

Nasdaq CTA Artificial Intelligence & Robotics™ Index (NQROBO™)

April 2023 Update

Overview & Methodology

The Nasdaq CTA Artificial Intelligence and Robotics™ Index (NQROBO™) is designed to track the performance of companies engaged in the artificial intelligence (AI) and robotics segment of the technology, industrial, medical, and other economic sectors.

CTA first classifies each potential index constituent as an AI and/or Robotics company and then assigns an Intensity Rating that captures the perceived degree of a company's AI & Robotics sector involvement within one of the three categories:

- Enablers are companies that develop the building block components for robotics or artificial intelligence, such as advanced machinery, autonomous systems/self-driving vehicles, semiconductors, and databases used for machine learning.
- Engagers are companies that design, create, integrate, or deliver robotics and/or artificial intelligence in the form of products, software, or systems.
- Enhancers are companies that provide their own value-added services within the Artificial Intelligence and Robotics ecosystem, but which are not core to their product or service offering.

Securities that meet the applicable Security Eligibility Criteria are then ranked within their respective categories by their CTA Intensity Ratings. Securities ranked in the top 30 within each category, including ties, are selected for the Index.

Currently, the NQROBO Index is comprised of 107 constituents across the entire AI and Robotics ecosystem with representation of underpinning technologies, products, and services focused in areas including:

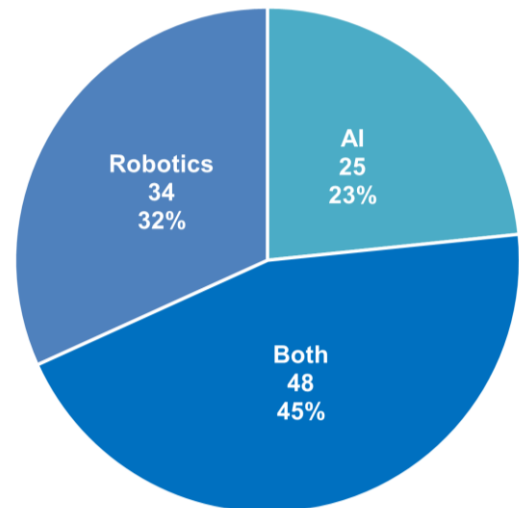
- 3D Printing & Additive Manufacturing
- Advanced Driver Assistance Systems (ADAS) & Self-Driving Software and Systems
- Artificial Intelligence (AI) & Machine Learning (ML)
- Automated Logistics & Fulfillment; Computer and Machine Vision
- Industrial Internet of Things (IoT)
- Industrial & Medical Robotics
- Natural Language Processing (NLP) & Large Language Models (LLM)
- Robotics Process Automation & Low/No Code
- Semiconductors
- Simulation Software
- Unmanned Aerial Vehicles (UAVs)

CTA recently evaluated each constituent within the NQROBO Index and assigned one of three segmentations:

- Artificial Intelligence (AI)
- Robotics
- Both AI & Robotics (Both)

Nearly half of the index constituents (48) work on both AI & Robotics. Roughly one-third of constituents (34) focus on robotics without AI efforts, while almost a quarter (23) develop AI innovations without engaging in robotics.

NQROBO Technology Focus Overview



NQROBO Index Constituents

Company Name	Classification	Company Focus	Segment
3D Systems Corp	Enabler	3D Printing / Additive Manufacturing	Robotics
ABB Ltd	Enabler	Industrial & Collaborative Robots	Robotics
Advanced Micro Devices Inc	Enhancer	AI/ML Semiconductors (CPUs & GPUs)	AI
AeroVironment Inc	Engager	Unmanned Aerial Vehicles (UAVs)	Both
Akamai Technologies Inc	Enhancer	Content Deliver Networks & Cybersecurity Solutions	AI
Alibaba Group Holding Ltd	Enhancer	Self-Driving, AI/ML Software; Large Language Models	Both
Alphabet Inc	Enhancer	Self-Driving, AI/ML Software; NLP, Large Language Models	Both
Amazon.com Inc	Enhancer	AI/ML Software; NLP; Cloud Computing	Both
Ambarella Inc	Engager	Computer Vision, Neural Network Processing	Both
ANDRITZ AG	Enabler	Computer Vision, AI/ML Software, Industrial Machines	Both
ANSYS Inc	Engager	Simulation Software	Both
Appian Corp	Engager	Low-Code Software; RPA	Both
Aptiv PLC	Enhancer	Self-Driving	Both
Atos SE	Engager	AI/ML Software, Computer Vision	Both
ATS Corp	Enabler	Manufacturing & Testing Automation	Both
Autodesk Inc	Enhancer	AI Software / AI-driven Design	Both
AutoStore Holdings Ltd	Engager	Automated Fulfillment & Robotics	Both
Baidu Inc	Enhancer	AI/ML Software, Self-Driving; NLP	Both
BlackBerry Ltd	Engager	AI/ML-Based Cybersecurity	AI

