



Production Line Loading and Unloading Solutions



AGIBOT Innovation (Shanghai) Technology Co., Ltd.
Creating Unlimited Productivity through Intelligent Machines



Scenario Challenges



High Changeover Costs

Legacy automation solutions require hardware re-teaching and complex precision compensation whenever production lines undergo fine-tuning or changes, resulting in longer deployment cycles.



Idle Assets

When production line capacity decreases or fluctuates, fixed equipment cannot be redeployed across lines, significantly reducing its utilization rate.



Poor Compatibility of Legacy Robots

Robotic arms or composite robots generally require complex teaching or fine-tuning of work points for each type of machine. When dealing with multiple workstations, they exhibit poor compatibility and require redeployment.

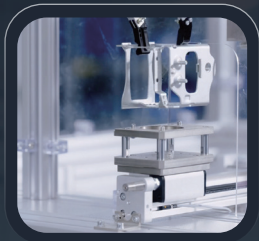


Low Reliability of Manual Operations

The repetitive nature of production line testing, combined with prolonged manual operation, can easily lead to operator fatigue, which may result in improper handling of material trays, material mixing, material pressing, or even dropping of trays, causing damage to high-value materials.

Production Line Loading and Unloading Solution Overview

The AGIBOT G2 robot, integrated with a flexible production line solution, utilizes its high-DOF arms and tactile feedback to accurately grasp and feed precision components.



Step 1

Multi-angle full-body cameras accurately locate materials

Step 2

Grasp materials from the material feeding area

Step 3

The robot moves to the loading area

Step 4

Perform adaptive adjustment for precise loading placement

Step 5

After testing is complete, remove the material and return it to the production line

Typical Loading and Unloading Scenario Process

-  **Precise Visual Positioning**
Head mounted cameras capture material data and accurately identify material position and stacking status
-  **Intelligent Single-Item Grasping**
Stably grasp a single item from the material stacking area to avoid overlapping or mis-grasping
-  **Loading Area Position Recognition**
Accurately identify the coordinates and pose of the equipment's loading area to ensure docking precision
-  **Adaptive Precision Loading**
Performs real-time fine-tuning based on workstation pose, allowing for adaptive and precise material placement
-  **Closed-loop unloading and return**
After processing, automatically removes finished materials and returns them to the production line or unloading area, forming a complete operational loop

Key Performance Indicators



Success rate: > 99.9%



Reliability: MTBF $\geq$ 7*24h

Product Overview

AGIBOT G2



640 * 760 * 1795mm Robot Dimensions	185kg Total Weight	1.5m/s Maximum Speed
26 Total DOFs	7 Single-Arm DOFs	10kg Maximum Dual-Arm Payload
Four-wheel drive, omnidirectional movement Chassis	2.3m Maximum Operating Height	2070 TFLOPS (FP4) Computing Power
4h+ Battery Life	2h Charging Time	1652Wh Total Battery Capacity
0 to 40°C Operating Temperature	Direct Charging, Battery Swapping, Autonomous Recharging Charging Methods	

Product Highlights



High Operational Precision

- Equipped with high-precision force-controlled dual arms across all joints, achieving sub-millimeter precision operation, and compatible with the AGIBOT OmniHand Series 19-DOF dexterous hands
- Real-robot RL toolchain, enabling deployment and model switching with a small number of demonstrations



Large Operation Range

- Operation height of up to 2.3meters, dual-arm span of 2.35 meters
- 5-degree-of-freedom waist and legs, 26-degree-of-freedom body, humanoid-level flexible movement
- Omnidirectional movement and crabbing capability, achieving efficient movement and maneuverability



Long Working Battery Life

- Dual-battery hot-swappable design for 7*24h uninterrupted operations
- Automatic recharging for quick recovery



Strong Interaction Capabilities

- Supports continuous multi-user voice dialogue and knowledge base Q&A, with precise identification of the intended speaker
- Combined with facial expressions and body movements, it can link with external devices, creating lifelike, human-like interactions



Powerful Chip Computing Power

- Can be equipped with NVIDIA Jetson Thor T5000, with computing power of up to 2070 TFLOPS (FP4)
- Provides strong computational support for multi-modal intelligence, real-time inference and interaction, and autonomous decision-making for complex tasks, enabling robots to transition from "demonstration-level" to "application-level."



