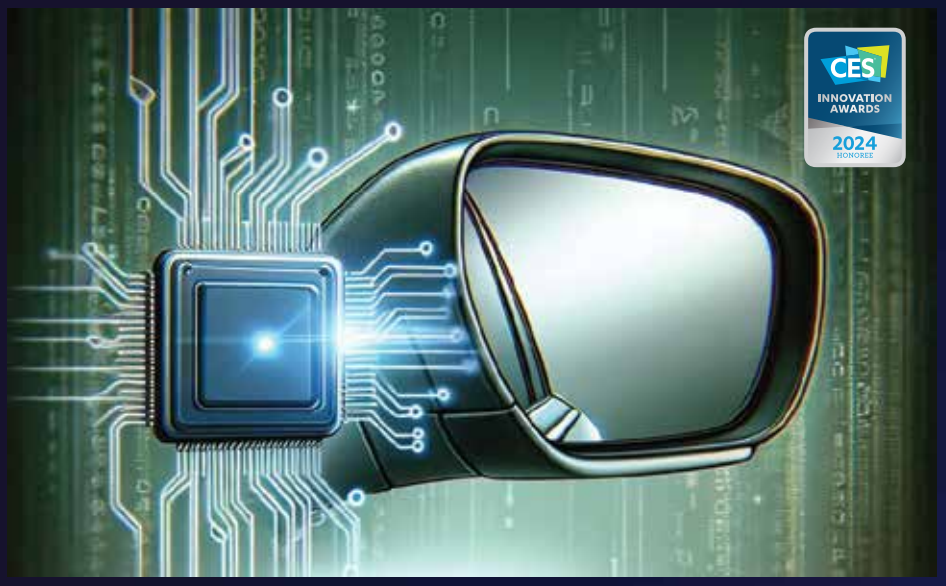
Johns Hopkins University · Stony Brook University · Wisconsin · Texas · Stanford University · Monash University

University of Stuttgart Germany · UC San Diego · University of Rochester · UCLA · Google · Adobe

Carnegie Mellon University · University of Maryland · George Mason University · NUS National University of Singapore · University of Michigan · University of Massachusetts Amherst · Nanyang Technological University Singapore

The University of Arizona · UCI University of California, Irvine · Oregon State University · The University of Edinburgh · The University of Iowa

Our featured presence at CES 2024



MirrorSense

Developed by VinAI

VinFast MirrorSense is the world's first AI-powered and real-life trialed auto-mirror-adjustment feature that can be seamlessly integrated into smart vehicles with a Driver Monitoring System (DMS) camera. Developed by VinAI, a brother company of VinFast. Using proprietary AI technology, MirrorSense precisely detects the head and eye gaze with 10mm accuracy, automatically adjusting all mirrors. Its innovative bridging algorithm ensures effortless integration into infotainment systems without costly hardware upgrades.

MirrorSense can easily be extended to auto-adjust seat's settings and Augmented Reality Head-Up Displays. MirrorSense will be integrated in VinFast (NASDAQ:VFS) electric vehicles in early 2024, enabling the accessibility of smart mobility for global communities.

VinAI

Smart MOBILITY

Next Level of Safety & Comfort

With our next-generation smart in-vehicle solution that combines in-car monitoring and surround sensory systems, VinAI sets to transform the automotive industry by making driving a safe and comfortable experience by harnessing cutting-edge AI Technology.

OUR FEATURES

- Driver & Occupants Monitoring Systems (DOMS)
- AR HUD (Augmented Reality Head-Up-Display)
- MirrorSense
- DrunkSense

INTERIORSENSE

Our specialized InteriorSense ensures a safe driving experience with our in-cabin solutions, using high-performance cameras and AI to analyze driver behavior patterns and prevent driving errors.

Our multi-camera integrated platform eliminates all blind spots and gives the driver a 360 degree view around the vehicle in real time, significantly improving vehicle safety and enhancing the driving experience.

SURROUNDSENSE

- Advanced Surround View Monitoring System (ASVM)
- FAPA Fully Automatic Parking Assistance
- Homezone Parking
- Narrow Street Assistance

OUR HIGHLIGHTS

50K+	Ship-to-market cars embedded with Smart Mobility Technologies
700K+	Vehicles set for shipment with integrated VinAI Smart Mobility products
8	Different car models equipped with Smart Mobility Technologies
INTERIORSENSE	Regulation Compliance: GSR phase 1 - 2021/1341 DDAW
SURROUNDSENSE	Regulation Compliance: NHTSA FMVSS 111 & UN ECE R158

WHY US?

