SUCCESS STORY

Revolutionizing Next-Gen AI Service Robots: NVIDIA Jetson-powered Innovation

> *We decided to use Aetina's hardware due to the build-quality, extensibility, and robustness. No other product line that we considered had such a complete feature set. All of our questions were handled quickly and easily by Aetina support.*
>
> — **Wilkins White**, Sr. Embedded Engineer at Daxbot

The Groundbreaking Solution: Aetina Empowers Daxbot by Embedded Edge AI

Daxbot is transforming urban delivery services with a fleet of service robots that navigate sidewalks, deliver food, patrol for security, collect ADA compliance data, and engage with pedestrians, redefining urban convenience and connectivity.

Dax's head houses **Aetina's AIB-MN32 Edge AI platform**, powered by NVIDIA Jetson Orin NX. Aetina's AI platform, providing the essential AI computing power for intensive neural network tasks and integrating all robotic functions. Key components include:

- **Dax Robot AI-Infused Brainpower for Integration**

  As the brain of Dax robots, Aetina's AIB-MN32 powers the key AI operating system, DaxOS, and seamlessly integrates various AI techniques, including computer vision and natural language processing.

- **High-Performance NVIDIA Jetson Orin for Robotics Vision**

  AIB-MN32, powered by the cutting-edge NVIDIA Jetson Orin, delivers unrivaled AI power for real-time 3D vision and complex object recognition, even in low-light conditions.

- **Rich Expansion Slots and Compact Design**

  Aetina's AIB-MN32, designed with rich expansion slots and I/O interfaces, supports Wi-Fi and LTE modules, enabling low-latency communication between the data center and the robot system. Additionally, its compact design is perfect for space-constrained mobile robot heads.

- **Comprehensive Integration Services & Technical Support**

  Aetina offers BSP software and hardware integration, technical support, and tailored services, accelerating Daxbot's robotic development cycle.

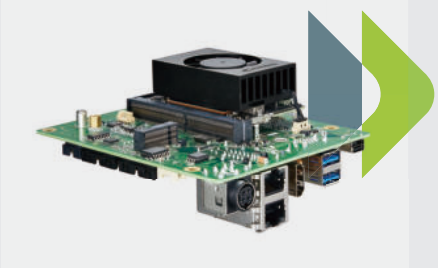
dax™

The Challenge: General-Purpose Robots

Traditionally, robots with top-down operating systems are programmed for specific tasks and excel in predictable environments, such as industrial robots performing predefined jobs.

Aetina's client, Daxbot, a pioneering robotics company in the US, created Dax, a general-purpose AI service robot for navigating urban environments and performing various tasks. However, there are challenges inherent in this endeavor:

- **Autonomous Navigation:**
  Essential for perceiving and reacting to complex surroundings
- **Real-Time Robotics Vision:**
  Needed for obstacle detection, interaction, and sidewalk data gathering.
- **Composite AI:**
  Requires integrating various AI techniques and processing neural network tasks efficiently.



Aetina's AIB-MN32 edge AI platform powered by NVIDIA Jetson modules

Result: Diverse Functions of Dax Robots

Leveraging NVIDIA's robust GPU, Daxbot enhances its AI robots through:

- **Stereo Cameras(with infrared filter & ir floodlight)**
  - Obstacle detection
  - Suspicious behaviors detection
- **Stereo Microphone**
  - Human-robot interaction
  - Surrounding sounds detection
- **RTK GPS Module**
  - Precise localization
  - Locational data collection
- **Speaker**
  - Human-robot interaction
  - Audio playback for trespasser deterrence
- **LTE/WiFi Connectivity**
  - Order reception from a system
  - App & QR code integration for robot drawer control and food pickup
  - Security alerts
- **Laser Device for Data Collection**
  - Sidewalk cracks and uplifts recording

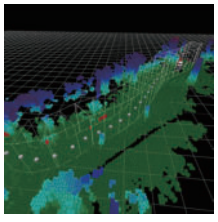
Food Delivery

The AI service robot Dax, powered by AIB-MN32 and running on DaxOS, safely performs self-driving on urban sidewalks at speeds of up to 6 km/h and covers 4 to16 km. It accurately identifies specified locations through GPS and stores food in a temperature-controlled drawer for delivery. Dax receives orders via the cloud, scans restaurant QR codes to unlock the drawer, and retrieves the food, which diners can confirm for pickup through an app when Dax arrives. Dax's multi-chip voting function enables smart decision-making, from detecting obstacles to engaging with people by tilting its head and making interactive sounds.

Security Patrol

Equipped with 3D cameras, infrared filters and IR floodlights, Dax utilizes disparity mapping techniques to monitor areas and stream live video and audio day and night. By using a human detection vision model, it can alert local security companies of security breaches, keeping premises secure and deterring up to 90% of crimes.

ADA Sidewalk Assessment



Dax creates 3D voxel maps to present analyzed data, utilizing laser devices to precisely capture cracks and uplifts, an onboard inclinometer to measure running and cross slopes, and RTK GPS for highly accurate location data.

Aetina Solution

Aetina offers the AIB-MN32 Edge AI computing platform, which features NVIDIA Jetson Orin NX 8GB and comes with comprehensive support, including:

- Up to 70 TOPS AI computing power
- Customized audio board
- Rich interface and I/Os
- BSP integration
- Long term product supply and technical support

NVIDIA Elite Partner

NVIDIA's Tech Used

NVIDIA provides a comprehensive software ecosystem with various robotic innovation and acceleration tools. The tools in the case include：

- NVIDIA CUDA® Toolkit
- NVIDIA Argus NvRaw Tool
- NVIDIA Vision Programming Interface (VPI) software library

NVIDIA Jetson: The Powerhouse of Success

NVIDIA Jetson, featuring powerful AI computing and comprehensive software stacks, is an essential engine of Dax robots. It delivers fast inference and AI/ML libraries, facilitating accelerated robotic development.

Tools	Function
NVIDIA CUDA® Toolkit	Development environment for high-performance, GPU-accelerated apps
NVIDIA Argus NvRaw Tool	Bayer raw command line interface (CLI) capture tool for the Jetson platform
NVIDIA Vision Programming Interface (VPI) software library	A software library for computer vision and image processing on various NVIDIA hardware platforms.

Collaboration for Future Robotic Innovation

The collaboration between Daxbot and Aetina fosters innovation and flexibility, advancing autonomous mobile robots in food delivery, security patrol, and ADA sidewalk assessment. Leveraging Aetina's expert technical support and over a decade of experience in Edge AI, Daxbot is well-positioned to innovate robotic functions with more sophisticated AI models and AI techniques, driving progress in AI-powered robotic solutions. As Daxbot pushes the envelope of AI service robots across various industries, Aetina and NVIDIA Jetson ecosystems are poised to be their dedicated partners in this ongoing journey.

About Daxbot

Daxbot, a pioneering robotics company in the US that makes AI service robots for urban spaces, aims to create a gold standard for helper-type robots that fit our human experiences.

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