Excellent Safety Protection

- 360°fisheye + LiDAR + ultrasonic radar, comprehensive all-around perception capability
- Active obstacle avoidance and collision perception, reducing safety risks
- Low risk of equipment damage; adaptive force control prevents rough handling

Case Study

3C Electronics Precision Loading and Unloading Production Line Deployment Project

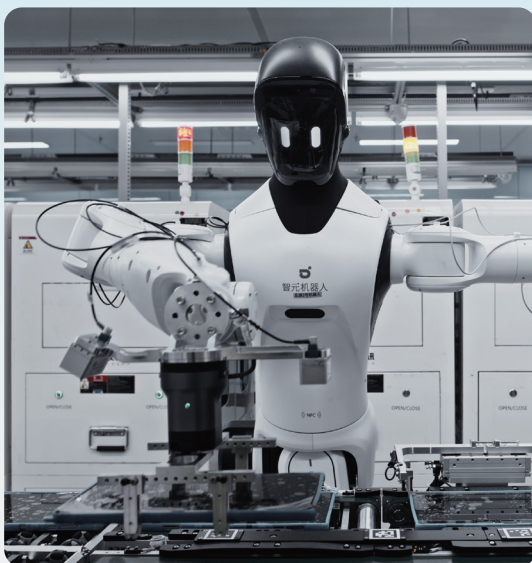
Longcheer Technology is a global leader and service provider in the smart product Original Design Manufacturer (ODM) industry. By integrating the industrial-grade AGIBOT G2 embodied intelligent robot into core stages of 3C precision manufacturing, Longcheer Technology is establishing a new paradigm for industrial embodied intelligent manufacturing. Our joint innovation project has successfully completed the verification of key performance indicators and integration of production lines. This marks a significant milestone in the transition of industrial embodied intelligence from the R&D phase to the deployment phase within the manufacturing sector. It demonstrates large-scale application validation and assists the industry in resolving pain points while reducing costs and increasing efficiency.



Products Applied

AGIBOT G2 + Genie Studio

Core Highlights



Rapid Migration and Plug-and-Play

- AGIBOT G2 enables quick changeover across various processes based on production tasks. Real-robot reinforcement learning algorithms reduce the calibration time for core precision placement actions to hours.

Humanoid Precision and Generalization Capabilities

- End-to-end embodied robot algorithms with visual-force perception enable sub-millimeter precision closed-loop control and adaptation to common changes in operating objects or environments.

Lasting Stability and Controllable Quality

- The system provides a stable cycle time of $18s \pm 2s$, with a Mean Time Between Failures (MTBF) of $\geq 7 \times 24h$, thereby eliminating quality fluctuations caused by operator fatigue in repetitive production tasks.

Multi-Robot Collaborative Scheduling

- Supports fleet management systems. When a specific line faces a capacity surge, multiple robots can be dynamically dispatched for collaborative operation, achieving horizontal scalability of productivity.



Case Study

HT-tech: Initiating a New Era of Automated Chip Testing

As a global leader in integrated circuit packaging and testing solutions, HT-tech has comprehensively automated material tray loading and unloading across chip testing lines by deploying AGIBOT G2 industrial embodied intelligent robots. Through phased implementation, this project successfully enabled the robot to efficiently serve multiple testing equipment in a human-robot coexistence environment. With 24-hour continuous and stable production, the solution effectively reduces labor costs and lays a solid foundation for the intelligent upgrade of the chip packaging and testing industry.

Products Applied

AGIBOT G2 + Genie Studio

Core Highlights

Rapid Deployment and Operation in Complex Environments

- Hour-level task migration: Precision action training is completed based on real-robot reinforcement learning, compressing cross-scenario deployment cycles to the hour-level. This enables seamless, agile transitions between different machines, significantly enhancing production capacity scalability.
- Operation in complex environments: Advanced mapping and route planning capabilities are integrated to enable long-distance autonomous navigation and agile obstacle avoidance in human-robot collaborative workshops spanning tens of thousands of square meters.

Humanoid Precision and Operational Reliability

- Sub-millimeter closed-loop control: The embodied robot algorithms with visual-force perception ensure sub-millimeter operational precision, enabling autonomous adaptation to the position deviation and tolerance of material trays and infeed ports.
- Exceptional operational reliability: The tray dropping rate is <0.001%. Features autonomous judgment and alarm capabilities for common operational anomalies, building a comprehensive full-process production assurance system.

Continuous High-Efficiency Operation and Quality Stability

- Stable production cycle time: $\leq 25s$ per operation. A single robot can cyclically serve ≥ 5 testing benches, with operational efficiency matching manual standards and enabling efficient capacity release.
- 24/7 continuous production: Supports multi-robot fleet operations, autonomous charging, and hot-swappable battery change, with a mean time between failures (MTBF) of $\geq 7 \times 24h$, eliminating quality incidents such as tray drops, material skips, and material compression caused by operator fatigue.

Flexible Adaptation and Fleet Scheduling

- Flexible changeover for various machines: After deployment, robots can perform seamless changeover between testing benches of different models and heights without manual intervention, with self-adaptation to equipment displacement and enabling horizontal scalability of production capacity.
- End-to-end Automated Closed-Loop: Compatible with AGV automated transport docking and supports interaction with MES/EAP systems. This achieves a full-process automated closed-loop, from warehouse material flow to loading and unloading operations.

“ Create Unlimited Productivity via Intelligent Machines ”

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