- Highly accurate AI model: Rank 6th NIST 2020
- DMS Accuracy and performance equal to top 2 world-wide DMS suppliers, independent benchmarking by EU Tier-1
- World-first MirrorSense feature, 3D estimation using single DMS camera
- Flexible and portable on different platforms and systems, adapted from high-price range to low-price range vehicles
- Adapted with multiple camera placement options (Steering Column, Instrument Cluster, Center Stack)
- AI-enabled safety functions and enhanced driving experience

VinAi

Smart MOBILITY

HIGHLIGHT FEATURES

DRUNKSENSE

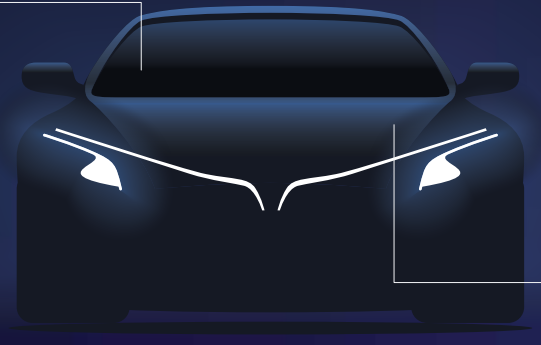
Why us?

- World-first feature developed and patented by VinAI
- Passive monitoring of drunk driving behaviors
  ~ Average Sensitivity: ~95% (1~5 minutes monitoring)
- Distinguish drunk driver from drunk passengers
- Avoid False Positive (FP) warning from drowsiness, distraction

DrunkSense highlight

- Uncovers intoxication cues: drowsiness, delayed responsiveness, erratic eye movements, providing comprehensive detection
- Establish a robust defense against potential manipulations, providing a tamper-resistant solution
- Cost-effective innovation to reliable and accessible drunk driving prevention

DrunkSense*



"DrunkSense is a fusion of an alcohol sensor and an advanced InteriorSense camera that optimizes the efficiency of breath detection and enhances the ability to identify intoxicated behaviors accurately"

"Jelly View is a 360-degree wrap-around view that offers a transparent vision through the entire vehicle."

Jelly View

JELLY VIEW

VinAI reinvents the driver's experience by offering complete awareness of the situation entirely outside and underneath the vehicle and identifying obstacles in "blind" areas with our Jelly View technology.

Our multi-camera integrated platform eliminates all blind spots and reconstructs a 3D transparent view around the vehicle in real time, significantly improving vehicle safety and enhancing the driving experience.

How it works

Using Jelly View, the driver can see the entire scene outside the vehicle and underneath the vehicle and can switch between different views using the on-screen control panel. The driver can interact with the view by swiping in any direction to see all around the car.
With this 3D transparent mode, the driver can observe blind spots, especially underneath the vehicle, and avoid unexpected accidents.

*Our DrunkSense Technology is still in R&D progress and ready for PoC. For detailed information, please reach out to our representatives at CES, or feel free to contact us at **v.dir.pr.sm@vinai.io**

VinAi

Smart EDGE

guardpro

Security, Surveillance, Compliance & Convenient Enhancement AI Solution

REAL-TIME GUARD & ALERTS MAKE ANY CAMERAS SMART

A set of embedded AI algorithms running on edge servers & a content management system.

GuardPro can turn individual and ordinary cameras into a wholistic AI system, that provides constant and real-time monitoring for your properties. GuardPro works 24/7 and it is more reliable and cheaper than human operators.

Our Solution for Smart Cities

AI FEATURES

Safety

- Face Recognition for Access Control
- Blacklist/Whitelist Detection
- Intruder Detection
- Person Reidentification
- Fence Jumping Detection
- Violence Detection
- Harassment Detection
- Kidnapping Detection
- Loitering Detection

Compliance

- Parking Violation Detection
- Face Mask Policy Violation Detection
- Abandoned Item Detection
- Unallowed Object Placement Detection
- Bulky Object Detection in Elevator
- Pet Detection

Convenience & Well-being

- Vehicle Localization by license plate number
- Available Parking Spot-localization
- Convenient Access to swimming pools and playgrounds without carrying resident cards
- Fall/Unconsciousness Detection

VinAI

AI OPTIMIZATION

Deploy AI Models to solve a specific problem running on a specific device

Deploy AI Models to solve a specific problem running on a specific device

Without MLB

exhausting loop

- Research & Testing to find suitable AI models that satisfy both problem-solving and hardware constraints
- Deploying and optimizing AI models on hardware devices
- Turning the AI models to balance the trade-off between in-wide accuracy and hardware capability

MLBOOSTER

Just some clicks	Select pre-trained models that are best fit for this kind of problem and in hardware-specific budget in MLB Model Optimizer Hub
Easy installation & just a few lines of code	MLB SDK allows integration of MLB models with a wide range of hardware devices
Just some clicks	Tuned models are ready in 30-60 mins when using MLB-FastBoot or an Ultra tuned models after 15 weeks