BrainChip Holdings Ltd	Enabler	AI/ML Semiconductors	AI
C3.ai Inc	Engager	AI/ML Software; RPA; No-Code AI Software Platform	Both
Cadence Design Systems Inc	Engager	Semiconductor Design; AI-Driven Processor Design	AI
Cargotec Oyj	Enabler	Automated Terminal Solutions (Ports)	Robotics
Ciena Corp	Engager	Automated Networking Solutions; RPA	Both
Cognex Corp	Enabler	Computer Vision	Both
Continental AG	Enhancer	Self-Driving; ADAS	Both
CYBERDYNE Inc	Enabler	Assistive/Healthcare Robotics	Robotics
Daifuku Co Ltd	Enabler	Manufacturing & Logistics Automation	Robotics
Dassault Systemes SE	Engager	AI/ML Software	Both
Deere & Co	Enhancer	Precision Agriculture	Both
Delta Electronics Inc	Enabler	Industrial Automation	Robotics
Denso Corp	Enhancer	Self-Driving, Robotics; ADAS	Both
Duerr AG	Enabler	Manufacturing Automation	Robotics
Dynatrace Inc	Engager	AI/ML Software	Both
Elbit Systems Ltd	Engager	Military Robotics & UAS/UAVs	Both
Emerson Electric Co	Enhancer	Industrial Automation	Robotics
Equinix Inc	Enhancer	Data Center; AI Cloud Services	AI
FANUC Corp	Enabler	Industrial Robotics	Robotics
FARO Technologies Inc	Enabler	3D Manufacturing	Robotics
Gentex Corp	Engager	Automotive Connectivity; Vision	Robotics
GXO Logistics Inc	Enhancer	Logistics Automation	Both
Halma PLC	Engager	Equipment Robotics	Robotics
Hexagon AB	Engager	Simulation Software	Both
Illumina Inc	Engager	Genetic Analytics AI	Both
Intel Corp	Enhancer	Chipmaker; AI Processors	AI
International Business Machines Corp	Enhancer	Enterprise AI	AI
Intuitive Surgical Inc	Enabler	Medical Robotics	Robotics
JD.com Inc	Enhancer	Autonomous Delivery	Both
John Bean Technologies Corp	Enabler	Vehicle AI; FoodTech AI	Both
Johnson & Johnson	Enhancer	Medical Robotics; AI-Driven Drug Discovery	Both

Kakao Corp	Enhancer	Consumer AI; NLP; AI-Driven Drug Discovery	AI
Kawasaki Heavy Industries Ltd	Enhancer	Industrial Robotics	Robotics
Keyence Corp	Enabler	Machine Vision	Both
KLA Corp	Enabler	Semiconductors	Robotics
Luminar Technologies Inc	Engager	Self-Driving; Lidar	Both
Magna International Inc	Enhancer	Autonomous Driving	Both
Medtronic PLC	Enhancer	Medical Robotics	Robotics
Micron Technology Inc	Enabler	DRAM	AI
Microsoft Corp	Enhancer	Enterprise AI; Large Language Model	AI
Mitsubishi Electric Corp	Enhancer	Industrial Robotics	Robotics
Mobileye Global Inc	Engager	Self-Driving & ADAS	Both
National Instruments Corp	Enabler	Measurement AI	Both
NAVER Corp	Enhancer	Search AI; Large Language Model	AI
Netcompany Group A/S	Enhancer	AI Analytics	AI
Nice Ltd	Engager	Data Analytics	AI
Nidec Corp	Enabler	Robotics Components	Robotics
NIO Inc	Enhancer	Autonomous Vehicles	Both
Northrop Grumman Corp	Enhancer	Defense AI	Both
NVIDIA Corp	Enabler	AI Chipmaker	Both
Ocado Group PLC	Enhancer	Robotic Automation; Logistics Automation	Both
Omniceil Inc	Enhancer	Robotic Automation; Business Analytics	Both
Omron Corp	Enabler	Robotic Automation	Robotics
Palo Alto Networks Inc	Engager	Cybersecurity AI	AI
Pegasystems Inc	Engager	RPA, PaaS	Both
PKSHA Technology Inc	Engager	AI Algorithms; NLP	AI
PROS Holdings Inc	Engager	SaaS; Data Science	AI
Proto Labs Inc	Enabler	3D Printing	Robotics
PTC Inc	Enhancer	SaaS; AI design	AI
QinetiQ Group PLC	Engager	Robotic Automation	Robotics
QUALCOMM Inc	Enabler	Semis & Components	AI
Renesas Electronics Corp	Enabler	Semis & Components	AI

Rockwell Automation Inc	Enabler	Industrial IoT	Robotics
Samsung Electronics Co Ltd	Enhancer	Semis & Components	AI
Schneider Electric SE	Enabler	Industrial IoT	Robotics
Seiko Epson Corp	Enhancer	Robotic Automation	Robotics
ServiceNow Inc	Engager	SaaS, Cloud AI	Both
Shibaura Machine Co Ltd	Enabler	Industrial IoT	Robotics
Siemens AG	Enhancer	Industrial IoT	Robotics
SoftBank Group Corp	Enhancer	Industrial IoT	Both
Sony Group Corp	Enhancer	Semis & Components	Both
Stryker Corp	Enhancer	Automated Medical Equipment	Robotics
Synopsys Inc	Engager	Semis & Components	AI
Taiwan Semiconductor Manufacturing Co Ltd	Enabler	Semi & Components	AI
Tecan Group AG	Enabler	Automated Medical Equipment	Robotics
Teladoc Health Inc	Enhancer	PaaS	Both
Tencent Holdings Ltd	Enhancer	PaaS; Consumer AI	AI
Teradyne Inc	Enabler	Industrial IoT; Automated Testing	Both
Tesla Inc	Enhancer	Smart Mobility & Self-Driving	Both
Topcon Corp	Engager	Industrial IoT	Robotics
Trimble Inc	Engager	Industrial IoT; Machine Vision	Both
UiPath Inc	Engager	Robotic Automation	Both
Valeo	Engager	Smart Mobility	Robotics
Valmet Oyj	Enabler	Industrial IoT	Robotics
Veritone Inc	Enabler	AI Algorithms; Cognitive Computing	AI
Yaskawa Electric Corp	Enabler	Industrial IoT	Robotics
Yokogawa Electric Corp	Enabler	Industrial IoT	Robotics
Zebra Technologies Corp	Enabler	Industrial IoT	Robotics

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