01 | **InstaBoost**
"Instant noodles" Models are available for you to download

02 | **FastBoost**
"Big Mac" Models are ready for you to pick up in 30-60 minutes

03 | **UltraBoost**
"Fine-dining" Models will be served on your table after 1.5 weeks

VinAI

RESEARCH DIVISION

Research Division

Research at VinAI is dedicated to expanding the boundaries of AI, fostering new applications, and deepening theoretical insights. While our research is often inspired by the transformative potential of practical applications, it is propelled by scientific curiosity. We tackle practical applications head-on, yet delve into core challenges, scrutinize established theories, and re-evaluate basic assumptions. This is followed by the development of algorithms to address these fundamental issues, always with an eye on cost-efficiency and the engineering hurdles of real-world deployment. Additionally, as we push forward in both science and engineering, we maintain vigilance over the risks associated with AI models, proactively investigating these risks, establishing measures to ensure the integrity of AI models, and devising strategies to combat the misuse of AI.

Our research division is divided into three groups: Machine Learning, Computer Vision, and Natural Language Processing.

Our Research Group

Core Research Groups

- 18 RS + 13 applied + 45 AI residents
- Research + residency PMs + editor/ethics

Machine & Deep Learning | Computer Vision | Natural Language Processing

Machine Learning & Deep Learning:

- Leader in optimal transport for machine learning
- Pushing frontier in human-level learning capabilities (self-supervised, domain adaptation, learning with less label)
- Generative AI in vision and language
- Theoretical core to AI products

Computer Vision:

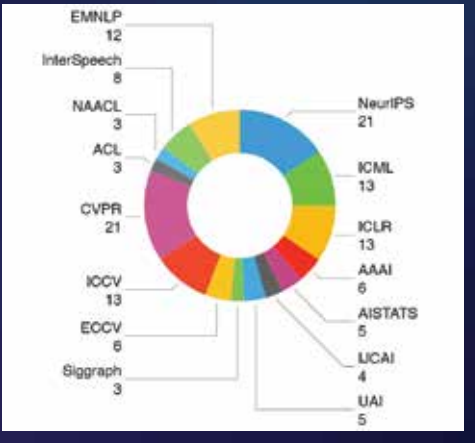
- 3D Vision, robust AI, zero/few-shot problems, open-vocabulary problems, image restoration and enhancement
- Pioneering AI features for DMS, SVM, Edge

Natural Language Processing:

- #1 Vietnamese machine translation system
- #1 Toolkit for core NLP tasks
- LLMs for Vietnamese (PhoGPT, PhoBERT, BARTPho)

Our Paper Distribution in Top-tier Conferences

- **2023** — 136 top tier papers
- **2022** — 109 papers
- **2021** — 68 papers
- **2020** — 23 papers
- **2019** — 6 papers



In 2022, VinAI was ranked among the Top 20 Global AI-based Companies

(*: Thundermark Report 2022)

Our Community Services

- **4** Annual AI Day Events
- **7** Live Conference Paper Workshops
- **64** Live Research Seminars
- **40** Released Source Codes + **11** Released Datasets
- **40** Technical Blogs
- **18** Technical Talks / Public Lectures

Generative AI and Large Language Models

Generative AI (GenAI) and Large Language Models (LLMs) are recent AI advancements capable of creating music, text, and lifelike images indistinguishable from human creations. This has led to a burgeoning realm of AI-generated content, with significant potential and complex ethical considerations.

At VinAI, our pioneering research in generative AI, including enhancements to GANs and VAEs, predated the advent of tools like Stable Diffusion and ChatGPT. Amidst a spike in community interest, we are intensifying our work to navigate this field's critical challenges. We are committed to releasing open-source Vietnamese foundation models, improving algorithms for enhanced content creation, reducing the costs associated with training and running generative models, and ensuring the reliability and ethical usage of AI-generated content.

Our commitment to the AI community includes offering free access to LLMs and other foundation models, especially for Vietnamese and other specific domains, helping overcome barriers like limited access to data and resources. This democratization effort has led to models like PhoGPT, PhoBERT, BERTweet, and XPhoneBERT with millions of downloads, benefiting a wide audience.

We are advancing algorithms for generative tasks in Computer Vision, Language and Speech Processing. Algorithms like HyperInverter and QC-StyleGAN enhance image quality, while text and speech models like XPhoneBERT and FlowVocoder push the boundaries in multilingual text-to-speech conversion and audio quality.

Our Monthly Most Downloaded Models on Hugging Face

"As of 24th Nov 2023"

VinAI Model	Monthly Downloads
Bertweet-base	970,000+
Xphonebert-base	160,000+
Phobert-base-v2	150,000+
Phobert-large	119,000+
Phobert-base	83,000+
Bertweet-large	5,700+
PhoGPT-7B5-Instruct	4,700+
Vinai-translate-vi2en	4,000+

VinAI

GENERATIVE AI

PhởGPT

Open-Source LLM for Vietnamese with 7.5B parameters

- PhoGPT-7B5: pre-trained monolingual model
- PhoGPT-7B5-Instruct: instruction-following model
- A new foundation model pretrained from scratch
- SOTA Open-Source Vietnamese LLM

We were able to compress the original PhoGPT 7B5 model to an efficient architecture which could be run on consumer-grade phone at the average speed of **12 tokens/sec**

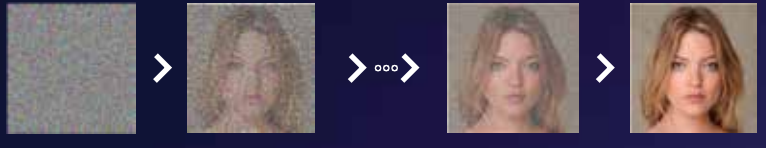
PhởGPT 7.5B

Check our model at

See our demo at

Instant ImageGen

Standard diffusion process



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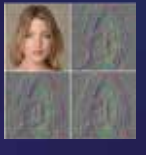


Wavelet transform

VinAI Instant ImageGen

GenAI Optimization

- Distribution-aware quantization
- Progressive distillation
- Foundation model squashing

Our model's Inference Time per image is approximately 10 times faster than Stable Diffusion

We understand that the efficiency of GenAI models significantly influences their capital and operational expenses. Consequently, we have committed considerable research and development resources to optimizing these models. Our initiatives include enhancing technology to optimize the architecture and decrease the inference time of Transformer modules, essential to numerous foundation models. We have also addressed the training and fine-tuning expenses of LLMs, deriving techniques that allow domain-specific fine-tuning within a single day.

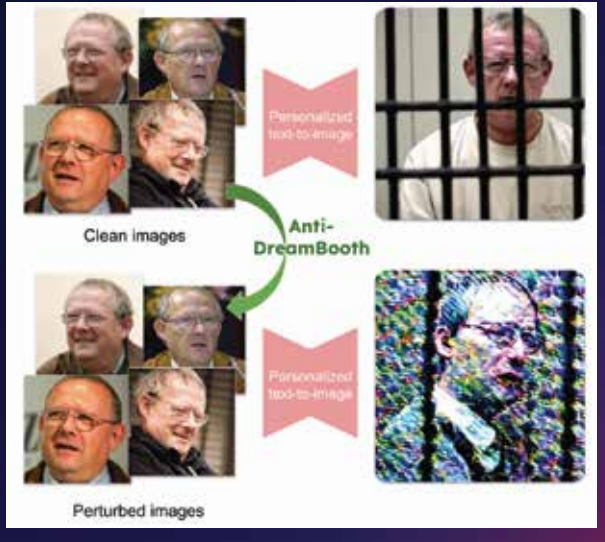
Generating quality images from noisy ones

Fig. 1: A demonstration of our capability to generate quality images based on noisy and blurry ones.

Paper: "QC-StyleGAN - Quality Image Generation and Manipulation, NeurIPS 2022"

We take the reliability and trustworthiness of GenAI models and their generated content seriously. We remain vigilant about the potential dangers of GenAI and proactively investigate risks that might compromise AI model integrity, establishing best practices for their development and use, and devising defensive strategies

Anti-DreamBooth



Prompt: *"Behind bars"*

Fig. 2: An illustration of our capability to protect users from malicious image generation by applying imperceptible perturbations to the user's images before releasing.

Paper: "Anti-DreamBooth: Protecting users from personalized text-to-image synthesis, CVPR 2023"

VinAI

RESIDENCY PROGRAM

AI Residency Program

VinAI AI Residency Program was created to identify the top young AI talents that will be trained to become future AI experts and tech leaders in the field. The residents are expected to spend approximately two years directly participating in our research programs while being mentored by our world-class research staff. Since its inception in 2019 until the end of 2022, the AI Residency Program has trained more than 80 brilliant young talents and had first-authored 48 papers accepted and published at Top-tier AI conferences. The program also records 67 Ph.D. scholarships across the world's top 20 Computer Science universities.

Nurturing Young AI Talents
& Global Leaders

At VinAI, the residents are expected to work on real-world AI problems and applications, as well as to conduct research in different techniques and methodologies. Once the research direction has been chosen, the residents are carefully instructed on how to consult materials, reading methods, and how to research works methodically, according to world-class standards.

Highlighted numbers

80	residents recruited in over 3 years, belonging to top 1% AI talents in Vietnam
48	accepted papers at top tier AI conferences
45	filed patents
67	Ph.D scholarships from top 20 global universities specializing in AI and Computer Science

*as of Oct 31st, 2023

VinAI

Contact us at
v.dir.pr.sm@vinai.io

or

Follow us on